

Network Neutrality and the Economics of Congestion

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ABSTRACT

The Supreme Court's recent *Brand X* decision has reignited the debate over broadband networks' ability to restrict end users' ability to access content, run applications, and attach devices. In this Article, Professor Christopher Yoo draws on the economics of congestion to propose a new analytical framework for evaluating such restrictions. He concludes that when transaction costs make usage-based pricing prohibitively expensive, imposing restrictions on bandwidth-intensive activities may well enhance economic welfare by preventing high-volume users from imposing uncompensated costs on low-volume users. Usage of bandwidth-intensive services can thus serve as a useful proxy for congestion externalities just as port usage served as a proxy for consumption of lighthouse services in Coase's classic critique of the economic parable of the lighthouse.

The case against network neutrality also draws on other economic considerations. Claims that network neutrality is needed to foster innovation are misplaced in the context of the Internet. Furthermore, allowing network owners to differentiate their services can mitigate the sources of market failure that require regulatory intervention in the first place. Finally, the classic telecommunications precedents invoked by network neutrality proponents were adopted during an era in which local telephone companies represented the only available means of transmission and in which the traffic consisted solely of person-to-person communications. Concerns that telephone companies may prevent end users from using their DSL connections to access VoIP at most justify targeted regulatory intervention. They do not justify a blanket prohibition of restrictions on end users' ability to access content, run applications, or attach devices.

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INTRODUCTION

The debate over United States' policy with respect to the Internet has reached a critical juncture. After avoiding the issue for years,¹ the Federal Communications Commission (FCC) has initiated proceedings to resolve the proper regulatory classification for the two leading broadband technologies, cable modem systems and digital subscriber lines (DSL). The FCC initially concluded that both technologies fall within the regulatory category known as "information services."² These proceedings were soon brought to an abrupt halt by the Ninth Circuit's *Brand X* decision, which held that the decision to classify cable modem systems as information services was barred by stare decisis.³ After three additional years of litigation, the Supreme Court's decision reversing the Ninth Circuit cleared the way for these proceedings to be brought to completion.⁴

The fact that "information service" is not a statutory category created by Congress, but rather a regulatory category created under the FCC's ancillary jurisdiction, leaves the agency

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¹ See *AT&T Corp. v. City of Portland*, 216 F.3d 871, 876 (9th Cir. 2000) (noting that the FCC had declined, both in its regulatory capacity and as amicus curiae, to address the proper regulatory classification for cable modem systems); *Nat'l Cable & Telecomm. Ass'n v. Gulf Power Co.*, 534 U.S. 327, 349-51, 353-55 & nn.5-6 (2002) (Thomas, J., joined by Souter, J., concurring in part and dissenting in part) (citing FCC statements recognizing that it had still not addressed the issue and criticizing the FCC for its continued failure to do so).

² See *Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities*, Declaratory Ruling and Notice of Proposed Rulemaking, 17 F.C.C.R. 4798, 4819-39 ¶¶ 33-71 (2002) [hereinafter *Cable Modem Declaratory Ruling and NPRM*]; *Appropriate Framework for Broadband Access to the Internet over Wireline Facilities*, Notice of Proposed Rulemaking, 17 F.C.C.R. 3019, 3029-35 ¶¶ 17-29 (2002) [hereinafter *Wireline Broadband NPRM*]. The former proceeding was preceded by a notice of inquiry initially exploring these issues. See *Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities*, Notice of Inquiry, 15 F.C.C.R. 19287 (2000).

³ *Brand X Internet Servs. v. FCC*, 345 F.3d 1120 (9th Cir. 2002).

⁴ *Nat'l Cable & Telecomm. Ass'n v. Brand X Internet Servs.*, 125 S. Ct. 2688 (2005).

with wide discretion over how to proceed from here. The FCC's initial rulings left open what regulations, if any, would be applied to broadband and sought comment on whether and how broadband should be regulated.⁵ Although some have suggested that the FCC might exercise its discretion to impose widespread regulatory obligations on broadband,⁶ such an inference is belied by the fact that the information service category has long been associated with nonregulation.⁷ Furthermore, the language of the FCC's notice of proposed rulemaking suggests the contrary, specifically acknowledging that information services had long been subjected to "minimal and/or reduced regulatory requirements"⁸ and suggesting that employing a light regulatory touch would yield substantial benefits.⁹

The prospect of widescale deregulation of broadband in the wake of *Brand X* reignited a long-simmering debate over a cluster of arguments that fit comfortably under the rubric of "network neutrality."¹⁰ This controversy was triggered when a number of cable modem and DSL providers began to experiment with restrictions on the content and applications that end users could access through their networks as well as limits on the devices that end users could attach to their networks.¹¹ Since then, these last-mile providers appear to have retreated from

⁵ See Cable Modem Declaratory Ruling and NPRM, *supra* note 2, at 4839-54 ¶¶ 72-112; Wireline Broadband NPRM, *supra* note 2, at 3040-48 ¶¶ 43-64.

⁶ See Cheryl Bolen, *Brand X Decision Could Support Regulation of Information Services*, TELECOMM. MONITOR, July 18, 2005.

⁷ See JASON OXMAN, THE FCC AND THE UNREGULATION OF THE INTERNET (FCC Off. of Plans & Pol'y Working Paper No. 31, July 1999), available at http://www.fcc.gov/Bureaus/OPP/working_papers/oppwp31.pdf.

⁸ Wireline Broadband NPRM, *supra* note 2, at 3064 ¶ 105; see also *id.* at 3042 ¶ 50 (referring to "a minimal regulatory Title I regime"); Cable Modem Declaratory Ruling and NPRM, *supra* note 2, at 4870 (Copps, Comm'r, dissenting) (noting that information services are "generally deregulated").

⁹ See Cable Modem Declaratory Ruling and NPRM, *supra* note 2, at 4868 (separate statement of Abernathy, Comm'r).

¹⁰ This Essay focuses on the aspects of network neutrality surrounding the relationship between last-mile providers and end users. Issues of network neutrality also arise from the architecture of the underlying network. I address these latter aspects of network neutrality in my other work. See Christopher S. Yoo, *Beyond Network Neutrality*, 19 HARV. J.L. & TECH. (forthcoming Fall 2005), available at <http://ssrn.com/abstract=742404>.

¹¹ The most systematic survey of these types of restrictions is Tim Wu, *Network Neutrality, Broadband Discrimination*, 2 J. ON TELECOMM. & HIGH TECH. L. 141, 158-62, 173-74 (2003). For other, less formal surveys,

this position and have instead pledged not to restrict users' ability to access content and run applications.¹² Indeed, FCC Chairman Kevin Martin and congressional supporters of network neutrality have acknowledged the lack of evidence that such restrictions still remain in widespread use.¹³ A group of academic commentators, led by Stanford law professor Lawrence Lessig, has nonetheless remained concerned that broadband providers may once again use their control over the last mile of distribution to limit end users' ability to access content, run applications, and attach devices to the network as they see fit.¹⁴ As a result, they have favored imposing prophylactic regulations prohibiting such restrictions.

These concerns have been echoed by traditional entertainment companies (such as Disney), providers of Internet-based applications (such as Amazon.com, eBay, Vonage, and Yahoo!), software companies (such as Microsoft), and device manufacturers (such as Apple Computer and Dell).¹⁵ In 2004, the issue also drew the attention of then-FCC Chairman Michael

see LAWRENCE LESSIG, *THE FUTURE OF IDEAS* 156-58 (2002) (citing Jerome H. Saltzer, "Open Access" is Just the Tip of the Iceberg (Oct. 22, 1999) (unpublished manuscript), *available at* <http://web.mit.edu/Saltzer/www/publications/openaccess.html>); François Bar et al., *Defending the Internet Revolution in the Broadband Era: When Doing Nothing Is Doing Harm* 25 (Aug. 1999) (unpublished manuscript), *available at* <http://e-conomy.berkeley.edu/publications/wp/ewp12.pdf>.

