

The End of End-to-End:

Preserving the Architecture of the Internet in the Broadband Era*

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Broadband Internet access is the holy grail of media companies. In the early 1990s, before the established entertainment industry took the Internet seriously, it proposed to deliver high-bandwidth content (movies, music, and other forms of video and audio) to the public over an “information superhighway” attached to television sets. While many companies held trials and rollouts of video-on-demand products,¹ the idea of interactive video over television never really caught on. By the mid-1990s, the attention of most content providers had switched to the Internet. While the Internet revolutionized communications, bandwidth constraints have until quite recently prevented its widespread use for streaming audio and video content.

Two principal new technologies promise to offer consumers broadband access to the Internet, enabling the fast and easy use of computer networks for audio and video content delivery. Those two technologies come from the two data pipes currently connected to most homes: the phone line and the cable television line. Digital subscriber lines, or DSL, use existing copper telephone connections to send a high-bandwidth digital signal to and from households within the covered service area. Unfortunately, the scope of DSL is currently limited both by the

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number of telephone switches that have been updated to accommodate the technology and by the requirement that customers live within approximately 3 1/2 miles of an updated telephone switching station. The second technology, cable modems, does not suffer from a similar geographic restriction, but it does require certain updates to the existing cable television network. Further, access to a cable modem requires that a cable television line be connected to a consumer's house. At the present time, 82% of U.S. households have access to a cable system.²

How these technologies are developed, and the speed with which they are deployed, are critical to the future design of the Internet. Curiously, the law has so far treated DSL and cable modems very differently on the important question of whether the owner of the data pipe is entitled to exercise control over the way in which its customers access the Internet. Telephone companies have been required to open access to competing DSL providers on an open and nondiscriminatory basis. This prevents telephone companies from bundling broadband access with other services they would also like to sell to consumers. By contrast, cable companies have so far been permitted to impose whatever conditions they desire on their customers. The two largest cable companies, AT&T and Time Warner, have exercised that power (or threatened to do so) by bundling cable modem service with Internet service provider (ISP) service. If you want Internet cable access from AT&T, you must agree to use their captive, in-house ISPs, @Home or

¹ Compare Mitchell Kapor, *Where is the Digital Highway Really Heading*, 1.03 **Wired** (1993). For later criticism of this approach, see, e.g., Evan I. Schwartz, *People Are Supposed to Pay for This Stuff?*, 3.07 **Wired** 148 (1995).

² See Comments of SBC Communication, *In re Applications of America Online, Inc and Time Warner Inc. for Transfers of Control*, Docket Number 00-30, before the FCC.

There are other possible sources of broadband communications competition. Both wireless and satellite communications can conceivably be used for broadband Internet access. To date, however, there has been exceedingly little deployment of these technologies that is both two-way and offers significant bandwidth. Nonetheless, these wireless technologies certainly bear watching as potential forms of competition.

Roadrunner. While Time Warner has yet not imposed a similar rule, there are indications that it intends to do so once its merger with America Online is complete.³

We believe that there is no justification in law or policy for giving cable companies special treatment. The current regime is simply an historical accident resulting from the different regulatory schemes traditionally imposed on telephone and cable television companies.⁴ In this article, we argue that the government should resist efforts by cable companies to leverage their control over cable lines into control over adjacent markets, such as the market for ISPs. If cable companies are allowed to dictate a consumer's choice of ISP, and therefore eliminate competition among ISPs in the broadband market, prices will increase and innovation will be harmed. Further, and more fundamentally, allowing such bundling will compromise an important architectural principle that has governed the Internet since its inception: the principle of "end-to-end" design ("e2e").⁵ Nothing less than the structure of the Internet itself is at stake in this debate.

The FCC's analysis to date does not consider these principles of the Internet's design. It therefore does not adequately evaluate the potential threat that this merger presents. Neither does the FCC's approach properly account for its role in creating the conditions that made the Internet

³ Time Warner has announced its intention to merge with AOL, the world's largest ISP. AOL, which formerly opposed such bundling by cable companies, withdrew its opposition after the merger was announced, leading to speculation that the merged entity would also require bundling. *See, e.g.,* Peter S. Goodman & Craig Timberg, *AOL Ends Lobbying for Open Access*, **Wash. Post**, Feb. 12, 2000, at A1. When pressured by Congress in hearings on the merger, the companies said there would be no "fixed limit" on the number of ISPs who could connect, but refused to make a binding commitment. *See AOL, Time Warner Vow on ISP Access to Broadband Cable Seen as Positive Step*, 5 **Elec. Comm. & L. Rep.** 239 (March 8, 2000). More recently, after further regulatory pressure, AOL said it would be willing to open part of its bandwidth to some (but not all) competing ISPs.

⁴ Francois Bar & Christian Sandvig, *Rules from Truth: Post-Convergence Policy for Access* (working paper 2000) (noting the accidental nature of different regulatory schemes in an era of convergent technologies).

⁵ David P. Reed, Jerome H. Saltzer, and David D. Clark, *Comment on Active Networking and End-to-End Arguments*, **IEEE Network** 12, 3 (May/June 1998) pages 69-71.

possible. Under the banner of “no regulation,” the FCC threatens to permit this network to calcify as earlier telecommunications networks did. Further, and ironically, the FCC’s supposed “hands off” approach will ultimately lead to more rather than less regulation.

We do not yet know enough about the relationship between these architectural principles and the innovation of the Internet. But we should know enough to be skeptical of changes in its design. The strong presumption should be in favor of preserving the architectural features that have produced this extraordinary innovation. We should be skeptical of allowing a single company with bottleneck control over broadband pipes to undo these design principles, without a clear showing that the threat would not undermine the Internet’s innovation.

In December 1999, the authors filed a declaration with the Federal Communications Commission that articulated some of these arguments.⁶ We filed this declaration in connection with the proposed merger of AT&T and Media One; in it, we suggested that the FCC condition approval of the merger on a commitment by AT&T to reverse its policy of linking cable modem service to the use of its in-house Internet service provider, @home. The declaration has received a great deal of attention in the scholarly community from both proponents and opponents of open access.⁷ In this article, we articulate the argument for open access in a formal way for the first time. We also respond to a variety of objections to open access.

⁶ Written Ex Parte of Professor Mark A. Lemley and Professor Lawrence Lessig, CS Docket No. 99- 251, 38-39 Application for Consent to the Transfer of Control of Licenses MediaOne Group, Inc. to AT&T, available at <<http://cyber.law.harvard.edu/works/lessig/MB.html>>, reprinted as *Open Access to Cable Modems*, __ **Whittier L. Rev.** __ (2000).

⁷ See, e.g., Mark Cooper, *Open Access to the Broadband Internet: Technical and Economic Discrimination in Closed, Proprietary Networks*, 71 **U. Colo. L. Rev.** 1011 (2000); James B. Speta, *The Vertical Dimension of Cable Open Access*, 71 **U. Colo. L. Rev.** 975 (2000); Phil Weiser, *Competing Paradigms in Telecommunications Regulation*, 71 **U. Colo. L. Rev.** 819 (2000); Written Ex Parte of Professor James B. Speta, CS Docket No. 99- 251, Application for Consent to the Transfer of Control of Licenses MediaOne Group, Inc. to AT&T. For an analysis very similar to our own, see Francois Bar et al., *Defending the Internet Revolution in the Broadband Era: When*

In Part I, we describe the design principles of the Internet, and how they differ from the principles animating traditional telephone networks. We also explain the nature of the problem presented by cable company policies. In Part II, we explain why permitting cable companies to bundle ISP service with network access threatens the structure of the Internet. Finally, in Part III we respond to arguments that have been made suggesting that requiring cable companies to permit ISP competition is either a bad idea, or alternatively that it is a good idea but that government shouldn't adopt it.

I. Why the ISP Market Should Remain Competitive

A. The Architecture of the Internet: End-To-End Network Design

The Internet is the fastest growing network in history. In the 30 years of its life, its population has grown a million times over. It is currently the single largest contributor to the growth of the United States economy, and has become the single most important influence linking individuals, and commerce, internationally.

The Internet is not, however, the first communications network. There have been other networks before the Internet that did not experience the same extraordinary growth. These networks followed different design principles, including different principles governing how protocols would evolve and become adopted. It is our view that these differences in growth can be traced, at least in part, to these differences in design.

It is the view of many in the Internet community, and ours as well, that the extraordinary growth of the Internet rests fundamentally upon its design principles. Some of these principles

Doing Nothing is Doing Harm, <http://brie.berkeley.edu/~briewww/pubs/wp/wp137.html> (working paper August 1999).

relate to the openness of the Internet's standards and the openness of the software that implemented these standards. Some are engineering principles, designed to make the net function more flexibly and efficiently. But from the very beginning, these principles have been understood to have a social as well as technological significance. They have, that is, been meant to implement values as well as enable communication. In our view, one aspect of this social significance is the competition in innovation the Internet enables. The tremendous innovation that has occurred on the Internet, in other words, depends crucially on its open nature.

Among the Internet's design principles is one that is particularly relevant to the bundling of broadband cable services. This is the "End-to-End" design principle has been latent in system design for many years, but was first articulated explicitly as principle in 1981 by Professors Jerome Saltzer, David Reed, and David Clark.⁸ The "e2e" argument organizes the placement of functions within a network. It counsels that 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.

One consequence of this design is a principle of non-discrimination among applications. Lower-level network layers should provide a broad range of resources that are not particular to or optimized for any single application — even if a more efficient design for at least some applications is thereby sacrificed. As described in a subsequent paper by Reed, Saltzer, and Clark,

⁸ See *End to End Arguments in System Design*, <http://web.mit.edu/Saltzer/www/publications/>.

End to end arguments have ... two complimentary goals: (1) Higher-level layers, more specific to an application, are free to (and thus expected to) organize lower level network resources to achieve application-specific design goals efficiently (application autonomy); (2) lower-level layers, which support many independent applications, should provide only resources of broad utility across applications, while providing to applications useable means for effective sharing of resources and resolution of resource conflicts (network transparency).⁹

While the e2e design principle was first adopted for technical reasons, it has important social and competitive features as well. e2e 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 e2e network creates a maximally competitive environment for innovation, which by design assures competitors that they will not confront strategic network behavior.

The e2e design of the Internet has facilitated innovation. As Reed, Saltzer and Clark argue, for example: “had the original Internet design been optimized for telephony-style virtual circuits (as were its contemporaries SNA and TYMNET), it would not have enabled the experimentation that led to protocols that could support the World-Wide Web, or the flexible

⁹ See David P. Reed, Jerome H. Saltzer, and David D. Clark, *Comment on Active Networking and End-to-End Arguments*, IEEE Network 12, 3 (May/June 1998) pages 69-71.

interconnect that has led to the flowering of a million independent Internet Service providers. Preserving low-cost options to innovate outside the network, while keeping the core network services and functions simple and cheap, has been shown to have very substantial value.”¹⁰

B. The Consequences of these Architectural Principles

The effect of these Internet design principles — including, but not exclusively, e2e — has been profound. By its design, the Internet has enabled an extraordinary creativity precisely because it has pushed creativity to the ends of the network. Rather than relying upon the creativity of a small group of innovators who work for the companies that control the network, the e2e design enables anyone with an Internet connection to design and implement a better way to use the Internet. By designing the network to be neutral among uses, the Internet has created a competitive environment where innovators know that their inventions will be used if useful. By keeping the cost of innovation low, it has encouraged an extraordinary amount of innovation in many different contexts. By keeping the network simple, and its interaction general, the Internet has facilitated the design of applications that could not have originally been envisioned. To take just a few examples, Internet telephony, digital music transfer, and electronic commerce are all applications far outside the range of expectations of those who designed the Internet (or even those who, much later, created the World Wide Web). Indeed, email itself, the first true “killer app” of the Internet, was an unintended by-product hacked by early users of the network, not the point of the network itself. By keeping the cost of innovation low in the future — especially in

¹⁰ *Id.* at 70 (emphasis added). Note the initial ARPANET did not implement End-to-End perfectly into its design. It was because of changes in the 1970s suggested by Vince Cerf and David P. Reed that the network we now recognize as the Internet conformed to End-to-End.

the context of broadband media — the design of the Internet should continue to facilitate innovation not dreamed of by those who built it.

e2e design does not only promote innovation by creating the opportunity for innovators to offer services to the network. In our view, the effect comes as well from the expectation that innovation will not be countered by strategic actors who might control the flow of commerce. The expectation that an actor in the distributional network will act strategically is an expected cost to innovation. Thus to the extent an actor is structurally capable of acting strategically, the rational innovator will reckon that capacity as a cost of innovation. And where that strategic actor owns the transmission lines themselves, giving them the power to decide what can and can't be done on the Internet effectively centralizes 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,¹¹ we think the history of the Internet to date 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 controlling it.