¹² See Amy Schatz & Anne Marie Squeo, *As Web Providers' Clout Grows, Fears Over Access Take Focus: FCC's Ruling Fuels Debate Between Broadband Firms and Producers of Content*, WALL ST. J. Aug. 8, 2005, at A1 (reporting phone and cable companies' insistence that they will not block access to competitors' websites).

¹³ See *id.* (quoting Chairman Martin as saying "We haven't seen any evidence of this binge a problem" and noting that "Congressional proponents of net-neutrality legislation acknowledge that it isn't a problem now"); Peter J. Howe, *News from the Chicago Cable and Telecom Show*, BOSTON GLOBE, June 16, 2003, at C2 (quoting FCC Commissioner Jonathan Adelstein as saying "[w]e don't see overwhelming evidence of a problem right now" and calling network neutrality "a solution awaiting a problem").

¹⁴ See, e.g., *Ex parte* Letter of Timothy Wu and Lawrence Lessig at 12-15, Cable Modem Declaratory Ruling and NPRM, *supra* note 2 (F.C.C. filed Aug. 22, 2003) (CS Docket No. 02-52) [hereinafter Wu & Lessig *Ex Parte*], *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6514683884; LESSIG, *supra* note 11, at 156-58; Wu, *supra* note 11, at 151-54, 165-70; Bar et al., *supra* note 11, at 24-26; Saltzer, *supra* note 11.

¹⁵ A consortium of trade association known as the High Tech Broadband Coalition (HTBC) (comprised of the Business Software Alliance, Consumer Electronics Association, Information Technology Industry Council, National Association of Manufacturers, Semiconductor Industry Association, and Telecommunications Industry Association) has advanced a series of "connectivity principles" that would require last mile broadband providers to give end users unrestricted access to all content and allow them to run any applications and attach any devices they desire, so long as these efforts do not harm the providers' network, enable theft of services, or exceed the bandwidth limitations of the particular service plan. Comments of the High Tech Broadband Coalition at 6-13, Cable Modem Declaratory

Powell, who called upon the industry to undertake voluntary steps to ensure end users' freedom to access content, use applications, and attach personal devices.¹⁶ Interest was fanned still further when a small carrier known as Madison River Communications attempted to protect its local telephone business by blocking its DSL customers from using the ports needed to access Internet telephony (also known as "voice over Internet protocol" or VoIP).¹⁷ Allegations of similar interruptions of VoIP service by minor service providers continue to appear.¹⁸

These issues came to a head after Chairman Martin indicated in a speech that the FCC was considering a proposal to level the regulatory playing field by "giv[ing] telcos the same deregulatory treatment as cable."¹⁹ Martin's speech touched off a paroxysm of lobbying at the FCC and Capitol Hill by industry representatives, who asked policymakers to mandate network neutrality.²⁰ Their efforts were partially successful. When adopting the order reclassifying DSL as an information service, the FCC repealed the access requirements established during the *Computer Inquiries* and rejected calls for imposing alternative access requirements or

Ruling and NPRM, *supra* note 2 (F.C.C. filed June 17, 2002) (CC Dkt. No. 02-52), available at http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513198026. The HTBC's proposal has drawn the support of a group composed primarily of software and content providers known as the Coalition of Broadband Users and Innovators (CBUI) (which is comprised of such notable content and software providers as Microsoft, Disney, Amazon.com, eBay, and Yahoo!, as well as the Media Access Project, the Consumer Electronics Association, and the National Association of Manufacturers). See *Ex parte* Communication from the Coalition of Broadband Users and Innovators at 3-4, Cable Modem Declaratory Ruling and NPRM, *supra* note 2 (F.C.C. filed Jan. 8, 2003) (CS Dkt. No. 02-52), available at http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513401671.

¹⁶ Michael K. Powell, *Preserving Internet Freedom: Guiding Principles for the Industry*, 3 J. ON TELECOMM. & HIGH TECH L. 5, 11-12 (2004).

¹⁷ See Madison River Communications, LLC, Order, 20 F.C.C.R. 4295 (2005).

¹⁸ See Tripp Blatz, *Three Carriers Have Now Blocked Access to Ports for VoIP*, *Vonage Chairman Alleges*, TELECOMM. MONITOR, Aug. 23, 2005.

¹⁹ Fed. Communications Comm'n Chairman Kevin J. Martin, Remarks at the NARUC Summer Meeting 5 (July 26, 2005), available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-260312A1.pdf.

²⁰ See Cheryl Bolen, *Entertainers Looking to Influence Next Telecommunications Act Update*, TELECOMM. MONITOR, July 19, 2005; Amy Schatz, *FCC May Set Rules Allowing Bells Exclusive Access Over DSL Lines*, WALL ST. J., Aug. 3, 2005, at A4.

nondiscrimination requirements.²¹ At the same time, the FCC explicitly reserved the right to impose access requirements should circumstances warrant doing so²² and issued a policy statement recognizing the agency's intent to preserve consumers' rights to access the content, run the applications, and attach the devices of their choice.²³

These steps were not sufficient to placate network neutrality proponents' concerns. The policy statement recognized an exception for "reasonable network management" and explicitly acknowledged that it has no legal effect until incorporated into formal rules.²⁴ In addition, the statement released by Chairman Martin in conjunction with the policy statement expressed his confidence that competition would remain sufficiently robust that such regulation would prove unnecessary.²⁵ The continuing controversy ultimately became front-page news in the *Wall Street Journal*, which predicted that the issue will be a major issue when Congress begins its impending overhaul of the communications laws.²⁶

These developments suggest that the time is thus ripe for a fresh look at the network neutrality debate. On its face, the vision of an Internet in which every user can access any content, run any application, and attach any device has considerable intuitive appeal. Such unfettered choice would appear to be a natural part of promoting consumer welfare. Indeed, the

²¹ See Appropriate Framework for Broadband Access to the Internet over Wireline Facilities, Report and Order and Notice of Proposed Rulemaking, FCC 05-150, slip op. at 10-46 ¶¶ 12-85, 52-53 ¶¶ 96-97 (rel. Sept. 23, 2005) [hereinafter Broadband Access Order], available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-05-150A1.pdf.

²² See *id.* at 52 ¶ 96.

²³ Appropriate Framework for Broadband Access to the Internet over Wireline Facilities, Policy Statement, FCC 05-151 (rel. Sept. 23, 2005), available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-05-151A1.pdf.

²⁴ *Id.* at 3 n.15.

²⁵ FCC Chairman Kevin J. Martin, Comments on Commission Policy Statement 1 (Aug. 5, 2005), available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-260435A2.pdf [hereinafter Martin Comments on Policy Statement].

²⁶ See Schatz & Squeo, *supra* note 12.

fact that end users have long been free from any restrictions on content, applications, and devices makes network neutrality appear to be a natural baseline.

A closer analysis reveals that this perspective may embody too narrow a vision of consumer welfare. The key to understanding why this might be the case is recognizing the fact that the Internet is subject to congestion. When networks are subject to congestion, one customer's usage of the network can degrade the quality of service that other customers receive. The ability to impose congestion costs on others thus constitutes an externality that, unless redressed, will inevitably lead to inefficient provision.²⁷

Fortunately, policymakers wishing to address these problems can draw on the extensive theoretical literature exploring the economics of congestion. Much of the literature has focused on the choice between flat-rate pricing and usage-sensitive pricing. The primary finding of this literature is that competitive markets will reach an efficient equilibrium if each user is charged a usage-sensitive price set equal to their marginal contribution to congestion.²⁸ As a result, some commentators have argued in favor of shifting all Internet services to usage-sensitive pricing.²⁹ Later studies point out that the case for usage-sensitive pricing becomes somewhat less compelling once transaction costs are taken into account. Indeed, the models that take transaction costs into consideration indicate that circumstances exist in which economic welfare would be better served if end users were charged flat-rates instead of usage-sensitive prices.³⁰

²⁷ See, e.g., A.C. PIGOU, *THE ECONOMICS OF WELFARE* 172-88 (4th ed. 1948) (providing the classic analysis of how externalities can lead to market failure).

²⁸ See, e.g., Eitan Berglas, *On the Theory of Clubs*, 66 AM. ECON. REV. 116, 119 (1976).

²⁹ See Jeffrey K. MacKie-Mason & Hal R. Varian, *Pricing Congestible Network Resources*, 13 IEEE J. on SELECTED AREAS IN COMMUNICATIONS 1141 (1995); cf. J. Gregory Sidak & Daniel F. Spulber, *Cyberjam: The Law and Economics of Internet Congestion of the Telephone Network*, 21 HARV. J.L. & PUB. POL'Y 327 (1998) (arguing that the economics of congestion justified requiring Internet service providers to pay interstate access charges).

³⁰ See Robert J. Barro & Paul M. Romer, *Ski-Lift Pricing, with Applications to Labor and Other Markets*, 77 AM. ECON. REV. 875, 876-79 (1987); Robert W. Helsley & William C. Strange, *Exclusion and the Theory of Clubs*, 24 CANADIAN J. ECON. 888, 889, 895-96 (1991); Kangoh Lee, *Transaction Costs and Equilibrium Pricing of*

While the debate between flat-rate and usage-sensitive pricing is an important one, it is incomplete in that it frames the range of available pricing options too narrowly. Specifically, it overlooks the insight, derived from Ronald Coase's classic critique of the economic parable of the lighthouse,³¹ that the high transaction costs associated with metered pricing can also be avoided by finding an alternative, more easily metered activity that can serve as a proxy for usage. If that alternative activity is easier to meter, it can provide a useful approximation of actual usage of the primary services.

Consideration of a broader range of possible solutions to the pricing problem expands the policy space in important ways. It suggests that allowing broadband providers to impose restrictions on bandwidth-intensive end user activities could well represent a cost-effective way to address the problems of congestion. In fact, the types of restrictions that cause network neutrality proponents the greatest concern are precisely the type of activities that tend to impose congestion costs on other users.

My analysis also suggests that allowing unfettered access to content, applications, and devices may actually harm consumers. Simply put, the current regime of flat-rate pricing and unrestricted access allows high-volume users who contribute more to congestion to impose costs on low-volume users, in effect requiring the latter to subsidize the former. Taking a broader vision of consumer welfare reveals that placing restrictions on high-bandwidth uses can benefit consumers by forcing those who create the most congestion on the Internet to internalize the costs they impose on others. Conversely, low-volume users will likely benefit from such

Congested Public Goods with Imperfect Information 45 J. PUB. ECON. 337, 340-43 (1991). Barro and Romer did not initially frame their analysis in terms of congestion economics, but later acknowledged the connection. See Robert J. Barro & Paul M. Romer, *Ski-Lift Pricing, with Applications to Labor and Other Markets: Reply*, 81 AM. ECON. REV. 378 (1991).

³¹ See R.H. Coase, *The Lighthouse in Economics*, 17 J.L. & ECON. 357 (1974), reprinted in FAMOUS FABLES IN ECONOMICS 32-48 (Daniel F. Spulber ed., 2002).

restrictions, through increases in the quality of the service they receive rises and the decreases in the prices they pay.³²

In essence, I am proposing a shift in the vision of the ideal form of competition. My approach would abandon the vision in which end users and providers of content and applications face no restrictions in their ability to contract with one another in favor of one in which the presence of transaction costs can justify the use of exclusivity arrangements (which network neutrality proponents are, in essence, a form of vertical integration³³) and in which competition among providers checks anticompetitive conduct. The transformation for which I am arguing largely parallels the evolution of the antitrust laws with respect to vertical integration over the past three decades. Prior to the mid-1970s, the Supreme Court's vertical integration precedents sought to protect the independence of purchasers and traders to buy and sell in an open market as they saw fit.³⁴ Over time, however, the Court began to acknowledge that exclusivity arrangements often served procompetitive purposes, such as allowing companies to avoid the transaction costs needed to protect themselves against opportunistic behavior.³⁵ As a result, the Court has become considerably more hospitable towards competition among vertically integrated enterprises, discarding buyer and trader freedom as independents value and rejecting categorical prohibitions of exclusivity arrangements in favor of a more nuanced, case-specific approach.³⁶

The case against network neutrality also draws on economic considerations separate from congestion. For example, by allowing network owners to differentiate the services they offer,

³² See Jeffrey K. MacKie-Mason & Hal R. Varian, *Some FAQs About Usage-Based Pricing*, 28 COMPUTER NETWORKS & ISDN SYS. 257, 258 (1995).

³³ See LESSIG, *supra* note 11, at 165-66; Tim Wu, *The Broadband Debate, A User's Guide*, 3 J. ON TELECOMM. & HIGH TECH. L. 69, 84-85 (2004).

³⁴ See, e.g., *United States v. Brown Shoe Co.*, 370 U.S. 294, 344 (1962) (freedom of purchasers); *Klor's, Inc. v. Broadway-Hale Stores, Inc.* 359 U.S. 207, 212-13 (1959) (freedom of traders).

³⁵ See, e.g., *Continental T.V., Inc. v. GTE Sylvania, Inc.*, 433 U.S. 36, 55 (1977).

³⁶ See *id.* at 52-59 & n.21.

exclusivity can play a key role in mitigating the sources of market failure that require regulatory intervention in the first place. Taken to its logical extreme, it suggests that broadband policy might be better off if it instead embraced a *network diversity* principle. Furthermore, close analysis reveals that claims that network neutrality is needed to protect innovation are misplaced in the context of the Internet. When innovation occurs on a physical network, the network owner is in an ideal position to internalize any innovation externalities that may exist. Finally, attempts to build a case for network neutrality on classic telecommunications precedents such as *Hush-a-Phone*,³⁷ *Carterfone*,³⁸ and the *Computer Inquiries*³⁹ ignore the fact that those decisions arose during an era when in which local telephone companies represented the only available means of transmission and in which the traffic consisted solely of person-to-person communications. They have less purchase in a world in which competition among last-mile providers is already vibrant and growing ever more robust and in which the avalanche of content available on the Internet has heightened end users' reliance on media filters exercising editorial discretion.

The result is a new perspective on network neutrality that is more complex and nuanced than has yet appeared in the existing debate. In advancing my argument, I do not mean to suggest that restrictions on end users' ability to access content, run applications, and connect devices will always be welfare enhancing. Indeed, circumstances exist under which permitting such restrictions would actually reduce economic welfare. In particular, as the recent conduct of Madison River demonstrates, telephone companies may attempt to insulate their core local telephone businesses from competition by preventing end users from using their DSL

³⁷ *Hush-a-Phone Corp. v. United States*, 238 F.2d 266 (D.C. Cir. 1956).

³⁸ *Use of the Carterfone Device in Message Toll Telephone Service*, 13 F.C.C.2d 420 (1968).

³⁹ Amendment of Section 64.702 of the Commission's Rules and regulations (Second Computer Inquiry, Final Decision, 77 F.C.C.2d 384, 474-75 ¶ 231 (1980), *aff'd sub nom.* Computer & Communications Indus. Ass'n v. FCC, 693 F.2d 198 (D.C. Cir. 1982).

connections to access VoIP.⁴⁰ Cable modem providers may similarly have the incentive to protect their core television businesses by prohibiting end users from using broadband connections for streaming video.⁴¹

My point is a more limited one and does not depend on whether the types of restrictions to which network neutrality proponents object are always economically beneficial. For my purposes it is sufficient if, as network neutrality proponents have been forced to concede, some restrictions may be motivated by legitimate concerns about network management and if it is hard to distinguish procompetitive and anticompetitive uses of such restrictions.⁴² When intervention may well do more harm than good and particularly when consumers do not face any immediate harm and the proposed protective measures are prophylactic in nature,⁴³ the more prudent course would be to forego imposing network neutrality as a regulatory mandate. As long as consumers have the option of switching to alternative broadband providers, any attempt to use exclusivity to harm competition will prove futile, since any frustrated end user will simply reallocate their purchases to another provider. Furthermore, even if competition is not sufficiently robust to protect consumers, at most these concerns would justify the type of targeted intervention imposed by the FCC in *Madison River*, limited to prohibiting the broadband provider from blocking access to those applications that compete directly with the broadband provider's core business. They would not justify the blanket prohibition of any restrictions on end users' ability to access content, run applications, or attach devices.