C. Comparing the Architectural Principles of the Old Telephone Network

The Internet's design principles are different from the design principles that governed the telephone network prior to the series of actions by the FCC and antitrust division of the Justice Department that resulted in the break-up of AT&T.¹² Prior to that break-up, the telephone network was not governed by the Internet's principle of e2e. It was instead governed by a

¹¹ See *infra* notes ___-___ and accompanying text.

¹² See *United States v. American Tel. & Tel. Co.*, 552 F. Supp. 131 (D.D.C. 1982), *aff'd*, 460 U.S. 1001 (1983).

different “end to end” philosophy – that the telephone network controlled the network from end to end. This meant that the telephone network would not be neutral about the uses to which the telephone system could be placed. For much of the history of the telephone network, it was a crime to use the network in ways not specified by AT&T. It was a crime, for example, to attach devices that performed services not offered by AT&T, or to provide services that competed with the services provided by AT&T.¹³ In the 1940s, even the telephone book was owned by AT&T.

Innovation under the old design was thus controlled by AT&T. If a person with a competing conception of how a communications network should be designed wanted to implement that competing conception, he or she would have to either work for AT&T, or convince AT&T of the merits of this alternative design. AT&T was, therefore, a bottleneck on creativity in network architecture. While no doubt AT&T did much to advance telecommunications, through Bell Labs and other research, it also decided which innovations would be deployed. No doubt its decision turned in part upon the expected effect a new technology would have on AT&T’s own business model.

The early history of the Internet itself was affected by AT&T’s control over telecommunications innovation. An early design idea for the Internet was proposed to AT&T by RAND researcher Paul Baran in the early 1960s. Resistance to his design was strongest from AT&T.¹⁴ As Naughton reports, Baran recalls one particularly telling instance of AT&T’s opposition:

¹³ See *Use of the Carterfone Device in Message Toll Telephone Service*, 13 F. C. C. 2d 420 (1968). See also *Hush-A-Phone Corp v. United States*, 238 F.2d 266 (D.C. Cir 1956).

¹⁴ **John Naughton, A Brief History of the Future** (1999).

[AT&T's] views were once memorably summarised in an exasperated outburst from AT&T's Jack Osterman after a long discussion with Baran. 'First,' he said, 'it can't possibly work, and if it did, damned if we are going to allow the creation of a competitor to ourselves.'¹⁵

This resistance is perfectly understandable. From AT&T's perspective, maximizing its control over its network was no doubt profit maximizing. We should expect corporate entities to behave in a profit-maximizing manner. But this resistance surely didn't maximize social welfare. It was profit-maximizing for AT&T only because AT&T was in control of the network uses. Or in other words, AT&T's strategy made economic sense only because the network was not "End-to-End." Had the network been e2e, AT&T would have had no incentive to disable one use of the network it controlled in favor for another.

The same point about the relationship between innovation and the concentration of control can be made more obviously about the Internet in foreign countries even today. It is no accident that the Internet first reached prominence in the United States, since in practically every other nation, the telephone architecture was controlled by state-sponsored monopolies. These monopolies, no less than AT&T, had no interest in facilitating the design of a network that would free individuals from that control. For many years it was a crime in parts of Europe to connect a modem to a telephone line. Even today, the franchise in Germany for public phones permits the provider to control how access to the Internet occurs.

¹⁵ **John Naughton, A Brief History of the Future** 107 (1999). Authors Katie Hafner and Matthew Lyon recount a similar resistance in **Where Wizards Stay Up Late** 52-66 (1996).

D. The Government's Role in Creating the Competitive Environment for the Internet

It is fashionable today to argue that innovation is assured if government simply stays out of the way. The FCC's hands-off policy to date appears largely to be motivated by this prevailing ideological vogue. The view is that the best way for the government to guarantee growth in Internet broadband is to let the owners of networks structure broadband as they see fit.

We believe this view is misguided. It ignores the history that gave the Internet its birth, and threatens to reproduce the calcified network design that characterized our telecommunications network prior to the Internet. The restrictions on innovation that marked the AT&T telephone monopoly were not removed by the government doing nothing. They were removed by active intervention designed to assure the possibility for innovation. It was the FCC and Department of Justice that cut the knot that tied innovation on the telecommunications network to the innovation favored by AT&T. It was their action that eventually freed the network from the control of a single strategic actor, and opened it up for the innovation of many.¹⁶ Beginning with the Carterfone decision in 1968,¹⁷ the FCC increasingly pursued a policy that forced AT&T to open its network to competing uses and providers. In a series of decisions, the FCC required that AT&T permit alternative uses of its network. In 1984, actions by the Antitrust

¹⁶ For discussions of the history of telecommunications deregulation, and its lessons for the modern day, see, e.g., Bar et al., *supra* note __, at [draft at 5-7]; Tom W. Bell, *Law and Disorder in Cyberspace: Abolish the FCC and Let Common Law Rule the Telecom*, 97 **Mich. L. Rev.** 1746 (1999); Jim Chen, *The Magnificent Seven: American Telephony's Deregulatory Shootout*, 50 **Hastings L.J.** 1503 (1999); Jim Chen, *Titanic Telecommunications*, 25 **Sw. U. L. Rev.** 535 (1996); Steve Bickerstaff, *Shackles on the Giant: How the Federal Government Created Microsoft, Personal Computers, and the Internet*, 78 **Tex. L. Rev.** 1 (1999);

¹⁷ In the Matter of Use Of The Carterfone Device In Message Toll Telephone Service; Docket No. 16942; 13 F.C.C.2d 420; June 26, 1968. *Compare* Hush-A-Phone Corp. v. United States, 238 F.2d 266 (D.C. Cir. 1956) (reversing an FCC order that had prevented the use of a product that would compete with Bell system equipment).

Division forced AT&T to unbundle its long-distance service from its local telephone service.¹⁸ This unbundling was effected through a decree that led to the breakup of the largest monopoly in American history.¹⁹

These actions together transformed the telephone network from a network whose use was controlled by one company — AT&T — into a general purpose network, whose ultimate use was determined by end users. In effect, they imposed a principle analogous to e2e 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. The fundamental economic goal of the FCC in deregulating telephony is to isolate the natural monopoly component of a network — the actual wires — from other components in which competition can occur. 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 structure will allow.

But for these changes brought about by the government, the Internet as we know it would not have been possible. Without these changes, the trend in telecommunications was towards more centralized control over the communication network. In 1972, for example, network theorist Robert Fano of MIT wrote that unless there was a change in the trend in the computer-communications network, existing institutions would further isolate computer and

¹⁸ See *AT&T*, 552 F. Supp. at 131.

¹⁹ Government eliminated price regulation and opened markets to competition subject to open access requirements in other industries as well, notably energy. See, e.g., Joseph Kearney & Thomas W. Merrill, *The Great Transformation of Regulated Industries Law*, 98 *Colum. L. Rev.* 1323 (1998). While the history of energy

communications technologies from broad-based control.²⁰ But by seeding the development of a network within a different communication paradigm, and then opening the existing communication network so that it might deploy this different communication paradigm, the government created the conditions for the innovation that the Internet has realized.

This is not to say that the government created the innovation that the Internet has enjoyed. Nor is it to endorse government, rather than private, development of Internet-related technologies. Obviously, the extraordinary innovation of the Internet arises from the creativity of private actors from around the world. Some of these actors work within corporations. Many have been associated with the Free Software, and Open Source Software Movements. And some have been entrepreneurs operating outside of any specific structure. But the creativity that these innovators have produced would not have enabled but for the opening of the communications network. Our only point is that the government had a significant role in that opening.

We do not claim that no communication network would have been possible without the government's intervention. Obviously, we have had telecommunication networks for over a hundred years; and as computers matured, we no doubt would have had more sophisticated communication-computer networks. But the design of those networks would not have been the design of Internet. The design would have been more like the French "equivalent" to the Internet — miniTel. But miniTel is not the Internet. miniTel is a centralized, controlled version of the Internet. And it is notably less successful.

deregulation is well beyond the scope of this paper, it is worth noting that open access in telecommunications is hardly *sui generis*.

²⁰ See, Robert M. Fano, *On The Social Role of Computer Communications*, 60 **Proceedings of the IEEE**, September 1249 (1972).

E. The Relevance of Legacy Monopolies

As we have said, no one fully understands the dynamics that have made the innovation of the Internet possible. But we do have some clues. One important element of that innovation is a structure that disables the power of legacy monopolies to influence the future of a network design. This was the essence of the architecture upon which the Internet was originally built.

By freeing the telecommunications network from the control of one single actor, the government enabled innovation free from the influences of what one might call “legacy” business models. 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 may recoil, either because they don’t know how to change to face changing conditions, or because they fear that they will lose the dominance they had 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 plans about how to respond to innovation. In a competitive environment, they will often disadvantage a company that fails to respond rapidly enough to changed circumstances.

In some markets, companies have no choice but to respond to changed circumstances. They either change or die. It is a mark of Microsoft’s success, for example, that its chairman, Bill Gates, succeeded in radically altering the course of the company’s development towards the Internet in the face of changed competitive circumstances, despite the fact that such changes resulted in the termination of projects at other times deemed central to Microsoft’s future. By contrast, commentators attribute Apple’s failure during the early 1990s to its refusal to give up

old models of business success.²¹ Legacy models hindered Apple's development; the refusal to be captured by legacy models was a key to Microsoft's success.

In an environment where a company has power over the competitive environment itself, however, the rational incentives of a business may be different. If the business has control over the architecture of that competitive environment, then it will often have an incentive to design that architecture to better enable its legacy business models. As Charles R. Morris and Charles H. Ferguson describe it,

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.²²

A company in this position can and will resist change, in order to keep doing what it knows best.

²¹ See generally James Daly, *101 Ways to Save Apple*, 5.06 **Wired** 114 (1997) (referring to the well-worn criticism of Apple for failing to open its OS).

²² Charles R. Morris and Charles H. Ferguson, *How Architecture Wins Technology Wars*, **Harvard Business Review** 86, 88 (March April 1993) (emphasis added).

This was the problem with the telephone company prior to its break up by the government. The telephone monopoly enjoyed substantial returns from its existing network architecture. The fear of regulators was that these returns would make it unwilling to experiment with other architectures that might better serve communication needs. As we have said, there is at least some evidence that AT&T in fact resisted the emergence of the Internet because it feared its effect on AT&T's own business model. Certainly it resisted the development and interconnection of other technologies to its telephone network. The regulators who pushed to free the telecommunication network believed that the market would choose differently from how AT&T, as controller of the network, would choose.

Time has proven these regulators correct. Once freed from the strategic control of an entity that had a particular business plan to protect, the communications network has evolved dramatically. The competitive process was enabled by making the network neutral about its uses, and by giving competitors access to the network so that they could compete in an effort to put the resources of the network to their best use. The same wires that AT&T used to send analog voice only are now being used to deliver stock quotes, music, fantasy games, reference information — in short, the whole content of the Internet. Left alone, AT&T might have made some content available over the telephone network, but it probably wouldn't have shifted to packet-switched data, and it certainly wouldn't have developed or licensed all of the content that can now be found on the Internet.

The lesson from this explosion of innovation is critically important. An architecture that maximizes the opportunity for innovation maximizes innovation. An architecture that creates powerful strategic actors with control over the network and what can connect to it threatens innovation. No doubt these strategic actors might choose to behave in a pro-competitive manner.

There is no guarantee that they will interfere to stifle innovation. But without competition or regulation to restrict them, we should not assume that they will somehow decide to act in the public interest.

F. The Technological Future of End-to-End

More recently, technological developments have led some to question whether the Internet's end-to-end architecture is sustainable. While the e2e architecture of the Internet is fundamentally in place, users and network administrators are introducing intelligence into the network for a variety of reasons. Firewalls, proxy servers, Network Address Translators (NATs), and other systems are designed to determine the content and origin of packets and discriminate between packets. These changes, which may be inevitable given security concerns and the growth of ecommerce, make the network less transparent than the e2e model envisions.²³ While many of these developments really exist at the software applications layer (that is, they are imposed at one end of the network or another), there have also been moves to build content-distinguishing intelligence into the network hardware layer itself.²⁴ Clark and others are concerned about the effect of these trends on future innovation in the network. But as a practical matter, building security features and other content-distinguishing elements may be inevitable, at least at the applications level.

One of the fundamental consequences of the switch from analog to digital networks is that the use of the network becomes a question of software implementation separable in

²³ For a detailed discussion of these changes, see, e.g., David D. Clark & Marjory S. Blumenthal, *Rethinking the Design of the Internet: The End to End Arguments vs. the Brave New World* (working paper 2000); Hans Kruse et al., *The InterNAT: Policy Implications of the Internet Architecture Debate* (working paper 2000).