⁴⁰ See *supra* note 17 and accompanying text.

⁴¹ See, e.g., LESSIG, *supra* note 11, at 156-58; Bar et al., *supra* note 11, at 25; Saltzer, *supra* note 11, at 1.

⁴² See LESSIG, *supra* note 11, at 46; Wu, *supra* note 11, at 143, 153-54; Bar et al., *supra* note 11, at 24; cf. Saltzer, *supra* note 11 (conceding that all such restrictions can be justified by a "technical excuse").

⁴³ See *supra* notes 12-13 and accompanying text.

The balance of the Article is organized as follows: Part I discusses the sources of congestion on the Internet. Part II lays out the basic economics of congestion, paying particular attention to the impact of transaction costs. Part III applies the insights provided by the foregoing analysis to the broadband industry, concluding that the types of restrictions that have drawn criticism from network neutrality proponents may well be economically justified. Indeed, if one adopts a broader notion of consumer welfare, such restrictions may well benefit consumers by forcing heavy bandwidth users to bear the congestion costs they impose on other users and by effectively lowering the prices paid by light bandwidth users who previously were forced to cross subsidize heavier users. It also engages the broader arguments about the economics of innovation and the dangers of imposing regulation in the face of prospective harms. Part IV bolsters the basic congestion-based argument by examining the ways that exclusivity can mitigate the sources of market failure that justify regulation in the first place. It also demonstrates the inapplicability of previous regulatory precedents in a world in which competition among last-mile providers is an emerging reality and in which the increasing use of telecommunications networks to convey media content has heightened the need for the exercise of editorial discretion.

I. SOURCES OF CONGESTION ON THE INTERNET

One of the keys to understanding the issues of network management is the fact that the Internet is subject to congestion. As is commonly known, the Internet is not a single network, but rather a network of interconnected networks. The FCC has found it useful to divide the

networks that comprise the Internet into three types.⁴⁴ *Backbone providers*⁴⁵ provide high-speed, long-distance connections between a small number of interconnection points.⁴⁶ *Middle-mile providers* provide regional distribution functions, carrying the traffic from the limited number of interconnection points served by backbone providers to the distribution facilities maintained by last-mile providers in individual cities.⁴⁷ *Last-mile providers* convey the traffic from these locally located distribution facilities to the premises of end users.⁴⁸ The FCC has analogized this to a road system. Backbones represent interstate highways, which convey traffic at high speeds and allow entry and exit only through limited access points. Middle-mile networks are the divided highways that connect interstate exits to local roads. Last-mile networks are the local roads, responsible for delivering traffic to the driveways leading into individual residences.⁴⁹

Until recently, the protocols that govern the Internet have required that all of these providers be organized into a series of parallel hierarchies, in which each last-mile provider exchanged traffic with a dedicated middle-mile provider, which in turn exchanged traffic with a

⁴⁴ See Inquiry Considering the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, Second Report, 15 F.C.C.R. 20913, 20922-28 ¶¶ 18-28 (2000) [hereinafter Second Section 706 Report].

⁴⁵ Depending on the context, the FCC sometimes replaces the term, backbone provider, with the term *long haul communications transport facilities* to make clear that it is referring to high-speed fiber transport used for voice as well as data communications. See Inquiry Considering the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, Third Report, 17 F.C.C.R. 2844, 2853 n.33 (2002).

⁴⁶ Originally, backbones only interconnected at the four public Network Access Points (NAPs) created by the National Science Foundation (located in San Francisco, Chicago, New York, and Washington, D.C.), as well as the Commercial Internet Exchange maintained in Santa Clara, California. See MICHAEL KENDE, THE DIGITAL HANDSHAKE: CONNECTING INTERNET BACKBONES 5-6 (FCC Off. of Plans & Pol’y Working Paper No. 32, Sept. 2000), available at http://www.fcc.gov/Bureaus/OPP/working_papers/oppwp32.pdf. The NAPs have since been privatized, and backbone providers have also created a number of other public interconnection points, where any carrier can exchange traffic. In addition, backbone providers have begun to exchange traffic directly through private interconnection points. See Christopher S. Yoo, *Would Mandating Network Neutrality Help or Hurt Broadband Competition?: A Comment on the End-to-End Debate*, 3 J. ON TELECOMM. & HIGH TECH. L. 23, 31 (2004).

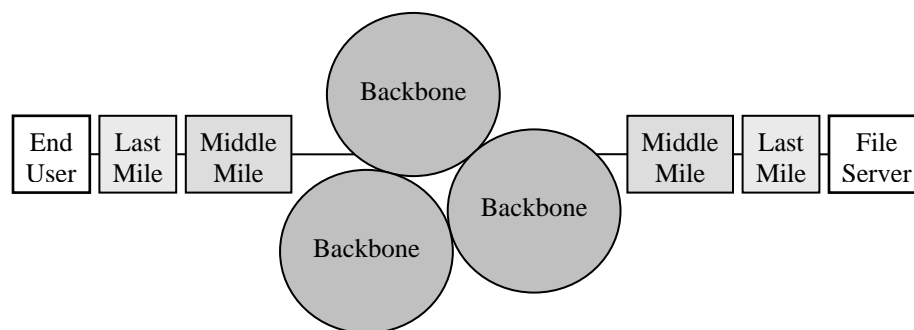
⁴⁷ Under broadband, middle-mile and last-mile provision is often vertically integrated. This is because there are often real efficiencies that result from such integration. Yoo, *supra* note 46, at 31-34.

⁴⁸ See Second Section 706 Report, *supra* note 44, at 20923 ¶ 18, 20938-39 ¶ 60.

⁴⁹ See *id.* at 20922-23 ¶ 18.

dedicated backbone.⁵⁰ Each type of Internet provider in this chain must maintain some infrastructure for conveying the stream of data packets, consisting of wires, fiber optic cable, or some other medium of transmission. Each network must also have a number of computers called *routers*, which operate in the core of the network to direct packets to their destination. Computers that store files at the edge of the network and fulfill requests for those files from other users are called *servers*.

Figure 1
The Basic Architecture of the Internet



The process can be illustrated by tracing the path of a typical Internet transaction, such as downloading a webpage over a cable modem system. The process begins when an end user employs its computer to submit the request for a webpage. The end user's computer divides the address of the requested webpage into packets and forwards the packets to the cable modem provider serving that end user. The packets travel through the coaxial cables connecting the end user's premises to a fiber node located in the neighborhood, which aggregates those packets with

⁵⁰ It is noteworthy that the deployment of a new routing protocol has allowed providers to deviate from this strict hierarchical arrangement. Middle-mile providers are beginning to enter into *secondary peering arrangements*, in which they exchange traffic directly with one another, and employing *multihoming*, in which they route traffic to more than one backbone. In addition, last-mile providers are beginning to use *caching* to store heavily demanded content locally, which allows them to fulfill requests without accessing the usual range of Internet resources. This richer set of interconnection arrangements has made the Internet less hierarchical and has reduced the ability of core backbone providers to engage in anticompetitive conduct. See Stanley M. Besen et al., *Advances in Routing Technologies and Internet Peering Agreements*, 91 AM. ECON. REV. 292 (2001).

other traffic and transmits them to a local facility known as the headend. A cable modem termination system separates the data packets from the video stream and directs them onto the data network maintained in the headend.⁵¹ The router on the data network located in the headend transmits the packets to a middle-mile provider, which in turn routes the packets to one of the interconnection points served by backbone providers. The backbone directs the packets to other backbone providers until they reach the backbone connected to the middle-mile provider that serves the destination.⁵² The middle-mile provider then directs the packets to the terminating last-mile provider, which passes them on to the server hosting the webpage content. The web server fulfills the request, and the packets comprising the webpage returns through a similar set of steps.

Congestion results from the fact that the capacity of almost every step in this process is constrained. For example, the bandwidth of each component of the physical transmission media (e.g., the wires and fiber nodes comprising the network) is limited. The number of packets and requests that routers and content servers can fulfill at any time is similarly constrained. When data packets arrive at a rate that exceeds the capacity of any particular element, they form a queue. The resulting delay in the speed with which the requests are fulfilled causes degradation in the quality of service provided by the network.

⁵¹ See Daniel F. Spulber & Christopher S. Yoo, *Access to Networks: Economic and Constitutional Connections*, 88 CORNELL L. REV. 885, 1014-15 (2003) (offering a more detailed depiction of cable modem systems).

⁵² The number of backbones involved depends on whether service is being provided under a *peering* or a *transit* arrangement. Under peering arrangements, backbones only exchange traffic that originates from the customer of one backbone and terminates with the customers of the other peered backbone. In that case, the maximum number of backbones involved is two. Under transit arrangements, backbones will serve as intermediaries for traffic that neither originates from nor terminates with their customers or the customers of their peering partners. In this case, the number of backbones involved may exceed two. See KENDE, *supra* note 46, at 5, 7.

Changes in the ways people are using the Internet are making these problems all the more acute. The Internet was once dominated by e-mail and other applications that placed fairly modest demands on the network, and the restrictions imposed by the National Science Foundation on backbone services limited the Internet to noncommercial uses. The subsequent privatization of the Internet has greatly increased the number of network users as well as the heterogeneity of network usage. These changes have increased the variability of demand in ways that have made problems of network management considerably more complex.⁵³ Just to name a few examples, the emergence of webpage downloading, which require the transfer of images and multimedia features, has increased the intensity of bandwidth usage, as has the emergence of music filesharing and other applications involving the transfer of increasingly large files. In addition, end users are increasingly using applications that are sensitive to delay, such as streaming media, online gaming, and VoIP. Thus, guaranteed throughput rates have become increasingly important at the precise time that increases in the volume of traffic are making quality of service harder to maintain.

II. THE ECONOMICS OF CONGESTION

The fact that the Internet is subject to congestion has a number of important policy implications. Perhaps the most sophisticated insights into congestion are provided by the branch of economics known as *club goods*, which was largely inspired by the pioneering work of Nobel laureate James Buchanan.⁵⁴

⁵³ See Daniel F. Spulber & Christopher S. Yoo, *On the Regulation of Networks as Complex Systems: A Graph Theory Approach*, 99 NW. U. L. REV. 1689, 1702 (2005).

⁵⁴ See James Buchanan, *An Economic Theory of Clubs*, 32 ECONOMICA 1 (1965). See generally RICHARD CORNES & TODD SANDLER, *THE THEORY OF EXTERNALITIES, PUBLIC GOODS AND CLUB GOODS* 351-53 (2d ed. 1996) (reviewing the origins of the study of club goods). Buchanan's work is related to Charles Tiebout's earlier work on *local public goods*, which analyzed shared resources provided by local governments. Tiebout's model

Club goods are goods that can be shared by more than one person. In this respect, they possess an element of nonrivalry similar to that possessed pure public goods associated with the work of Paul Samuelson.⁵⁵ At the same time, they differ from pure public goods in that consumption by an additional person creates congestion costs that cause the quality of the services provided to others to deteriorate. Even though congestion costs render the good in question partially nonrival, the good retains the qualities associated with jointness of supply, in the sense that individuals cannot make purchase decisions independently.⁵⁶ As is the case with pure public goods, individuals also have the incentive to conceal their true preferences for the shared resource in an attempt to lower the proportion of the setup and exclusion costs that they must bear.⁵⁷ Buchanan's paradigmatic example of a club good is a swimming pool.⁵⁸ Others have suggested that the theory also applies to a wide range of facilities, including golf courses, theaters, laundromats, and restaurants.⁵⁹

A. Congestion and the Choice Between Flat-Rate and Usage-Sensitive Pricing

One of the primary issues that has emerged in the literature is whether a club should charge a single flat-rate price for membership or whether it should charge a price that varies with

assumed that cities attempt to achieve an optimal community size, which is achieved when a city produces the bundle of services desired by residents at the lowest average cost. The posited "U"-shape of the cost curve in turn presupposed the existence of some local resource that was in fixed supply, such as a beach or the total amount of land available; otherwise, there would be no logical reason to limit community size. See Charles M. Tiebout, *A Pure Theory of Local Expenditures*, 64 J. POL. ECON. 416, 419 (1956). Although Tiebout does not specify what causes marginal cost to increase, it is analogous to the congestion costs assumed by the club goods literature. The primary difference between club goods and local public goods is the feasibility of entry. The former assumes that entry by new clubs is possible. The latter assumes that the total number of municipalities is fixed. See Suzanne Scotchmer, *Public Goods and the Invisible Hand*, in MODERN PUBLIC FINANCE 93, 95, 107 (John M. Quigley & Eugene Smolensky eds., 1994).

⁵⁵ See Paul A. Samuelson, *The Pure Theory of Public Expenditure*, 36 REV. ECON. & STAT. 387 (1954) (providing the seminal analysis of pure public goods).

⁵⁶ See Buchanan, *supra* note 54, at 3-5.

⁵⁷ See William H. Oakland, *Theory of Public Goods*, in 2 HANDBOOK OF PUBLIC ECONOMICS 485, 502-03 (Alan J. Auerbach & Martin Feldstein eds., 1987).

⁵⁸ See Buchanan, *supra* note 54, at 1.

⁵⁹ See, e.g., Robin Boadway, *A Note on the Market Provision of Club Goods*, 13 J. PUB. ECON. 131, 131 (1980).

the intensity of each member's usage of the club facilities. The standard result is that reliance solely on flat-rate pricing will result in inefficiently high levels of congestion and in overconsumption of the club facilities.⁶⁰

The intuitions underlying this result are quite straightforward. Economic welfare is maximized if the market reaches equilibrium at the point where the social benefits equal the social costs. In the case of club goods, this would occur where the benefits each club member derives from the last unit consumed equals the costs of congestion created by the last unit consumed. The problem is that if club members are charged rates that are not sensitive to usage, the private cost of consuming an additional unit is zero. That means that utility-maximizing club members will increase their consumption of club resources until the marginal utility from any further increases in usage is zero, at which point the social costs associated with the last unit consumed exceed the benefits and welfare is reduced.

In short, flat-rate pricing results in excessive consumption of club resources, which arises because the congestion costs represent a negative externality that individual club members responsible for causing the congestion are not forced to bear. The classic solution is to impose a usage-sensitive price that is equal to the congestion costs imposed by the last unit consumed. In this way, usage-sensitive pricing aligns incentives by bringing private costs into line with the true social costs of consuming an additional unit.⁶¹

⁶⁰ See, e.g., Berglas, *supra* note 28, at 119; Eitan Berglas, *The Market Provision of Club Goods Once Again*, 15 J. PUB. ECON. 389, 393 (1981); Suzanne Scotchmer, *Two-Tier Pricing of Shared Facilities in a Free-Entry Equilibrium*, 16 RAND J. ECON. 456, 457 (1985).