²⁴ Clark & Blumenthal, *supra* note __, at [draft at 11-12].

fundamental ways from the ownership or even the nature of the network itself. Bar and Sandvig explain:

In past networks, the communication platform and its configuration were “hard-wired” in the specific arrangement of electro-mechanical devices that formed a particular communication network – the logical architecture of the network precisely reflected its physical architecture. One had to own the network to change the arrangement. By contrast, platform configuration in digital networks depends on ability to program the network’s control software. Control over network configuration thus becomes separable from network ownership. Multiple network platforms, supporting a variety of communication patterns, can simultaneously co-exist on a single physical infrastructure.²⁵

This raises the intriguing possibility that the decision to build intelligence into the network need not be an all-or-nothing proposition. Rather, we can preserve the possibility of e2e systems by keeping intelligence out of the hardware design, but building it into some software layers on an as-needed basis.

Kevin Werbach has modeled this “layered” approach to Internet architecture.²⁶ He argues that the outmoded “horizontal” regulatory framework, in which cable, wireline, wireless, and satellite are all different forms of media with different regulatory structures, must give way to a vertical model of regulation. This vertical model would distinguish between four different layers that comprise communications media: physical, logical, applications or services, and content.²⁷ Werbach argues that the goal of regulatory policy should be to prevent any one party from controlling the interface between different vertical layers.²⁸ This approach would permit competition at the higher-level layers (especially applications and content, but also potentially

²⁵ Bar & Sandvig, *supra* note __, at [draft at 22].

²⁶ Kevin Werbach, *A Layered Model for Internet Policy* (working paper 2000).

²⁷ *Id.* at [draft at 20].

²⁸ *Id.* at [draft at 25-26].

between different logical dataflow structures), notwithstanding the existence of a technical bottleneck at the physical layer.

It should be evident that this layered model will work only if control of the layers is not vertically integrated. Thus, as Bar and Sandvig explain, “[t]his newfound separability between a network’s logical architecture and its physical layout . . . calls for a new policy bargain between control and access, that allows non-discriminatory *ability to design* the architecture of a communication platform, not only for those who own and control network infrastructures, but also for end-users or third parties.”²⁹ It is precisely the maintenance of this ability to design at the software layer that is the central issue in the debate over “open access” to cable networks.

II. Implications for Broadband Cable

A. The Threat Posed by Allowing Cable Companies to Bundle ISP Service

Some cable companies deploying broadband technology currently prevent users from selecting an Internet Service Provider (“ISP”) of their choice, and more are likely to do so in the future.³⁰ Instead, for customers of these cable companies Internet access is technologically bundled with ISP service. The broadband cable network being developed thus discriminates in the choice of services that it allows. This kind of discrimination may have profound consequences for the competitive future of the net.

To see the potential problem with this architecture, we must first understand the importance of an ISP. ISPs serve a number of functions in the existing narrowband residential

²⁹ Bar & Sandvig, *supra* note __, at [draft at 22]; Werbach, *supra* note __, at [draft at 26].

³⁰ Specifically, this is the policy of one of the two largest cable companies in the U.S. today, AT&T, and seems likely to be the policy of Time Warner after its merger with AOL. *See supra* note __.

market. Some ISPs focus primarily on access to the Internet. Customers, through their local telephone exchange, connect to the ISP; the ISP serves Internet access at speeds limited only by the local telephone exchange. Some ISPs supplement this access with promises of user support — both the support to assure the Internet connection is maintained, and in some cases, support with the use of certain Internet applications. Some ISPs further supplement this access with server capabilities — giving users the ability to build web pages on the ISP’s servers, or support more expansive Internet activities. And finally some ISPs provide, or bundle, content with access. The most famous of these is America Online, but other ISP/content providers have included the Microsoft Network, CompuServe and Prodigy.

This existing narrowband residential market is competitive. Customers have a wide range of needs in this market; the market responds to this range of needs with different packages of services. Nationwide there are some 6,000 ISPs. In any particular geographic region, there can be hundreds that compete to provide service.

The functions performed by ISPs, however, are not fixed. They have no inherent “nature.” Hence as bandwidth changes from narrow to broadband, we should expect the range of services offered by ISPs to change. As throughput becomes more critical in video services, for example, we could imagine ISPs competing based on the caching services they would offer. Or as the character of the content available increased, we might imagine some ISPs catering to certain content (video content) while others specialized elsewhere (new users).

The functions of ISPs, then, must not be conceived of too narrowly. Their importance, for example, does not have to do only with hosting “home pages” on the world wide web, or the portal sites they might now provide. Their importance is also in the range of services they might bundle and offer competitively — from content (including video and audio services) to help

functions to reference functions to special caching needs. In short, ISPs are engines for innovation in markets we do not yet imagine.

These ISPs thus could be important middle level competitors in the Internet economy. They could provide an ongoing competitive threat to actors at their borders. In the terms defined by Timothy Bresnahan, ISPs could become “vertical competitors” in an industry marked by highly concentrated markets at each horizontal level.³¹ Thus AOL, a traditional online content and ISP, is now a potential threat to Microsoft in the operating system platform market. This threat could not have been predicted three years ago. But by maintaining the fluidity of borders between markets, the net preserves the potential for new forms of competition.

This layer of potential competition is especially important given how little we know about how the broadband market will develop. The Internet market generally has been characterized by massive shifts in the competitive center. Hardware companies (IBM) have been displaced by operating system companies (Microsoft); operating system companies have been threatened by browser corporations (Netscape) and by open-platform “meta”-operating systems (Sun’s Java). As Bresnahan notes, we have no good way to know which layer in this chain of services will become the most crucial. Thus, multiplying the layers of competition provides a constant check on the dominance of any particular actor. Again, Bresnahan: “Far and away the most important [factor in market structure] is that competition came ... from another horizontal

³¹ See Timothy F. Bresnahan, *New Modes of Competition: Implications for the Future Structure of the Computer Industry*, June, 1998, <http://www.pff.org/pff/microsoft/bresnahan.html>.

layer.”³² Thus as he recommends, “one (modest) policy goal would be to make the threat of [vertical competition] more effective.”³³

The architecture proposed by AT&T and Time Warner for their broadband cable services threatens this vertical competition. By bundling ISP service with access, and by not permitting users to select another ISP, the architecture removes ISP competition within the residential broadband cable market. By removing this competition, the architecture removes an important threat to any strategic behavior that AT&T or Time Warner might engage in once a merger is complete. The architecture thus represents a significant change from the existing e2e design for a crucial segment of the residential Internet market. Further, there is in principle no limit to what AT&T could bundle into its control of the network. As ISPs expand beyond the functions they have traditionally performed, AT&T may be in a position to foreclose all competition in an increasing range of services provided over broadband lines. The consequence of this bundling will be that there will be no effective competition among ISPs serving residential broadband cable. The range of services available to broadband cable users will be determined by the “captive” ISPs owned by each local cable company. These captive ISPs will control the kind of use that customers might make of their broadband access. They will determine whether, for example, full length streaming video is permitted (it is presently not); they will determine whether customers might resell broadband services (as they presently may not); it will determine whether broadband customers might become providers of web content (as they presently may

³² *Id.* at 6.

³³ *Id.* at 18.

not).³⁴ These ISPs will have the power to discriminate in the choice of Internet services they allow, and customers who want broadband access will have to accept their choice.

Giving this power to discriminate to the owner of the actual network wires is fundamentally inconsistent with e2e design. These cable-owned-ISPs would influence the development and use of cable broadband technology. They would be exercising that influence not at the “ends” of the network, but at the center. They are therefore shifting control over innovation, as Dr. Jerome Saltzer has written, from a variety of users and programmers to a single network owner. This design defeats the principle that the network remain neutral, and empower the users. It is the first step to a return to the architecture of the old AT&T monopoly.

B. The Costs of Violating Architectural Principles

The costs of violating this fundamental principle of the Internet’s design are hard to reckon. We simply do not know enough to know how sensitive the innovation of the Internet is to changes in this competitive architecture. Obviously, in part the significance turns on how the broadband market develops. But given trends as we can identify them now, the risks are great. We detail some of these risks below.

The first is the cost of losing ISP competition. As we have argued, one should not think of ISPs as providing a fixed and immutable set of services. Right now ISPs typically provide customer support, as well as an IP address that channels the customer’s data. Competition among ISPs focuses on access speed, as well as some competition for content. AOL, for example, is both an access provider and content provider. Mindspring, on the other hand, simply provides

³⁴ These limitations are imposed by At Home Corporation. See @Home Acceptable Use Policy, <http://www.home.com/support/aup/> (Visited November 8, 1999); At Home Corporation. @Home Frequently Asked Questions, <http://www.home.com/support/netscape/faq/faq.html> (Visited November 8, 1999).

access. In the future, however, ISPs are potential vertical competitors to access providers who could provide competitive packages of content, or differently optimized caching servers, or different mixes of customer support, or advanced Internet services. This ISP competition would provide a constant pressure on access providers to optimize access.

The benefits from this competition in the history of the Internet so far should not be underestimated. The ISP market has historically been extraordinarily competitive. This competition has driven providers to expand capacity and lower prices. It has also driven providers to give highly effective customer support. This extraordinary build-out of capacity has not been incited through the promise of monopoly protection. The competitive market has provided a sufficient incentive, and the market has responded.

The second cost is the risk that legacy monopolies will improperly affect the architecture of the net in an effort to protect their own “turf.” Broadband is a potential competitor to traditional cable video services. Traditional cable providers might well view this competition as a long term threat to its business model, and they may not want to change to face that competitive threat. By gaining control over the network architecture, however, cable providers are in a position to affect the development of the architecture so as to minimize the threat of broadband to their own video market. For example, a broadband cable provider that has control over the ISPs its customers use might be expected to restrict customers’ access to streaming video from competitive content sources, in order to preserve its market of traditional cable video. AT&T has announced just such a policy. When asked whether users of the AT&T/MediaOne network would be permitted to stream video from competing providers across their network, Internet

Services President Daniel Somers is reported to have said that AT&T didn't spend \$56 billion to get into the cable business "to have the blood sucked out of our vein."³⁵

Even absent a deliberate intent to restrict some forms of innovation, giving the owners of the pipes control over the nature of the network will inherently skew innovation in the network. As Bar and Sandvig observe, "those who control communication networks tend to design communication platforms which support the patterns of interaction that futher their interest [and that] relect their own history and technical expertise."³⁶ The old Bell System didn't design a packet-switched alternative to the telephone system, because it simply didn't think in those terms. Similarly, cable companies should be expected to design systems over which they have control in ways that are consistent with their experience and their interests. But in doing so, they will disadvantage other approaches, even if they do not intend to do so.

The third cost of such control by a strategic actor is the threat to innovation. Innovators are less likely to invest in a market where a powerful actor has the power to behave strategically against it. Innovation in streaming technologies, for example, is less likely when a strategic actor can affect the selection of streaming technologies, against new, and competitive systems.

One example of this cost to innovation is the uncertainty that is created for future applications of broadband technology. One specific set of such applications are those that count on the Internet being "always on."³⁷ Applications are being developed, for example, that would allow the Net to monitor home security, or the health of an at-risk resident. These applications

³⁵ David Lieberman, *Media giants' Net change Major companies establish strong foothold online*, USA Today B2 (Dec 14, 1999).

³⁶ Bar & Sandvig, *supra* note __, at [draft at 22].

would depend upon constant Internet access. Whether, as a software designer, it makes sense to develop such applications depends in part upon the likelihood that they could be deployed in broadband cable contexts. Under the e2e design of the Internet, this would not be a question. The network would carry everything; the choice about use would be made by the user. But under the design proposed by the cable broadband, AT&T and Time Warner affiliates would have the power to decide whether these particular services would be “permitted” on the cable broadband network. Cable has already exercised this power to discriminate against some services.³⁸ They have given no guarantee of non-discrimination in the future. Thus if cable companies decided that such services would not be permitted, the return to an innovator would be reduced by the proportion of the residential broadband market controlled by cable.

Our point is not that cable companies would necessarily discriminate against such technologies. Rather, our point is that the possibility of such discrimination increases the risk an innovator faces when deciding whether to design for the Net. Innovators are likely to be cautious about where they spend their research efforts if they know that one company has the power to control whether that innovation will ever be deployed.³⁹ The increasing risk is a cost to innovation, and this cost should be expected to reduce innovation.

³⁷ Francois Bar and others believe these potential developments are so significant they constitute an entirely new “third phase” of the Internet’s development. *See* Bar et al., *supra* note __, at [draft at 5].