⁶¹ Within each club, each member will calibrate their consumption until the utility they derive is equal. There may initially be some variation in per capita utility across clubs, with some clubs being more crowded than others. Assuming that there is mobility across clubs is possible, people in high-congestion clubs will seek to shift to low-congestion clubs until utility is equalized across all clubs. Furthermore, club goods theory posits the existence of an optimal club size. On the one hand, increasing club size benefits members by allowing them to amortize the overhead costs needed to establish the club and to enforce exclusion over a larger membership base. On the other hand, any increase in membership causes congestion costs to rise. Clubs thus add members until the benefits of

Usage-sensitive pricing has thus been traditionally regarded as a critical mechanism for promoting the efficient allocation of resources. This type of reasoning explains why the FCC has historically been quite skeptical of pricing regimes that are not sensitive to the degree of usage. For example, when determining the pricing regime for interconnecting local telephone networks under the Telecommunications Act of 1996, the FCC expressed considerable hostility towards a flat-rate pricing regime known as *bill and keep*, in which each local telephone provider terminates calls originating on the other network on a settlement free basis. The problem is that while the terminating carrier would incur significant costs for terminating a call, it would not receive any revenue for doing so. The failure to compensate terminating carriers for their costs thus gives originating carriers both the ability and the incentive to impose costs onto terminating carriers. As with club goods, the concern is that the resulting externalization of costs can lead to overutilization of the terminating carrier's resources. It is why the FCC criticized bill and keep as "economically inefficient."⁶² This basic insight has also led a number of commentators to favor imposing some type of usage-sensitive pricing on the Internet.⁶³

spreading costs over an additional member no longer exceed the marginal increase in congestion costs, at which point they will stop adding new members. Assuming free entry, any remaining individuals refused membership in existing clubs remain free to form new clubs. The result is an equilibrium in which the optimal number of clubs exists and in which each club member consumes the optimal amount of club services. See Buchanan, *supra* note 54, at 3-5, 8-9. Subsequent work has confirmed this result regardless of whether the market structure is monopolistic, oligopolistic, or competitive. See MacKie-Mason & Varian, *supra* note 29, at 1143, 1147 (competitive and monopolistic); P.S. Calem & Daniel F. Spulber, *Multiproduct Two-Part Tariffs*, 2 INT'L J. INDUS. ORG. 105 (1984) (oligopolistic).

⁶² See Implementation of the Local Competition Provisions in the Telecommunications Act of 1996, First Report and Order, 11 F.C.C.R. 15499, 16055 ¶ 1112 (1996) [hereinafter Local Competition Order].

⁶³ See, e.g., MacKie-Mason & Varian, *supra* note 29, at 1142-43; Spulber & Sidak, *supra* note 29, at 353-54, 357-59.

B. The Impact of Transaction Costs on the Choice Between Flat-Rate and Usage-Sensitive Pricing

The basic result for clubs goods is subject to a number of assumptions and limiting conditions, most of which are not relevant to the network neutrality debate.⁶⁴ One caveat that is applicable, however, is that the standard result depends on the assumption that exclusion and metering is costless.⁶⁵ A literature has emerged relaxing this assumption and exploring the results that obtain when taking into account the fact that metering and exclusion require the incurrence of transaction costs. It draws on the insight that someone buying ten units of a good is indifferent between a price of \$1 per unit and a \$10 entry fee with a ten-unit limit per customer. In other words, the equilibrium under usage-sensitive pricing can be replicated by charging a flat-rate price set equal to the unit price under usage-sensitive pricing times the

⁶⁴ For example, as a purely formal matter, a club good equilibrium is only stable if dividing the overall population by the optimal club size results in an integer. When that occurs, the solution is said to be in the *core*, which in turn implies that the equilibrium is Pareto optimal, in that no individual or set of individuals can improve their situation by forming a different club. A noninteger result destabilizes the equilibrium, however, since anyone excluded from club membership will have the incentive to attempt to bid their way into a club by offering to accept a lower payoff than a current club member. The result is a constant shuffling of club composition. See, e.g., Mark V. Pauly, *Clubs, Commonality and the Core: An Integration of Game Theory and the Theory of Public Goods*, 34 *ECONOMICA* 314 (1967). Fortunately, introduction of a concept known as the *approximate core* renders the nonexistence of an equilibrium less problematic than initially appears. If the number of club members is large relative to the number of nonmembers, club members can make side payments to nonmembers in order to induce them not to destabilize the existing coalitions. The resulting utilities lie fairly close to core utilities. See, e.g., Myrna H. Wooders, *The Tiebout Hypothesis: Near Optimality in Local Public Goods Economies*, 48 *ECONOMETRICA* 1467 (1980).

Another limiting factor is that the classic analysis of club goods assumes that consumer preferences are homogeneous. See, e.g., Buchanan, *supra* note 54, at 6, 8. If preferences are heterogeneous, each homogeneous subset of the population should partition itself into homogeneous clubs. See Eitan Berglas & David Pines, *Clubs, Local Public Goods, and Transportation Models: A Synthesis*, 15 *J. PUB. ECON.* 141, 150-52 (1981); Martin McGuire, *Group Segregation and Optimal Jurisdictions*, 82 *J. POL. ECON.* 112 (1974); Mark V. Pauly, *Cores and Clubs*, 9 *PUB. CHOICE* 53 (1970). If integer problems prevent the total population from segregating itself into homogeneous clubs, individuals with different preferences may have to form a *mixed club*. The resulting intraclub heterogeneity can lead to suboptimal provision. See Berglas & Pines, *supra*, at 150-52. Later work has shown that mixed clubs may be optimal so long as crowding is anonymous and members' demands for facility size and congestion coincide at a feasible division of total economy wide endowments. See Suzanne Scotchmer & Myrna Holtz Wooders, *Competitive Equilibrium and the Core in Club Economies with Anonymous Crowding*, 34 *J. PUB. ECON.* 159 (1987).

⁶⁵ See Helsley & Strange, *supra* note 30, at 889, 895-96.

optimal number of units consumed.⁶⁶ Given the identity of these two pricing mechanisms, providers are free to choose the pricing regime that imposes the fewest transaction costs. Thus, if the transaction costs of metering and exclusion are sufficiently high, flat-rate pricing may well prove economically superior to usage-sensitive pricing.⁶⁷

The FCC has recognized the plausibility of this result by acknowledging that circumstances exist under which bill and keep may make economic sense. If the traffic exchanged between carriers is roughly symmetrical, the compensation that each carrier would pay the other for terminating its calls would tend to offset one another. Under these circumstances, eliminating usage-sensitive pricing would not have any significant adverse impact on the carriers while allowing both carriers to avoid the administrative burdens and transaction costs needed to create and implement metering regimes.⁶⁸ In other words, the presence of transaction costs may well make flat-rate pricing the preferred institutional arrangement.

Indeed, historical patterns suggest that bill and keep may make economic sense even when the traffic exchanged between carriers is not symmetrical. Similar compensation issues were posed long prior to the enactment of the 1996 Act by the existence of independent (i.e., non-Bell) local telephone companies operating in the same local calling area as AT&T. The

⁶⁶ See Barro & Romer, *supra* note 30, at 875-79.

⁶⁷ See *id.* at 879; Helsley & Strange, *supra* note 30, at 895-96. It is worth noting that the analyses that found flat-rate pricing preferable to usage-sensitive pricing assumed perfect information. See Helsley & Strange, *supra* note 30, at 893. When information is imperfect, the presence of transaction costs can lead to an adverse selection problem in which high demanders patronize facilities designed for low demanders. In such cases, no equilibrium may exist, and any equilibrium that does exist is inefficient. See Lee, *supra* note 30, at 338, 359.

In addition, existing analyses take capacity as given. Although per capita usage will be higher under flat-rate pricing, models that take capacity as endogenous also point out that capacity will be higher as well. As a result, the net impact on congestion is ultimately ambiguous and depends on which of these effects dominates. The problem becomes even more complex if one acknowledges that flat-rate pricing can cause the number of users to change as well. If users can shift to alternative providers of network services, adopting a flat-rate price will cause the customer base to consist solely of a small group of intensive users with a high tolerance for congestion. See MacKie-Mason & Varian, *supra* note 29, at 1145-47.

⁶⁸ See Local Competition Order, *supra* note 62, at 16055 ¶ 1112.

most prominent example of this situation is the simultaneous provision of local telephone service by GTE and Pacific Bell to adjacent neighborhoods in Los Angeles. Just as was the case with local telephone providers under the 1996 Act, these carriers needed some mechanism for compensating the other for the costs of terminating calls that originated on the other network. Interestingly, these carriers generally relied on bill and keep as the mechanism for settling interconnection costs despite the fact that the traffic exchanged was far from symmetrical. The implication is that the transaction cost economies associated with avoiding metering costs outweighed what little benefit the larger carrier would have derived from being compensated for the asymmetry in traffic flows.⁶⁹

Nor is reciprocal compensation between local telephone providers the only prominent instance in which communications networks have relied on flat-rate pricing. Top-tier backbones exchange traffic on a settlement-free basis through a system known as *peering*.⁷⁰ The FCC has taken the existence of peering as an indication that it should rethink its hostility towards flat-rate pricing regimes.⁷¹ At the same time, the experience of backbone peering does provide some evidence that symmetry in traffic may represent an important prerequisite for flat-rate pricing to constitute the preferred pricing regime. Large backbones have begun to limit peering to other backbones that can maintain certain minimum traffic volumes.⁷² Backbones unable to meet

⁶⁹ See PETER W. HUBER ET AL., *FEDERAL TELECOMMUNICATIONS LAW* § 2.4.1, at 174-75 (2d ed. 1999).

⁷⁰ See KENDE, *supra* note 46, at 5.

⁷¹ See Developing a Unified Intercarrier Compensation Regime, Notice of Proposed Rulemaking, 16 F.C.C.R. 9610, 9627 ¶ 43 (2001) [hereinafter Intercarrier Compensation NPRM].

⁷² See James B. Speta, *A Common Carrier Approach to Internet Interconnection*, 54 FED. COMM. L.J. 225, 232 (2002). Asymmetry in termination costs may not provide the only explanation for this requirement. The transaction costs of coordinate routing tables goes up as the number of core backbones increases. This suggests the existence of an optimal number of core backbones exchanging traffic on a settlement-free basis. This also suggests that other networks must be charged for terminating traffic in order to prevent them from free riding on the efforts of the core backbones. See Paul Milgrom et al., *Competitive Effects of Internet Peering Policies*, in *THE INTERNET UPHEAVAL* 173, 179-85 (Ingo Vogelsang & Benjamin M. Compaine eds., 2000).

Limiting peering to large backbones may also be designed to minimize another type of free riding. For example, backbones that interconnect on a settlement-free basis would prefer coast-to-coast traffic to travel on their

these minimum volume requirements were forced to enter into *transit arrangements*, in which backbones pay other backbones to terminate traffic.⁷³ The importance of symmetry is further underscored by the fact that backbones too small to peer with top-tier backbones have begun to enter into *secondary peering arrangements* with one another, which has helped to create a richer, less hierarchical set of interconnection arrangements that has weakened the dominant position of the top-tier backbones.⁷⁴ Other important examples of nonusage-sensitive pricing also exist, such as the fact that residential subscribers typically pay a flat monthly fee for unlimited local calls despite the facts that incremental usage does create costs and provision of local telephone service on an unmetered basis arguably stimulates overconsumption.⁷⁵

These examples have prompted the FCC to initiate a number of proceedings exploring broader use of bill-and-keep pricing regimes. For example, the FCC had tentatively concluded in 1996 that wireless providers should interconnect with wireline providers on a bill-and-keep basis.⁷⁶ In drawing this conclusion, it noted studies indicating that the transaction costs of metering the termination of traffic were sufficiently high to make bill and keep the more economically efficient pricing regime.⁷⁷ This effort ended when FCC opted to fold wireless-to-

peering partners' network to the greatest extent possible. This would mean that they would hand off traffic that they originate at the earliest possible interconnection point and would accept traffic that they terminate at the latest possible interconnection point. In order to avoid this type of free riding, backbones have adopted a practice known as *hot potato routing*, in which each backbone delivers packets bound for another backbone at the nearest possible interconnection point. Such a solution only works if the peering partners are large enough to maintain a relatively large set of interconnection points. *See id.* at 186.

⁷³ See KENDE, *supra* note 46, at 5-7, 16-17; Jay P. Kesan & Rajiv C. Shah, *Fool Us Once Shame on You—Fool Us Twice Shame on Us: What We Can Learn from the Privatizations of the Internet Backbone Network and the Domain Name System*, 79 WASH. U. L.Q. 89, 148 (2001).

⁷⁴ See Besen et al., *supra* note 48, at 292, 295.

⁷⁵ See Intercarrier Compensation NPRM, *supra* note 71, at 9615 ¶ 10.

⁷⁶ See Interconnection Between Local Exchange Carriers and Commercial Mobile Radio Service Providers, Notice of Proposed Rulemaking, 11 F.C.C.R. 5020 (1996).

⁷⁷ *Id.* at 5038 ¶ 36.

wireline interconnection into the larger pricing regime established to implement the Telecommunications Act of 1996.⁷⁸

The FCC's interest in bill and keep has continued to grow. Prompted by a pair of in-house studies supporting broader use of bill-and-keep regimes⁷⁹ and by the prevalence of bill-and-keep regimes for backbone interconnection and flat-rate pricing for residential local telephone service,⁸⁰ the FCC has begun exploring whether bill and keep can serve as the basis for reforming the entire regime of intercarrier compensation.⁸¹ In the process, the FCC specifically sought and received comments on whether transaction costs might justify flat-rate pricing.⁸²

C. Coasean Proxies as an Overlooked Solution to Congestion

Although incorporating transaction cost considerations has yielded important insights into the choice between flat-rate and usage-sensitive pricing, the analysis remains incomplete. The problem is that framing the issue as a choice between flat-rate and usage-sensitive pricing fails to take into account the full range of possible institutional forms. In particular, it overlooks the possibility that transaction costs can also be avoided by identifying and charging for another good that can be metered more cheaply and that can serve as a reasonable proxy for usage of good that needs to be metered.

⁷⁸ See Local Competition Order, *supra* note 62, at 16005-07 ¶¶ 1023-1026.

⁷⁹ See JAY M. ATKINSON & CHRISTOPHER C. BARKENOV, A COMPETITIVELY NEUTRAL APPROACH TO NETWORK INTERCONNECTION (FCC Off. of Plans & Pol'y Working Paper No. 34, Dec. 2000), *available at* http://www.fcc.gov/Bureaus/OPP/working_papers/oppwp34.pdf; PATRICK DEGRABA, BILL AND KEEP AT THE CENTRAL OFFICE AS AN EFFICIENT INTERCONNECTION REGIME (FCC Off. of Plans & Pol'y Working Paper No. 33, Dec. 2000), *available at* http://www.fcc.gov/Bureaus/OPP/working_papers/oppwp33.pdf.

⁸⁰ See Intercarrier Compensation NPRM, *supra* note 71, at 9615 ¶¶ 9-10.

⁸¹ See *id.* at 9624-45 ¶¶ 37-97 (seeking comment on replacing all aspects of intercarrier compensation with bill and keep); Developing a Unified Intercarrier Compensation Regime, Further Notice of Proposed Rulemaking, 20 F.C.C.R. 4685 (2005) [hereinafter Intercarrier Compensation Further NPRM] (seeking comment on specific industry proposals submitted in response to the FCC's request for comments on imposing bill and keep).

⁸² See Intercarrier Compensation NPRM, *supra* note 71, at 9628 ¶ 51; Intercarrier Compensation Further NPRM, *supra* note 81, at 4700 ¶ 30.

This solution is suggested by Ronald Coase's classic critique of lighthouses as pure public goods.⁸³ Lighthouses have long been regarded as posing a paradigmatic example of market failure in need of governmental redress.⁸⁴ The standard account posits that the fact that lighthouse owners are unable to secure payment from ships that benefit from the services provided by the lighthouse prevents lighthouse owners from generating sufficient revenue to cover their costs. Restated in terms relevant for our purposes, the impossibility of metering the usage of lighthouse services introduces an externality that creates a wedge between private and social net product. The resulting distortion in the market for lighthouse services caused by the presence of metering costs is generally regarded as providing a classic case for governmental intervention.