³⁸ For example, @Home’s policy limits the amount of video its consumers can download, limits total upstream traffic, precludes running a server of any sort, and prevents the use of corporate LANs over the cable connection. *See, e.g.,* Bar et al., *supra* note __, at [draft at 16] (listing @Home policies). These policies are presumably driven by bandwidth limitations. We have no evidence on how these policies have been enforced by @Home in practice.

³⁹ *Cf.* Lemley, *Economics of Improvement*, *supra* note __, at 989 (giving one company the power to centrally coordinate improvements on an existing product is likely to reduce innovation in those improvements).

In economic terms, a potential innovator of a product that must interoperate with a bottleneck monopolist faces reduced incentive to innovate compared to an innovator facing a competitive industry. This is true because the innovator’s only option in the bottleneck setting is to sell out to the monopolist, who in this case will act as a monopsonist in the market for the innovation. It is well-established that monopsonists purchase products at artificially low prices.

Finally, it is worth thinking about how the elimination of ISP competition in broadband markets would affect the architecture of the Internet as a whole. We have extolled the virtues of decentralization as a spur to innovation. But the decentralization of the Internet has social policy effects as well. It is much harder for governments to censor a vibrant, decentralized ISP market than a market in which only a few ISPs serve all customers. Concentration of the ISP market may make government intervention to control certain forms of speech easier and therefore more likely.⁴⁰ Enabling government control may be a good or a bad thing, depending on one's perspective. But for those who doubt the government's motives in regulating speech, it should be cause for concern.⁴¹

Perhaps some of these costs to closing the cable market to ISP competition could be ameliorated by competition from other broadband providers. If cable companies restrict the nature of ISP service for broadband cable, then to the extent there is competition from DSL, DSL might have a competitive advantage over cable. We're not terribly persuaded by this argument, for reasons we discuss below.⁴² But even if the broadband market were competitive, not all of the costs from denying ISP competition in broadband cable could be remedied by competition from other broadband providers. In particular, the cost to innovation would not be remedied by competition among providers. That cost is borne by the market as a whole, not by particular consumers in the market. Consumers individually don't feel any cost from innovation that does not occur. They therefore have no additional incentive to move from one kind of provider (cable)

⁴⁰ See Hans Kruse et al., *The InterNAT: Policy Implications of the Internet Architecture Debate* (working paper 2000). Cf. Lessig & Resnick, cite Michigan.

⁴¹ See generally **Lawrence Lessig, Code and Other Laws of Cyberspace** (1999) (making this architectural point on a number of different fronts).

⁴² We address these arguments in more detail *infra* Part III.B.

to another (DSL). Thus, if the increase in strategic power dampens the willingness to invest in broadband technologies, there is no mechanism by which that effect will be felt, and remedied, by broadband consumers directly.

III. Arguments Against Permitting ISP Competition

A. No Challenges to the Principle of e2e Design

We have been amazed by the number of objections raised to what strikes us as the rather intuitive argument made above, and in particular by the vigor with which those objections have been asserted not only by the cable companies, but by groups within the FCC and scholarly communities. In this Part we address those arguments in detail. Before responding to these objections, though, it is worth noting one important fact. None of the objections raised offer any reason to believe that either permitting ISP competition or preserving the e2e character of the Internet is a bad idea. Rather, these objections fall into three basic categories: (1) government doesn't need to act because the market will solve the problem; (2) ISP competition is good, but permitting cable companies to eliminate that competition is on balance desirable in order to give them incentives to deploy broadband more quickly; and (3) requiring cable companies to permit ISP competition might be a good thing, but the law simply doesn't permit it.

B. The Market Will Solve the Problem

In its initial consideration of the issue access to broadband cable services, and in the most recent reports from the Cable Services Bureau, the FCC has taken the position that it would best facilitate competition in this market by simply doing nothing. The FCC calls this a policy of

“regulatory restraint.”⁴³ In our view, this approach profoundly underplays the importance of the FCC’s activism in assuring competition in the past, and will jeopardize the innovative prospects for broadband Internet service in the future. It is based on a fundamentally misguided assumption also shared by many other commentators: that if we leave the cable industry alone, “the market” will take care of the problem. This argument comes in several flavors.

1. *Cable Companies Will Open Access on Their Own*

First, James Speta has argued that the economics of telecommunications are such that cable companies will open their networks to multiple ISPs.⁴⁴ Speta argues that cable companies actually have no incentive to bundle ISP services with broadband Internet access, even if they are in a monopoly position with respect to such access:

[A] broadband network . . . does not have the [] incentive to foreclose providers of complementary information services, even if the platform provider markets its own information services. It is against the platform owner’s interest to attempt to monopolize content – even if the platform owner is a monopolist in transmission service.⁴⁵

Speta bases this argument on a theory that he calls “indirect network externalities.” Essentially, his model is one in which the cable company’s customers derive value both from

⁴³ See *Broadband Today*, Staff Report To William E. Kennard, Chairman Federal Communications Commission On Industry Monitoring Sessions Convened By Cable Services Bureau (October 1999).

⁴⁴ James B. Speta, *Handicapping the Race for the Last Mile? A Critique of Open Access Rules for Broadband Platforms*, 17 *Yale J. Reg.* 39, 76 (2000). Others have endorsed this theory as well. See Weiser, *supra* note __, at 834 (calling Speta’s argument “persuasive”).

⁴⁵ *Id.* at 76.

interconnection and from the content provided over that connection. Speta argues that this means that cable companies have an incentive to provide the most efficient set of content possible. He challenges advocates of ISP competition for failing to make arguments consistent with his theory:

Those asserting that cable television systems and other providers of broadband access will use their ownership of wires or other platforms to impede competition in other markets fail to provide an economic model to support those claims. The most plausible model, in fact, suggests otherwise.⁴⁶

Similarly, he criticizes us for failing to explain why cable companies would want to restrict access to ISP competition, and concludes that “economic theory holds that” cable companies “will have no incentive to do so.”⁴⁷ Stripped to its essence, what Speta and others argue is that cable companies have an incentive to act in a way that maximizes competition, and so they will. QED.

The difficulty with this argument is that cable companies have *already* closed the ISP market to competition. We are not concerned with a hypothetical future risk here. Speta’s theory therefore has a rather large prediction problem. Obviously, the cable companies haven’t seen the market in the way he suggests they should.⁴⁸ One should be skeptical indeed of a theory whose predictions are so demonstrably at odds with reality.⁴⁹

⁴⁶ *Id.* at 78.

⁴⁷ Speta, *Vertical*, *supra* note __, at 997.

⁴⁸ Interestingly, the cable companies themselves periodically say that they would be fools to close the ISP market to competition. *See* Weiser, *supra* note __, at 834 (quoting statements of AT&T CEO Michael Armstrong). It is worth

There are two possible explanations for why cable companies have not acted in accordance with Speta's predictions. First, Speta's theoretical model may be wrong. It turns out, in fact, that there is good theoretical reason to be skeptical of Speta's analysis. Speta seems to conflate the provision of content with the provision of ISP services. He is surely right to say that cable companies will want to give cable modem customers access to the Internet, and therefore to a host of content other than their own. But it does not follow from that that cable companies will permit competition among ISPs to connect consumers to that content. Rather, a cable company's incentive is to maximize its profit by striking the best deal it can with one or more ISPs. That deal will most likely involve ISP exclusivity, with the cable company sharing in the monopoly profits the ISP will charge.⁵⁰ They may have an incentive to choose an efficient ISP, but they emphatically do not have an incentive to minimize the cost to consumers or to give them a choice of ISPs.⁵¹

Network effects don't change this story. In the first place, it is not clear the extent to which broadband cable really involves network effects.⁵² Certainly, access to the Internet is desirable largely because of its potential to interconnect users, and so the Internet itself is characterized by network effects. This effect carries over to speed and bandwidth of Internet

taking these comments with a rather large grain of salt. Not only were they made while the cable companies were trying to persuade Congress and the FCC to allow them to merge, but they don't reflect what the cable companies are actually doing. Neither AT&T nor Time Warner has opened access to ISPs. The few concessions they have made have been as a result of regulatory, not market, pressure. *See, e.g.,* Cooper, *supra* note __, at 1029-1032, 1036-40. And AOL, which used to be the chief proponent of open ISP competition over cable modems, changed its tune once it agreed to merge with Time Warner. *See, e.g., id.* at 1040.

⁴⁹ Cooper makes the same point. Cooper, *supra* note __, at 1030-31.

⁵⁰ Indeed, the vertical integration of cable companies and ISPs, as has happened with AT&T and is currently happening with Time Warner and AOL, is merely an efficient means of capturing this revenue stream.

⁵¹ See Jean-Jacques Laffont and Jean Tirole, **Competition in Telecommunications** 161-73 (2000).

service; broadband service is more valuable to me if there is a great deal of content (say, streaming video) that makes use of that bandwidth, and content providers are in turn more likely to provide that content if there are a large number of broadband users. So far, so good. But for any given broadband cable provider, the network benefits collapse rather quickly because of the technology involved. The more people with cable modems share a single cable loop, the less bandwidth each of them have available to them. For subscribers on any given local loop, then, it is emphatically not the case that they benefit from adding more users to the network beyond a certain minimum subscription base. Rather, consumption is locally rivalrous. In such a market, cable companies benefit from charging a supracompetitive price to a smaller number of users of each loop.

Second, even if Speta is right as a theoretical matter that a hypothetical cable company behaving rationally should open its lines to ISP competition, it is not necessarily the case that cable companies will do the “rational” thing. The rationality assumption has historically been central to law and economics, but it has recently come under fire even within the discipline of economics. The “behavioral law and economics” literature offers strong reason to believe that at least in certain circumstances, people don’t always do the rational thing. Rather, systematic biases may infect decisionmaking.⁵³ In the business context, these biases often take the form of what might be called a “corporate endowment effect.” Businesses have “core competencies” –

⁵² For a detailed discussion of network effects, see *cites*. For a discussion in the legal context, see Mark A. Lemley & David McGowan, *Legal Implications of Network Economic Effects*, 86 **Calif. L. Rev.** 479 (1998).

⁵³ See, e.g., Cass R. Sunstein, ed., *Behavioral Law and Economics* (1999); Jennifer Arlen, *The Future of Behavioral Economics and the Law*, 51 **Vand. L. Rev.** 1765 (1998); Samuel Issacharoff, *Can There Be a Behavioral Law and Economics?*, 51 **Vand. L. Rev.** 1729 (1998); Jeffrey Rachlinski, *The New Law and Psychology: A Reply to Critics, Skeptics, and Cautious Supporters*, 85 **Cornell L. Rev.** 739 (2000); Russell Korobkin, *Inertia and Preverence in Contract Negotiation: The Psychological Power of Default Rules and Form Contracts*, 51 **Vand. L. Rev.** 1583 (1998).

areas in which they are experienced and in which they know how to make money.⁵⁴ They may discount the value of radically new ideas that would require them to move their business in a new direction. This is especially true when the proposed shift in business model is one that would cannibalize an existing revenue stream.⁵⁵

In this case, it is quite possible that this sort of effect is at work. Even if network effects are at issue here, and even if Speta is right that these effects should prompt cable companies to open their networks, it is not clear that the cable companies will see it that way. Cable companies might believe they will not lose the benefit of those effects simply by mandating that consumers use a single ISP. While in earlier times ISPs often promoted their own content, in the modern era ISP access is mostly valuable because it connects users to the Internet. A cable company might well believe that one ISP can do that just as well as another, and therefore that consumers won't lose the benefits of network access by being forced to choose just one ISP. As we have argued, we think such a decision ignores the potential for future innovation to be spurred by ISP competition, but cable companies might not focus on such benefits, just as AT&T in an earlier era didn't focus on the computer applications of its telephone lines. Further, from the cable company's perspective even some perceived reduction in network benefits may be offset by a differentially greater impact on rivals.⁵⁶ It seems wrong to suggest that an

⁵⁴ For a review of this literature, see Robert P. Merges, *Rent Control in the Patent District: Observations on the Grady-Alexander Thesis*, 78 **Va. L. Rev.** 359, 371-73 (1992) (collecting economic literature suggesting that a company with a successful invention will choose to focus on one or two basic applications of that invention, rather than investing money and effort in researching implications of its invention that lie outside its core competencies).

⁵⁵ Companies may also be less likely to act "rationally" in monopoly settings because they do not face the discipline of the market.

⁵⁶ Thus, Carl Shapiro explains that exclusive dealing should be of greater, not less, antitrust concern in network markets. Carl Shapiro, *Exclusivity in Network Industries*, 7 **Geo. Mason L. Rev.** 673 (1999); Cf. Joseph Farrell, *Creating Local Competition*, 49 **Fed. Comm. L.J.** 201, 203-04 (1996) (pointing out that the Bell System's exclusion of rivals who wanted to interconnect benefited it on balance, even though it reduced the aggregate network benefits).

appreciation for these network effects will necessarily compel cable companies to open their access.

We believe, then, that it is wrong to assume that cable companies will have incentives to promote a vibrant and competitive ISP market, particularly when they own certain competitors in that market. But even if one is skeptical of our theoretical explanation, the fact that the cable companies have voted with their feet – and seem to agree with us – should give one pause. In short, it doesn't really matter whether cable companies are rational or irrational in refusing to open their networks. What really matters is that they have resisted doing so.

One potential response in other contexts to this “voting with their feet” argument might be to say that if cable companies were foolish or presumptuous enough to act against the dictates of theory, they are merely being inefficient and the market will discipline them. But this brings us to a critical problem for advocates of the theory that the market will fix everything: there is no effective competitive market for cable services. Cable companies are regulated monopolies. I can't easily start a competing cable service because of the natural monopoly characteristics associated with local wire distribution. The theory must instead be that some other, non-cable provider of broadband services will recognize the wisdom of open access, and that their competition will be enough to force cable companies to abandon their policy of using captive ISPs. We address this argument in the next section.

2. *Other Broadband Services Will Preserve ISP Competition*

Cable companies are not the only ones providing broadband Internet access.⁵⁷ Telephone companies (and independent companies using colocated equipment) provide broadband access

through a service called digital subscriber line, or DSL. Other potential (though as yet largely unrealized) sources of broadband competition include satellite and wireless services.⁵⁸ Given these potentially competitive services, one might ask, why worry at all about what cable companies do with their broadband wires? If the cable companies don't permit competition among ISPs, the argument goes, they will simply be driven out of the market by other companies that do. Indeed, the FCC Bureau Report on cable open access makes this argument.⁵⁹

It is unquestionably true that there are other sources of broadband Internet access besides cable modems, and that those alternative providers may both constrain and shape what cable companies do with their lines. We think, however, that it is unwise to rely on this potential facilities-based competition as an excuse for permitting cable companies to prevent downstream competition among ISPs. In our view, a principle is respected if respected generally, not occasionally. And the benefits of a principle come from the expectation that it will be respected. Further, competition in a small subset of the broadband market is no substitute for competition in the entire broadband market. This is particularly true if (as the Bureau report itself suggests) the characteristics of the competing media differ.

In the first place, one should be careful not to overstate the effectiveness of such alternate means of competition. The current market share of cable in the residential broadband market is

⁵⁷ We assume here that broadband Internet access is a separate market from narrowband access. Whether this is true as an economic matter depends on the cross-elasticity of supply between broadband and narrowband services. Treating broadband and narrowband separately seems intuitive to us, given the different uses to which the two will be put, but in any event it is explained more rigorously in Bar et al., *supra* note __, at [draft at 8-9]. See also Marcus Maher, *Cable Internet Unbundling: Local in the Deployment High Speed Access* [sic], 52 **Fed. Comm. L.J.** 211, 219-21 (2000).

⁵⁸ A good summary of broadband services can be found in Speta, *Last Mile*, at 48-61.

⁵⁹ Staff Report to William E. Kennard, Chairman Federal Communications Commission, on Industry Monitoring Sessions Convened by Cable Services Bureau (October 1999).

high. As of 1999, it was over 80% and perhaps as high as 94%.⁶⁰ So while other broadband technologies do exist, and more may be deployed, for most consumers the reality of the marketplace is that broadband access means a cable modem.⁶¹ Further, not all consumers face even potential competition between cable modems and other forms of broadband service. For consumers outside a wireless or satellite service area, or more than 3 miles from a converted telephone switching station, cable is the only possible choice for broadband service.⁶²

Second, because cable and DSL use different technologies, they have different strengths and weaknesses. The content and services that fit best with broadband are just being developed. DSL may compete with cable modems for some kinds of broadband services, but not for others. DSL, for example, will probably not be competitive for streaming video on demand. Its competitive strength is not uniform.

Finally, given how cable companies have behaved so far, it is reasonable to ask why other broadband providers should be expected to behave any differently. Wireless and satellite providers might well have the same incentives and decide to maximize profits by closing off access to ISPs, just as cable companies have done. As each new broadband technology enters the Internet market, the FCC's position with respect to cable would imply that that new technology too could violate the principle of e2e design. Only DSL would be required (because of existing statutory obligations) to maintain the principle of e2e design with respect to ISP choice.

⁶⁰ See *Cable Takes the Early Lead*, **The Industry Standard** (October 11, 1999) at 119. For the higher estimate, see Randy Barrett, *Cable, phone lines in battle for supremacy*, **Inter@ctive Week** 69 (January 25, 1999); Bar et al., *supra* note __, at [draft at 10]. By contrast, cable is not widely deployed in the business market, because the existing cable lines are virtually all residential.

⁶¹ It is clearly correct that broadband services are just beginning. The vast majority of Internet users are narrowband users. Thus, the situation in several years could possibly look very different.

It is true that DSL lines are currently open to certain indirect forms of ISP competition.⁶³ But this is not the result of the operation of the market. Rather, it is the result of regulation. DSL service is provided by phone companies, and that Congress and the FCC have been more willing both to regulate phone companies historically and to require open interconnection during their deregulation. It would be ironic indeed if competition over DSL lines were to be cited as an example of the market at work, when in fact those DSL lines are open to competition only because regulators have forced them to be.

Given that historical accident, should we assume that DSL and the future wireless and satellite technologies provide “enough” competition that we don’t need to encourage any more? We think not. It is admittedly true that the existence of facilities-based competition lessens the harm cable companies will do by closing the ISP market. But lessening the harm is not the same thing as eliminating it. Even if DSL does provide a partially competitive market for some ISPs who want to serve broadband access to some customers, it simply makes no sense as a matter of economic policy to foreclose the largest possible market for ISP competition, particularly when doing so serves no good end.⁶⁴ Second, it seems manifestly unfair to give cable and satellite companies a free ride because we’ve already imposed regulation on their competitors. One of the principal lessons of telecommunications convergence is that we are better off treating like things

⁶² See Bar et al., *supra* note __, at [draft at 9-10] (as of 1999, 40-50% of local telephone loops would not support DSL).

⁶³ It is generally *not* the case that DSL providers open their lines to multiple ISPs. Rather, the competition that exists in DSL is proxy competition that results from the FCC’s requirement that local exchange carriers permit competing DSL providers to collocate their equipment on phone company premises.

⁶⁴ Shih makes the perverse argument that we should eliminate ISP competition in cable in order to make non-cable methods of data transmission more attractive by comparison. See Daniel Shih, *Open Access or Forced Access: Should the FCC Impose Open Access on Cable-Based Internet Service Providers?*, 52 *Admin. L. Rev.* 793, 807 (2000). Far from being an argument against open access, we think the market attractiveness of openness proves our point.

alike.⁶⁵ Third, it is not clear that DSL ISP access will remain competitive. Several scholars has already argued that phone companies shouldn't have to open their wires to ISP competition, because they will be constrained by the existence of cable companies who will discipline them if they act anticompetitively.⁶⁶ This is a neat switch on the arguments made above. It seems we have potential competition everywhere, but the only broadband market in which ISP competition actually exists is the one in which regulators have required infrastructure providers to permit it.

3. *The FCC Should Take a "Wait and See" Approach*

Finally, one commentator has endorsed the idea of "regulatory restraint" by arguing for a presumption of inaction. In a broader, theoretical context, Stuart Benjamin has suggested that Congress and the agencies should presumptively not act "proactively" in circumstances in which the harm sought to be remedied is speculative.⁶⁷ Benjamin identifies proposals to open access to broadband cable as an example of attempts to regulate based only on a potential future harm.⁶⁸ The FCC seems to have endorsed this "wait and see" approach in the cable context. As an alternative to its argument that the government should do nothing now, the FCC Bureau Report argues that if things turn out for the worse — if cable does in fact implement a closed system as they say they intend, and if cable becomes an important aspect of the broadband market — then

⁶⁵ See, e.g., Thomas G. Krattenmaker & L.A. Powe Jr., *Converging First Amendment Principles for Converging Communications Media*, 104 **Yale L.J.** 1719 (1995).

⁶⁶ See Jerry A. Hausman & J. Gregory Sidak, *A Consumer-Welfare Approach to the Mandatory Unbundling of Telecommunications Networks*, 109 **Yale L.J.** 417, 489-90 (1999) ("Because cable companies' lines currently pass more than ninety-five percent of U.S. homes, it follows that mandatory unbundling of the ILECs' broadband networks is not necessary for competition in broadband services, nor would competition be impaired if the ILECs' broadband networks were not unbundled."). Why this "follows" the authors do not explain. See also Howard Shelanski, *The Speed Gap: Broadband Infrastructure and Electronic Commerce*, 14 **Berkeley Tech. L.J.** 721, 743-44 n.99 (1999) ("There is intuitive appeal to the argument that if providers of one major broadband technology (cable modem) are not regulated, nor should the providers of the competing (DSL) technology be.").

⁶⁷ Stuart Minor Benjamin, *Proactive Legislation and the First Amendment*, 99 **Mich. L. Rev.** __ (forthcoming 2000).

the government can pursue open access to cable after the fact, through, one presumes, antitrust litigation.

Benjamin's concern is more plausible than Speta's. While the question of ISP competition in the broadband cable market is not a hypothetical one – the cable companies are precluding such competition today – it is true that the risks we identify in Part II have not yet come to pass. In large measure this is because the broadband Internet market itself is still in its nascency. Benjamin is right to be concerned as a general matter about predictions of future harm as a determinant of policy. It is too easy to predict disaster on either side of a debate.

We do not believe, however, that the presumption he suggests is the right one here. In the first place, Benjamin is concerned in the balance of his article with the government asserting interests in order to justify the suppression of speech.⁶⁹ There is no government regulation of speech at issue here.⁷⁰ We do not propose that cable modems must carry certain content to all customers, as in *Turner*.⁷¹ Rather, the question is one of technical interconnection: whether the cable company is entitled to control the means by which consumers access the same content – the Internet. Even in the speech context, the Supreme Court rejected the argument that Benjamin

⁶⁸ *Id.* at [draft at 14-18].

⁶⁹ *See generally id.*

⁷⁰ Harold Feld effectively deconstructs the idea that the owners of cable lines ipso facto have a First Amendment right to control ISP choice over those lines, an argument which if accepted would require us to eliminate the entire concept of common carriers in telephony as well. *See* Harold Feld, *Whose Line Is It Anyway? The First Amendment and Cable Open Access*, 8 **CommLaw Conspectus** 23 (2000).

For this reason, we are not concerned by Raymond Ku's argument that the First Amendment must protect both ISPs and cable companies, or neither. Raymond Ku, *Open Internet Access and Freedom of Speech: A First Amendment Catch-22*, 75 **Tul. L. Rev.** ____ (forthcoming 2000), http://stlr.stanford.edu/STLR/Working_Papers/00_ku_1/index.htm. We don't see the case for open access as a First Amendment argument at all, but rather as an antitrust and regulatory issue.

⁷¹ *Turner Broadcasting System, Inc. v. FCC*, 512 U.S. 622 (1994) (*Turner I*); *Turner Broadcasting System, Inc. v. FCC*, 520 U.S. 180 (1997) (*Turner II*).

now advances, permitting evidence of a threat to future competition to justify the must-carry requirement in the cable context.⁷²

The Court had good reasons for rejecting Benjamin’s argument. The “wait and see” approach discounts the cost of regulating ex post. In the structural context in which antitrust and regulatory activities generally arise, it is much harder to undo a problem once it has become entrenched than it is to prevent that problem from arising in the first place. In its present state, the ISPs that AT&T and Time Warner would rely upon are independent business units. Once these newly-merged entities have integrated their ISPs, 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 more true 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 them back by deciding later to open the broadband market to competition. It is for this reason that antitrust and regulatory law have provided mechanisms for stopping threats to competition “in their incipency,”⁷³ rather than waiting until competition has disappeared entirely and then trying to rebuild it.

Whether one believes the government is justified in its suit against Microsoft or not, one cannot avoid the conclusion that the existing systems for dealing with monopoly problems in the networked economy ex post are extremely inefficient. Among the costs of using antitrust litigation to design markets are precisely the costs of uncertainty that the Bureau discusses in

⁷² See *Turner I*, 512 U.S. at 662.

relation to cable. To say there is no reason to use a seatbelt because there is always the care of an emergency room is to miss the extraordinary costs of any ex post remedy. There is little evidence that the government is in a position to intervene to undo excess monopoly power in an efficient and expeditious manner.

Moreover, the costs of dislodging an existing monopoly power are always significant, and always higher ex post. This is particularly true in this context, where if we must regulate ex post we will face integrated, bundled broadband providers that will have to be broken up, and ways will have to be found to recreate the competition the FCC will have allowed to languish.

Indeed, if the Bureau does in fact decide to regulate this industry because access does not magically become open, we will end up with more rather than less regulation, because the bureau will have to regulate not just access to the wires, but a whole host of industries that could have been competitive but that ended up being bundled to the network itself. We will find ourselves, in short, in a new era of regulation reminiscent of the old days of the Bell System.

A second problem with the “wait and see” approach in this context is that it is not at all clear we *will* “see” the costs of eliminating ISP competition. It may be impossible to measure the loss of innovation that results from stifling ISP competition and “regularizing” innovation along the lines of what cable companies think is optimal. Any ex post assessment will face the difficult problem of evaluating a negative – what things didn’t happen as a result of this change.⁷⁴

⁷³ See Clayton Act § 7, 15 U.S.C. § 18; *Cargill, Inc. v. Monfort of Colo.*, 479 U.S. 104, 124-25 (1986).

⁷⁴ To be fair, we acknowledge that it is similarly difficult to prove the positive – that innovation occurred only because of the structure of the Internet.

In the cable modem context, we think “wait and see” should have a different meaning. The Internet already has a certain architecture; it is the cable companies that are attempting to remake that architecture in fundamental ways. If we truly do not know enough about the consequences of this effort, we are better off maintaining a status quo that we know to have been successful. This is particularly true because the costs of action and inaction are not symmetrical. If we’re right, permitting the cable companies to eliminate ISP competition could do untold damage to innovation and competition on the Internet. But if we’re wrong, so what? ISP competition isn’t hard to do.⁷⁵ It doesn’t cost anyone a lot of money. And while a myriad of commentators have objected to the FCC mandating such competition, not one has identified a single reason to believe that using captive ISPs furthers some important policy goal that could not be furthered any other way.⁷⁶ Given this imbalance, we think any uncertainty offers good reason not to let the cable companies proceed with eliminating competition.

C. Monopoly Control Provides Needed Incentives

The only argument we have been able to find suggesting that eliminating ISP competition might actually be desirable is that eliminating such competition gives cable companies supracompetitive revenues, and that those revenues will encourage them to deploy broadband Internet access more quickly. Howard Shelanski has raised this issue in the telecom context, noting that requiring competition may reduce the incentives for incumbent carriers to build out their systems and make them available for broadband use.⁷⁷ Speta and Weiser have developed

⁷⁵ See *infra* Part III.D.3.

⁷⁶ Indeed, the only credible argument that closing access is a good thing at all is the one that it gives needed incentives to cable companies. We discuss that argument immediately below.

⁷⁷ See Shelanski, *supra* note ___, at 739.

and relied upon this argument in more detail. Speta argues that cable companies will deploy broadband access, and open it to competition, but only if they are “able to charge unaffiliated ISPs and other content providers the full monopoly price for interconnection and access.”⁷⁸ Speta’s argument is grounded not so much on indirect network effects as on an assumption about “priming the pump.” Speta assumes that no one will buy broadband cable services initially unless the cable company itself provides high-bandwidth content.⁷⁹ And the cable companies will have no incentive to invest in developing broadband infrastructure unless they can reap monopoly profits from that endeavor. The Bureau repeats the threat of cable companies, that they won’t invest as quickly if they are forced to open access.⁸⁰ In effect, the argument is that we must grant cable companies not just a monopoly over the wires, but a right to expand that monopoly into competitive markets, in order to give them an incentive to implement broadband access.

The need for investment incentives is a fair point. But it is worth noting at the outset that this “monopoly incentives” argument flatly contradicts every other argument made by opponents

⁷⁸ See Speta, *Vertical*, *supra* note __, at 995. Speta continues: “If the price is unregulated, then cable companies should experience increased profits with open access. If the price they may charge for access is limited, however, then cable companies may in fact experience decreased profits, and price controls could well affect a cable operator’s willingness to provide new, upgraded services.” *Id.* See also Speta, *Handicapping*, *supra* note __, at 87 (“open access rules that attempt to mimic perfectly competitive markets may decrease the broadband access provider’s incentives to deploy the platforms in the first instance.”); Weiser, *supra* note __, at 830 (“Imposing an unbundling mandate on cable modems . . . will undoubtedly deter investment in those areas – after all, why invest in new facilities, intellectual property, or a customer base when you will not be able to appropriate all returns on this investment?”).

A curious variant of this argument is that cable companies must be able to control ISP access in order to make the cable companies themselves more valuable, and therefore more attractive targets for acquisition by others. See Daniel Shih, *Open Access or Forced Access: Should the FCC Impose Open Access on Cable-Based Internet Service Providers?*, 52 **Admin. L. Rev.** 793, 806 (2000).

⁷⁹ Speta, *Last Mile*, at 83 (“vertical integration of access providers may be necessary. Especially in initial periods of deployment, broadband access providers must ensure a supply of complementary information services. . . . [A] broadband provider must either provide those goods itself or arrange for a source of supply.”). Speta goes on to argue that internal content development by cable companies may be more efficient, and that it may serve to guarantee the existence of goods that take advantage of broadband services. *Id.*

⁸⁰ Bureau Report, *supra* note __.

of ISP competition. For cable companies to reap monopoly returns from prices charged to ISPs means, among other things, that the cable companies will not voluntarily open their lines to ISP competition.⁸¹ If cable companies are collecting monopoly profits from ISPs, it means that facilities-based competition by other forms of broadband Internet access have not served to restrict their power over price. It means that broadband cable service is a monopoly, and therefore within the jurisdiction of the antitrust laws. And it assumes that, contrary to the Chicago-school theory of tying, cable companies will make more money from bundling ISP service with the provision of access than they would merely by charging an unregulated price for access alone.⁸²

The question then becomes whether giving cable companies the power to eliminate ISP competition is the only way to provide the requisite incentives. We think not. It is possible to grant whatever incentives are needed by letting the cable companies set the appropriate price to consumers for use of the wires themselves. Allowing the cable companies to gain that incentive by monopolizing an adjacent competitive market offers no guarantee of giving the appropriate incentive, and (as discussed above) poses significant risks to competition and innovation.

We also suspect that the cable companies protest too much. We have heard many times the argument that an industry won't ever develop — or will collapse — if it isn't given

⁸¹ Speta apparently assumes that cable companies will open their lines to all ISPs at a monopoly price. Speta, *Vertical*, at 995. This is implausible, however. In the first place, charging a monopoly price to ISPs to permit them to interconnect will necessarily exclude some ISPs from the market. If it didn't restrict provision of ISP services, it wouldn't be a monopoly price. Second, the cable company can maximize revenue from the ISP market by choosing one ISP, not by taking money from many different ISPs. Granted, the ISP it chooses may be the most efficient one — and therefore the one able to pay it the most money. But that doesn't mean consumers will be as well off as they would be under competitive conditions. And in fact, cable companies will probably have incentives to do what so far they all have done — use the ISP they already own.

⁸² If not, there is no additional incentive provided by the bundling that cable companies couldn't achieve in a competitive ISP market.

preferential treatment by the government. Most of those arguments turn out to be illusory. In the late 1970s, Hollywood argued to Congress that the movie business would not exist in ten years unless VCRs were banned. We wisely decided not to ban VCRs, and Hollywood is doing better than ever. More recently, respected legal scholars argued as late as 1995 that no one would ever put any valuable content on the Internet unless Congress passed special copyright protections for Internet works.⁸³ The amazing variety of useful material on the Internet today, despite Congress' failure until recently to give special perks to copyright owners, belies the argument. It may well be that cable companies will provide broadband Internet access whether or not we give them special incentives to do so, particularly since the costs of buildout are not all that great in the cable context.⁸⁴ Indeed, a variety of companies are veritably racing to deploy broadband Internet services – even phone companies, whose DSL service is theoretically hobbled by the inability to charge monopoly prices to ISPs. Some commentators have even suggested that competition, not monopoly, is actually the best spur to investment by incumbents in telecommunications and related fields.⁸⁵

Further, the speed of investment in broadband is not the only economic and social value at stake. There is as well the environment for innovation which is affected by the competitive

⁸³ See Jane C. Ginsburg, *Putting Cars on the "Information Superhighway": Authors, Exploiters, and Copyright in Cyberspace*, 95 *Colum. L. Rev.* 1466 (1995) (arguing that no one would make real content available on the Internet in the absence of stronger intellectual property protection).

⁸⁴ Accord Bar et al., *supra* note __, at [draft at 14-15] (noting substantial profits cable companies are making now, and the limited cost associated with broadband cable "buildout"). It is worth noting that Shelanski makes his argument primarily in the context of telephone, not cable, incentives. Cf. Thomas M. Jorde et al., *Innovation, Investment, and Unbundling*, 17 *Yale J. Reg.* 1 (2000) (making a similar argument against unbundling requirements in telecommunications).

⁸⁵ See, e.g., Glenn A. Woroch, *Competition's Effect on Investment in Digital Infrastructure* (working paper 1999). Shooshan et al. present evidence that capital investment in telecommunications infrastructure increased dramatically after the breakup of AT&T, a fact at odds with the infrastructure investment argument. See Harry M. Shooshan III et al., *MaCable.com: Closed v. Open Models for the Broadband Network* (working paper 1999).

environment of the Internet. If the cost of a faster deployment of broadband is a reduction in that competitive environment, then it is not clear the benefit is worth the cost. And if the cost is a reduction in innovation in Internet services, the long-run risk to social welfare is even greater. The extraordinary returns that AT&T enjoyed as a monopoly provider before the 1984 consent decree may well have sped its investment in its conception of what a communications network should be; it doesn't follow that there was a net benefit to society from that increased incentive to invest. Indeed, the vibrant, innovative markets that have sprung up since the breakup of AT&T suggest that competition is a better spur to innovation than monopoly is.

The monopoly incentives argument is one piece in a much larger debate in the economics literature over the relative value of monopoly and competition in spurring innovation. On the one hand are those who believe that competition dissipates research incentives, and therefore that monopoly is desirable because it spurs research. Advocates of this view, with which the cable industry has aligned itself, point to Joseph Schumpeter's statement that "perfect competition is not only impossible but inferior."⁸⁶ On the other hand are those who hold, with Kenneth Arrow, that monopolists tend to be lazy, and it is the threat of competition that spurs new innovation.⁸⁷ In the related context of intellectual property law, this debate plays out in a difference between those who argue that granting broad initial intellectual property rights incents the initial inventor

⁸⁶ **Joseph A. Schumpeter, *Capitalism, Socialism and Democracy* 106 (3d ed. 1942).** Strictly speaking, this is only one interpretation of Schumpeter's classic work, one that might be termed "East-coast Schumpeterianism." By contrast, "West-coast Schumpeterians" are more skeptical of the value of monopoly over competition in inducing innovation.

⁸⁷ . Kenneth J. Arrow, *Economic Welfare and the Allocation of Resources to Invention*, in *The Rate and Direction of Inventive Activity* 609 (National Bureau of Economic Research ed., 1962), reprinted in *Collected Papers of Kenneth J. Arrow: Production and Capital* 104, 115 (Belknap 1985).

For a nice discussion of the debate in the context of telecommunications policy, see Jim Chen, *Standing in the Shadows of Giants: The Role of Intergenerational Equity in Telecommunications Reform*, 71 **U. Colo. L. Rev.** 923, 947-951 (2000).

to develop improvements,⁸⁸ and those who believe that improvements will be encouraged by allowing a competitive market to develop.⁸⁹

As Howard Shelanski has observed, this is not a question that can be answered a priori, but only by reference to actual cases.⁹⁰ We believe the empirical evidence suggests quite strongly that it is competition, not monopoly, that spurs creativity.⁹¹ Shelanski's study of ten technological innovations in the U.S. telecommunications industry demonstrates not only that innovation does occur under competitive conditions, but that in the cases he studied innovations were deployed faster in competitive markets than in monopoly markets.⁹² We think the evidence

⁸⁸ For arguments in favor of allowing one central party to coordinate the market for subsequent improvements, see Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 **J.L. & Econ.** 265 (1977).

Doug Lichtman has recently argued that facilitating competition in goods complementary to a network market is actually undesirable, because it results in a price that is too high given the network effects. He proposes that the network monopolist be permitted to control the market for complementary goods in order to coerce a lower price in that market. Douglas Lichtman, *Property Rights in Emerging Platform Technologies*, 29 *J. Legal Studies* 615 (2000). If Lichtman is correct—and we are not persuaded that any system manufacturer that has actually sought to control complementary goods has done so in order to *reduce* prices—his argument would be a reason to oppose reverse engineering in one specific class of cases: complementary goods to strong network markets. *But see* Jeffrey Church & Neil Gandall, *Systems Competition, Vertical Merger, and Foreclosure*, 9 *J. Econ. & Mgmt. Strategy* 1 (2000) (control by a hardware manufacturer over complementary software goods leads to monopolization of the complementary goods and higher prices). But it's not clear that the markets he discusses bear much resemblance to this one, a point on which Lichtman would likely agree.

⁸⁹ For arguments against giving one party control over subsequent improvements, see Mark A. Lemley, *The Economics of Improvement in Intellectual Property Law*, 75 **Tex. L. Rev.** 989, 1042-72 (1997); Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope*, 90 **Colum. L. Rev.** 839 (1990).

⁹⁰ See Howard A. Shelanski, *Competition and Innovation in U.S. Telecommunications* [draft at 16-17] (working paper 2000).

⁹¹ We should emphasize here that this conclusion has no direct bearing on the very different question of intellectual property incentives. Intellectual property grants incentives to invent by promising *future* market control in the invented product; it has nothing to say about the structure of the market in which the putative inventor operates *ex ante*.

⁹² *Id.* at [draft at 35-38]. Shelanski cautions that it is difficult to compare the deployment paths of different innovations, and that his data cannot themselves be taken as proof of causation.

It is also worth noting that cable industry advocates have recently taken to arguing that DSL is “fast-growing” and therefore providing cable companies with a significant source of facilities-based competition. See, e.g., Milo Medin, VP of Excite@Home, presentation to *Regulating on the Technological Edge*, organized by the Berkeley Center for Research on Telecommunications Policy, October 20, 2000. But the growth of DSL belies the

is even stronger in the case of the Internet. As discussed above, the tremendous innovation associated with the Internet not only came about in a competitive marketplace, but in a fundamental sense *resulted* from the competitive, end-to-end character of that market.

Further, one important point that the debate over monopoly versus competition often elides is that the kinds of innovation that occur are likely to differ in each regime. Monopoly firms may have the ability to spend more on R&D than competitive firms, though in fact the economic evidence does not demonstrate that they do so.⁹³ But the money they spend tends to follow established research paths that lead to what one might call “regularized innovation” – optimization along existing lines. By contrast, competition is much more likely to spur innovation that marks a radical departure from the past. It is that latter, serendipitous kind of innovation that we fear will be lost if the ISP market is eliminated.

D. Arguments That Government Can’t Prevent Bundling

A second set of arguments against action by the FCC focus not on the desirability of government action to preserve ISP competition, but the legal or technical competence of the government to act. These advocates generally claim not that the FCC shouldn’t act to preserve competition, but that it is legally barred from doing so.

1. Only Antitrust Law Governs Broadband Cable

The first assumption that opponents of cable open access seem to make is that the FCC’s authority to act in this area is coterminous with antitrust law. They speak in terms of proof of monopoly power, the essential facilities doctrine, and the like. We address those antitrust

argument that monopoly incentives are necessary to induce investment, since DSL is subject to open access requirements.

objections below.⁹⁴ But antitrust law applies in this context only as a backstop for the failures of regulatory policy. Cable companies are certificated and regulated natural monopolies. Both federal and local governments have not only the power but the obligation to regulate cable companies in the public interest.

Some commentators have argued that the Communications Act actually forbids the FCC from regulating in this area. Speta, for example, argues that broadband Internet access is actually a form of “programming service” (and therefore a subset of the larger “cable service”) similar to other sorts of cable content traditionally provided over cable wires.⁹⁵ As such, he believes the Act precludes the FCC from treating a cable company’s provision of Internet access as a “common carrier or utility.”⁹⁶ He further argues that a rule permitting ISP competition would in effect treat the cable company as a common carrier.⁹⁷

We are not specialists in the intricacies of the Communications Act, and are therefore reluctant to essay our own explanation of what the Act is intended to do. We doubt Speta’s chain of inferences in two critical respects, however. First, it does not seem to us that a cable company is providing a “cable service” by offering access to the Internet.⁹⁸ A telephone company surely does not offer “cable service” merely by providing Internet access; it’s not clear to us why the result should be different merely because the company in question also provides cable

⁹³ *Id.* at [draft at 20-24] (collecting data from prior studies).

⁹⁴ *See infra* Part III.D.2.

⁹⁵ Speta, *Vertical Dimension*, *supra* note ___, at 989-990. The relevant statutory provision is 47 U.S.C. § 522(6).

⁹⁶ 47 U.S.C. § 541(c).

⁹⁷ Speta, *Vertical Dimension*, *supra* note ___, at 990.

programming services. Our reading is bolstered by the only appellate decision to have considered the issue. In *AT&T v. City of Portland*,⁹⁹ decided after Speta wrote his article, the court held that “[t]he essence of cable service . . . is one-way transmission of programming to subscribers generally. This definition does not fit @Home [] Internet access. . . .”¹⁰⁰ Instead, the court concluded that @Home was providing two separate services bundled together: the “information services” provided by traditional ISPs, and a “telecommunications service” similar to that provided by telephone companies.¹⁰¹ The court explained that the common carrier status imposed on telecommunications services under the Act was consistent with the architecture of the Internet.¹⁰²

Second, even if the Supreme Court were to conclude that broadband Internet access was a form of cable programming, it does not follow that broadband access via cable modem falls entirely outside the FCC’s regulatory purview. Rather, the only restriction that would be imposed is one that forbids the FCC from imposing “common carrier” or “utility” obligations on the cable company. But permitting ISP competition is not equivalent to imposing common carrier status on cable companies. As Speta acknowledges, common carriers are subject to rate regulation, tariffs, colocation rules, and the like.¹⁰³ He believes that any open access rule would necessarily include rate regulation, in part because he equates a rule requiring nondiscriminatory pricing with actual

⁹⁸ Accord Jason Whiteley, *AT&T Corp. v. City of Portland: Classifying “Internet Over Cable” in the Open Access Fight*, 2000 **B.Y.U. L. Rev.** 451 (arguing that cable modems are not a “cable service,” and should instead be regulated as a telecommunications service).

⁹⁹ 216 F.3d 871 (9th Cir. 2000).

¹⁰⁰ *Id.* at 876.

¹⁰¹ *Id.* at 876-77.

¹⁰² *Id.* at 879.

¹⁰³ Speta, *Vertical*, *supra* note ___, at 990.

government oversight and approval of the prices charged.¹⁰⁴ It seems to us that this assumption misunderstands what the debate is all about. As we explain more fully below, Speta and others may be misled by the term “open access” into believing that we propose cable companies should be subject to all the same interconnection requirements as telephone companies. This is simply not the case. All we propose is that cable companies be permitted to charge consumers for access to their wires, but not to bundle ISP services together with wire access. This is an unexceptional principle in other areas. To take a similar example, modem makers do not sell their equipment only on the condition that consumers also buy ISP services from them. Should they attempt to do so, we don’t need to solve the problem by creating a complex rate structure to determine a “fair” price for the bundle. We just need to prohibit the bundling.

2. *Antitrust Law Is Inapplicable Here*

A related fallacy seems to infect the arguments of ISP competition opponents about antitrust law. Weiser, Sidak and others suggest that antitrust law comes into play in the cable modem context only if the cable lines are determined to be an “essential facility” to which the law might compel access.¹⁰⁵ The standards for making an essential facilities argument are quite high, and with good reason. We could debate whether or not those standards are met here,¹⁰⁶ but

¹⁰⁴ *Id.* at 991.

¹⁰⁵ *See, e.g.,* Weiser, *supra* note __, at 830 (assuming that open access advocates need “to establish that cable modems constitute an essential facility.”); Sidak, *supra* note __, at __. *See also* Speta, *Ex Parte*, *supra* note __, at 8-12 (arguing against our regulatory filing on the grounds that AT&T does not control an essential facility). On the essential facilities doctrine in antitrust law generally, see IIIA **Areeda & Hovenkamp, Antitrust ¶¶ 772-774**. To be fair, Weiser goes on to acknowledge that other, non-antitrust arguments can be based on the principle of interconnection, not on an essential facilities argument. Weiser, *supra* note __, at 835. He does not discuss tying, however.

¹⁰⁶ Some have suggested that the traditional models of neoclassical economics overstate the possibility of competition in the telecommunications industries because of their static assumptions. *See* Ashutosh Bhagwat, *Unnatural Competition? Applying the New Antitrust Learning to Foster Competition in the Local Exchange*, 50 **Hastings L.J.** 1479 (1999).

let's assume for the sake of argument that they aren't. Opponents of ISP competition seem to have forgotten that there is more to antitrust law than the essential facilities doctrine.

The bundling of cable line access and ISP service instead presents a straightforward claim of tying. Tying violates the antitrust laws when four conditions are satisfied: there are two separate products or services, the customer is required to purchase one in order to get the other, the tying party has market power in the tying product market (here cable wires), and there is likely to be an effect on the market for the tied product (here ISP services).¹⁰⁷ None of these elements seems to us in serious doubt. We have not seen anyone suggest that access to cable lines and the provision of ISP services are really the same thing, or even that (a la Microsoft) there is some significant technological benefit to be gained from packaging them together. Cable companies do have monopolies over cable wires in their local service area by government fiat.¹⁰⁸ The question becomes whether there is likely to be an effect¹⁰⁹ on ISP competition. We find it hard to believe that there could not be such an effect, given that the best source of broadband access will be foreclosed to all but a single ISP. And even if the market were defined so broadly that closure by a small cable company didn't have the requisite effect, certainly closure by the two largest cable companies (AT&T and Time Warner) and the dominant ISP provider (AOL) should be of competitive concern.

¹⁰⁷ See, e.g., *Eastman Kodak v. Image Technical Servs.*, 504 U.S. 451 (1992); *Jefferson Parish Hosp. Dist. # 2 v. Hyde*, 466 U.S. 2 (1984).

¹⁰⁸ It is possible, of course, that the tying product could be defined more broadly for these purposes, including other forms of wires into the home. Even if the market were defined to include all broadband access points, however, the evidence suggests that cable has a dominant share of that broader market too. See *supra* note ___. And certainly cable companies have a monopoly over broadband access in the significant parts of the country where DSL access is unavailable.

¹⁰⁹ N.B.: under current law, even a dangerous probability of monopolization of the tied market is not required.

Some academics have suggested that tying should not be illegal at all, because it is premised on a concept of monopoly leveraging that makes no sense as a matter of economic theory.¹¹⁰ Louis Kaplow has deconstructed that argument rather effectively, explaining among other things that the economic criticism of leveraging theory assumes a static market for both tied goods.¹¹¹ Kaplow’s argument seems to have particular force here, where both markets are subject to rapid evolution, and where the broadband ISP market is itself in the early formative stages.¹¹² Further, the one circumstance in which it seems everyone can agree that tying does make economic sense is where it is used to leverage monopoly power from a regulated to an unregulated market – precisely what the cable companies are doing here.¹¹³

The application of antitrust law to “isolate” a natural monopoly, and therefore to minimize the effects of that monopoly on potentially competitive markets, is hardly a surprising one. It is the principle that underlies both the *MCI v. AT&T* case¹¹⁴ and the Modified Final Judgment against AT&T itself.¹¹⁵ The idea is to “wall off” the monopoly market from the competitive market, a process Joe Farrell has referred to as “quarantining the monopoly lest it

¹¹⁰ See Robert Bork, **The Antitrust Paradox: A Policy At War With Itself** 373-74 (1978).

¹¹¹ See Louis Kaplow, *Extension of Monopoly Power Through Leverage*, 85 **Colum. L. Rev.** 515 (1985).

¹¹² See also Herbert Hovenkamp, *Antitrust Policy After Chicago*, 84 **Mich. L. Rev.** 213 (1985).

¹¹³ Admittedly, cable programming service is no longer subject to general price regulation. However, cable programming services are regulated in a variety of other ways. See *supra* note ___ (discussing cable regulation). While the incentives to leverage in order to escape non-price regulation are presumably less than the incentives to escape price regulation, they may still be greater than zero.

¹¹⁴ 708 F.2d 1081 (7th Cir. 1983).

¹¹⁵ *United States v. AT&T Corp.*, 552 F. Supp. 131 (D.D.C. 1982), *aff’d sub. nom. Maryland v. United States*, 460 U.S. 1001 (1983).

infect the competitive segments.”¹¹⁶ William Baxter, who no one would call an antitrust liberal, endorsed this idea as the least restrictive alternative, and we think it makes sense as a general principle of antitrust law.

In any event, it is simply wrong to characterize this debate as one in which cable companies are being forced to share their private property. All we propose is that they have to obey the same rules everyone else does: they can’t bundle two different products or services together in circumstances where doing so will reduce competition. This proposal won’t affect the price cable companies can charge for bandwidth. It merely prevents them from controlling which ISP a consumer uses to take advantage of the bandwidth they have paid for.

3. *Regulating Bundling Isn’t Feasible*

The Bureau in its Report repeats technological arguments made by the cable companies themselves about why open access is not feasible in the context of broadband cable. Speta makes a variant of these arguments, suggesting that allowing the cable company to tie ISP services to cable access will permit it to ensure that only those Internet services which “perform well on the platform” will be available to consumers.¹¹⁷ This is a curious argument to juxtapose with Speta’s first objection – that cable companies will open access on their own. If open access isn’t feasible, it’s not clear how or why they would open access.

We think the argument is a red herring – that it is misleading to suggest that there is any technological need for this tie. As AOL explained in its October 1999 filing with the city of San

¹¹⁶ Joseph Farrell, *Creating Local Competition*, 49 **Fed. Comm. L.J.** 201, 207 (1996); see also Roger G. Noll & Bruce M. Owen, *The Anticompetitive Uses of Regulation: United States v. AT&T*, in **The Antitrust Revolution** 290 (John E. Kwoka, Jr. & Lawrence J. White eds. 1989).

¹¹⁷ Speta, *Handicapping*, *supra* note ___, at 85.

Francisco, less than a month before it agreed to merge with Time Warner (and thus switched sides), “there is no technical reason why the City could not adopt an open access policy for multiple ISPs.”¹¹⁸

First, the fact that cable is a “shared medium,” while DSL is dedicated, shouldn’t affect ISP choice. The Internet itself is a shared medium. Its performance, as the report notes, “var[ies] depending on the number of actual subscribers using the Internet connection at the same time.”¹¹⁹ The only difference between DSL and cable is the place where one enters the shared pool. It is true that cable is architected to share bandwidth among local users, whereas DSL does not. But whether that difference results in a difference in performance is simply a function of how many users the cable company decides to connect, and not upon whether the users it connects have different ISPs. Give a certain profile of usage, cable broadband can guarantee an effective equivalent of unshared access simply by not overselling the access they attach at any single node. More to the point, the cable companies can control usage whether or not they also own the ISPs, merely by limiting the number and size of network subscriptions. So the shared medium argument does not justify bundling of ISP service with access to the network.

Second, the Bureau argues that security on a cable node is less effective than on a DSL connection, since data from other computers passes by all computers on a network node (as is the case, for example, with an Ethernet network). This argument too is misleading. There is a difference in the security approaches necessary to implement broadband cable securely, since users on a particular node are all exposed to the same network traffic. But cable companies are

¹¹⁸ Open Access Comments of America Online, Inc., before the Department of Telecommunications and Information Services of San Francisco, California, October 27, 1999, at 5.

¹¹⁹ *Id.* at 19.

already developing technologies to eliminate that security risk. There is no reason to believe that a properly implemented cable system would be any less secure than a comparable DSL system. And again, there is no reason to believe that cable control over ISPs is necessary to achieve this goal.

In fact, it seems that open access is technically feasible.¹²⁰ The real question is how hard it will be. As O'Donnell points out, that question depends in significant part on how the cable infrastructure itself is designed. This architecture is being built as we write. Indeed, the cable industry itself is developing open standards not just for "Layer III" interconnections (DOCSIS cable modems, etc.), but for higher-level interoperability.¹²¹ O'Donnell argues that the architecture should be constructed in a way that facilitates rather than impairs access by others.¹²² Interconnection of cable modems with multiple ISPs may take work, but it surely isn't impossible.

Postscript: Why All the Fuss?

What strikes us as most notable about this debate is the great lengths to which the FCC and so many commentators are willing to go to justify the behavior of cable companies. Indeed, cable advocates are making arguments that are internally inconsistent: that cable modems face serious competition from DSL, but that controlling the ISP market will give them monopoly incentives to invest; that open access isn't feasible, and yet cable companies can be expected to

¹²⁰ See Shawn O'Donnell, *Broadband Architectures, ISP Business Plans, and Open Access* [draft at 2] (working paper 2000) (coming to this conclusion).

¹²¹ See David Reed, presentation to *Regulating on the Technological Edge*, organized by the Berkeley Center for Research on Telecommunications Policy, October 20, 2000; <http://www.opencable.com>. N.B. This David Reed works for Cable Labs, and is not the same as the David Reed cited above as a co-author with Salzer and Clark.

open access on their own. Given that, as we noted above, virtually none of these arguments actually suggest that ISP competition itself is a bad thing, it is worth asking why so many people feel a burning need to defend its abolition. In our view, much of this debate has been shaped by two misapprehensions that have more to do with terminology than with reality.

First, much of the debate seems to have been sidetracked by the use of the term “open access.” The term is apparently a red flag of sorts to those who spend their lives in telecommunications law, carrying a whole series of connotations from the history of telecommunications deregulation. In the context of cable modems and ISP competition, “open access” advocates are actually asking for something different and far more limited. Thus, much of the response to open access requests seems to focus on what the respondent thinks open access means, and not what its proponents are in fact asking for.¹²³

In our view, “open access” is simply a short hand for a set of competitive objectives. The objectives sought in the DSL context are perfectly adequate to apply in this context, at least as a starting point. But they are not the only possible approach. For the relevant question that the agency should address is how to assure that customers have an easy choice among relevant competitors, so as to preserve competition in the broadband market. The DSL requirements assure that. The Commission can impose open access conditions on cable companies without replicating the complex regulatory scheme necessary to implement sections 251 and 252 of the 1996 Telecommunications Act. Interconnection to a cable modem network, even by multiple

¹²² O’Donnell, *supra* note __, at [draft at 2].

¹²³ For example, Speta clearly seems to assume that “open access” or “unbundling” in this context carries with it all of the baggage of traditional cost-of-service regulation. *See* Speta, *Handicapping*, *supra* note __, at 85. Indeed, Speta suggests in a later paper that the economics of cable modems “suggest only an interconnection obligation, not the ‘open access’ rules being pushed.” James B. Speta, *A Common Carrier Approach to Internet Interconnection*

ISPs, involves nothing more than the development of an Internet connection between an ISP and a router. It does not necessarily require price regulation of cable lines or colocation of equipment, nor would open access conditions require cable companies to honor requests for interconnection at special locations within its network.¹²⁴ So long as unaffiliated ISPs are allowed to interconnect at the same place — and at the same price — as affiliated ISPs, the e2e principle will not be compromised.¹²⁵

The second terminology problem has to do with the fact that proponents of ISP competition are asking for . . . (gasp!) regulation. Regulation seems to be a dirty word in many sectors these days. There are some good reasons for that. Government has in the past unquestionably regulated too many industries, and too many aspects of those industries. It has been too quick to assume that an industry was a natural monopoly, and that price regulation was the only way of creating a simulacrum of competition. The FCC has been part of the problem in some respects, and has justly been criticized for attempting to regulate broadcast content, impose equal time rules, and the like.¹²⁶

We fear, however, that the FCC has gone overboard in taking these criticisms to heart, and now fears doing anything that might be tarred with the label “regulation.”¹²⁷ The fact is that

[draft at 2] (working paper 2000). We think Speta misunderstands what advocates of cable “open access” are actually asking for. An obligation to interconnect ISPs is precisely the heart of open access.

¹²⁴ *Accord* Bar et al., *supra* note __, at [draft at 4]; Christopher K. Ridder, *AT&T Corp. v. City of Portland*, 15 **Berkeley Tech. L.J.** 397, 409-12 (2000) (“open access” isn’t the equivalent of common carriage).

¹²⁵ *See* Cooper, *supra* note __, at 1023 (cities “have not sought to impose full common carriage obligations on broadband internet services.”). To be sure, Bar et al. point out that merely nondiscriminatory pricing may not be sufficient should the cable company decide to price its captive ISP services below cost. Bar et al., *supra* note __, at __. But there are other antitrust remedies for such an act.

¹²⁶ *See, e.g.*, Thomas G. Krattenmaker & Lucas A. Powe Jr., **Regulating Broadcast Programming** (1994)..

¹²⁷ *See, e.g.*, Bar et al., *supra* note __, at [draft at 3] (citing comments by FCC Chairman William Kennard that has mandate was to “do no harm.”).

the structural characteristics of the cable and telecommunications markets require some form of regulatory oversight over the use of the local distribution networks themselves. The error of past eras was not that they regulated these industries at all, but that they regulated too much. For most of this century, the Federal Communications Commission took its mandate to be the exclusion of competition from the telephone market and the regulation of AT&T as a monopoly provider not just of access to local wires, but of local telephone services, long distance service, and telephone equipment.¹²⁸ Beginning in the late 1960s with the Carterfone decision,¹²⁹ the FCC began to allow competition into first the equipment and then the long-distance segments of the market. Competition in those areas—and the principle of nondiscriminatory interconnection—were cemented in the consent decree breaking up AT&T.¹³⁰ Once the single phone network was divided into seven “regional Bell operating companies” (plus some independents) in charge of local phone service, and a potentially unlimited number of long-distance carriers, it was evident to all that interconnection was at the heart of the phone system. This didn’t mean there was no place for regulation – merely that many of the things the FCC regulated could in fact be competitive markets. What stood in their way for 70 years was the fact that these different products and services were bundled and sold together.

Broadband Internet access is not precisely analogous to telecommunications, of course. But cable regulators should learn one important lesson from the history of telecommunications

¹²⁸ See *In re Policy and Rule Concerning Rates for Dominant Carriers*, 4 F.C.C.R. 2873, 2882-88 (1989) (reviewing this history); see also Joseph Farrell, *Creating Local Competition*, 49 **Fed. Comm. L.J.** 201, 204-06 (1996).

¹²⁹ See *In re Use of the Carterfone Device in Message Toll Telephone Service*, 13 F.C.C.2d 420 (1968). See also *Hush-A-Phone Corp. v. FCC*, 238 F.2d 266, 269 (D.C. Cir. 1956) (allowing attachment of non-AT&T equipment which did not affect the phone or the network).

¹³⁰ See *United States v. AT&T*, 552 F. Supp. 131, 227 (D.D.C. 1982), *aff’d sub nom. Maryland v. United States*, 460 U.S. 1001 (1983).

regulation: if we let natural monopoly services be bundled together with potentially competitive services, we will end up having to regulate not only the monopoly services but the competitive ones as well. Thus, it is ironic that the FCC now seems willing to allow cable companies to tie their natural monopoly service to a competitive one. Ironic because in the name of deregulation, the FCC is embarking upon a course of action that will lead in the end to more regulation – and what’s worse, to unnecessary regulation. If one is generally predisposed to keep the government’s hands off the market, this is exactly the wrong way to go about it.¹³¹

Conclusion

Everyone seems to agree about one important fact: We know less than we should about how this market functions. Ten years ago, no one would have predicted how network architecture would matter to the Internet; as late as 1995, Microsoft itself confessed it had missed the significance of the Internet. We are faced in the Internet with a phenomenon we don’t fully understand, but which has produced an extraordinary economic boom.

In the face of such uncertainty, the question we should ask is what presumptions should we make about how this market is functioning. In our view, these assumptions should reflect the design principles of the Internet. The Internet has been the fastest growing network, crucial to our economy, because it has enabled an extraordinarily innovative competition. It has enabled this competition in part because of its design. It has been architected, through the e2e design, to enable this competition.

¹³¹ Phil Agre argues that @Home is essentially on its way to proprietizing the Internet, and that the Internet needs to be made proprietary, in order to improve its basic standards, so this is a good thing. See Philip E. Agre, *The Self-Limiting Internet: Problems of Change in Networks and Institutions* (working paper 1999). We don’t agree with Agre that this is a good thing. We further suspect that the FCC wouldn’t agree either, if they thought about it.

This principle of the initial Internet should guide the government in evaluating changes to the Internet's architecture, or acquisitions that threaten to change this effective architecture. The presumption should be against changes that would interfere with this e2e design. The aim should be to keep the footprint of monopoly power as small as it can be, so as to minimize the threats to innovation.

These principles should guide the FCC in the context of mergers and regulations affecting ownership of significant aspects of the Internet. If a regulated entity threatens to force the adoption of an architecture which is inconsistent with the Internet's basic design, and if that action affects a significant portion of a relevant Internet market, then the burden should be on the party taking that action to justify this deviation from the Internet's default design. The presumption should be against deviating from these principles.

As with any principle, these presumptions should apply unless there is clear evidence that displacing them in a particular case would be benign. The burden should not be upon those who would defend the existing design. The existing design has done quite enough to defend itself. If there is good reason to allow AT&T, Time Warner and others to change the cable network into a version of the old telephone network, then it should bear a heavy burden in justifying this return to past. In our view, the cable industry has not come close to meeting that burden.