Coase rebutted this account by pointing out that lighthouses in Britain were operated by private individuals motivated by profit throughout most of the 17th and 18th Centuries. These lighthouse owners were able to finance their lighthouses through tolls collected at nearby ports, since presumably those were the ships that benefited from the lighthouse's services. Port usage thus represented a rather easily meterable proxy for determining which ships had benefited from the services of nearby lighthouse. The historical record suggests that this system was quite successful. As of 1820, thirty-four of the forty-six lighthouses in existence had been built by private individuals. Over time, these private lighthouses began to be taken over by a quasi-governmental organization known as Trinity House. Even after being acquired by Trinity

⁸³ See Coase, *supra* note 31.

⁸⁴ For classic references to this proposition, see 1 JOHN STUART MILL, *PRINCIPLES OF POLITICAL ECONOMY* (1847), *reprinted in* 3 *THE COLLECTED WORKS OF JOHN STUART MILL* 968 (J.M. Robson ed. 1965); PIGOU, *supra* note 27, at 183-84; HENRY SIDGWICK, *THE PRINCIPLES OF POLITICAL ECONOMY* 406 (3d ed. 1901). For more modern references, see, e.g., PAUL A. SAMUELSON, *ECONOMICS* 159 n.1 (6th ed. 1964); JOSEPH E. STIGLITZ, *ECONOMICS OF THE PUBLIC SECTOR* 102 (1986).

House, they continued to be privately financed through user fees rather than through tax revenues.⁸⁵

Coase's analysis of lighthouse financing suggests that framing the debate over congestion pricing as a choice between flat-rate and usage-sensitive pricing overlooks the full range of possible pricing arrangements. Instead, public policy might be better served if providers of club goods were given the latitude to explore the use of proxies that minimize transaction costs while incorporating some of the positive features benefits associated with usage-sensitive pricing. Stated more broadly, it underscores how allowing flexibility and experimentation in institutional arrangements can promote economic welfare and counsels against imposing too many restrictions on the manner in which goods subject to congestion are priced.

III. IMPLICATIONS OF CONGESTION ECONOMICS FOR NETWORK NEUTRALITY

In this Part, I apply the analytical framework that I have developed above to the network neutrality debate. It reveals that economic justifications may exist for many of the end-user restrictions that have elicited criticism by network neutrality proponents. Although these restrictions would place some limits on end users' ability to access content, run applications, and attach devices as they see fit, they can provide a new way to internalize the congestion costs that high-volume users impose on others. It also creates consumer benefits by reducing the congestion costs and by lowering the access prices that low-volume end users must pay. Although network neutrality proponents have suggested that mandating network neutrality is essential to preserving the environment for innovation on the Internet, a close examination on the

⁸⁵ See Coase, *supra* note 31, at 363-68; see also David E. Van Zandt, *The Lessons of the Lighthouse "Government" or "Private" Provision of Goods*, 23 J. LEGAL STUD. 47 (1993) (arguing that lighthouse provision represented a combination of public and private involvement, but agreeing that port charges provided sufficient financing).

economic literature reveals that such arguments are misplaced in the context of physical networks like the Internet, since the network owner has both the ability and the incentive to internalize any spillover benefits created by network economic effects. Mandating network neutrality is particularly problematic where the dangers are conceded to be contingent rather than real, when any harms would be reversible, and when it is difficult to discern when restrictions on content, applications, and devices are motivated by anticompetitive motives and when they simply reflect a legitimate attempt to address the problems of network management.

Shifting to a view that restrictions on the unfettered freedom of end users and providers of content and applications can actually promote consumer welfare would parallel the historical development of antitrust doctrine with respect to vertical integration, which also transformed from a vision of competition that favored the independence of purchasers and traders to buy and sell in an open market as they saw fit into one considerably more hospitable towards vertical integration. Given the similarities between these two situations, the lessons of vertical integration would seem to apply with equal force to network neutrality.

The balance of this Part is organized as follows. Section A applies the insights of the foregoing analysis to the network neutrality debate and engages the counterarguments offered by leading network neutrality proponents. Section B shows how the economics of congestion can provide a broader vision of consumer welfare. Section C confronts the alternative contention advanced by network neutrality proponents that nondiscrimination in content, applications, and devices is necessary to preserve innovation on the Internet. Section D explores the danger of imposing regulation to protect against potential (rather than existing) harms in an environment when the restricted conduct may well serve legitimate purposes. Section E then considers the most problematic circumstance, which is the use of restrictions to protect existing businesses.

A. The Role of Use Restrictions in Managing Congestion

The economic attractiveness of employing usage-sensitive pricing on the Internet turns on the magnitude of the transaction costs needed to implement such a scheme. If transaction costs are sufficiently high, it may well prove more economical to allow network providers to pursue alternative pricing regimes.

The available data suggest that the transaction costs associated with metering and billing for Internet service are likely to be substantial. A comparison with local telephone service is particularly useful. Because a telephone call consists of a single transaction devoted to setting up a dedicated connection that is maintained for the duration of the call, a single billing record is sufficient to cover any single call regardless of its length. Even so, U.S. local telephone market is dominated by flat-rate pricing for residential service.⁸⁶ Studies conducted several years ago have suggested that the costs of metering and billing represent more than 50% of the costs associated with an incremental call and roughly 10% of the total costs of providing telephone service,⁸⁷ with the total cost to the industry exceeding \$10 billion.⁸⁸ The implication is that costs of this magnitude are sufficient to render usage-sensitive pricing uneconomical. In fact, the persistence of flat-rate pricing has historically been attributed to the transaction costs of metering and billing individual calls.⁸⁹

Because Internet-based communications operate on fundamentally different principles, the transaction costs associated with metering Internet traffic are likely to be even more

⁸⁶ See Local Competition Order, *supra* note 62, at 16055 ¶ 1112. This situation contrasts with the rate practice of much of the rest of the world, which generally employs usage-based pricing for local telephone service.

⁸⁷ See MacKie-Mason & Varian, *supra* note 32, at 263.

⁸⁸ See Tim Wilson, *Billing Systems Market Reaps Huge Growth: How Telecom Carriers Handle Phone Bills Can Make or Break Their Customer Base*, TELEPATH, Jan. 5, 1998, at T15.

⁸⁹ See Bridger M. Mitchell, *Optimal Pricing of Local Telephone Service*, 68 AM. ECON. REV. 517, 517 (1978) (attributing the persistence of flat-rate pricing to “the added costs of metering equipment and billing”); Larry Garfinkle, *Usage Sensitive Pricing: Studies of a New Trend*, TELEPHONY Feb. 10, 1975, 24, 29 (same).

significant. The protocol that comprises the Internet breaks every piece of communication into smaller packets that are transmitted individually and reassembled at their destination. In addition, the Internet is connectionless, in that it does not establish a closed, dedicated circuit between the originating and the terminating computers. Instead, each packet is allowed to move independently. Because routing tables are updated dynamically, it is possible for different packets from the same communications to pass through different routes on their way to their destination. As a result, multiple records are required to account for every Internet-based communication. Indeed, the number of records needed to account for the packets associated with a ten-minute telephone call over Internet could number in the tens of thousands.⁹⁰ Consequently, the industry has struggled to develop workable methods for metering Internet usage.⁹¹

It is thus quite plausible that the transaction costs needed to establish and run a usage-based pricing regime would be sufficiently large to make an alternative pricing arrangement economically desirable. Furthermore, even if metering is economical in the long run, the inevitable lag in creating such a metering system may lead Internet providers to rely on alternative institutional arrangements on a transitional basis. At the same time, the increasingly varied and intense demands that end users are placing on the network and the rise of applications that are more sensitive to variations in throughput rates has made the need for managing congestion all the more acute.⁹²

The significance of these transaction costs reveals why Internet providers might be interested in experimenting with alternative ways to manage the costs of congestion by forcing those who consume large amounts of bandwidth to bear the costs created by their actions. From

⁹⁰ See MacKie-Mason & Varian, *supra* note 32, at 263.

⁹¹ See Wilson, *supra* note 88.

⁹² See Yoo, *supra* note 10, at 21-22.

this perspective, it would be quite sensible for providers to charge higher prices to those who engage in bandwidth-intensive activities. If enforcement of these bandwidth limits proves too costly, it may make sense to prohibit certain bandwidth-intensive applications altogether. Indeed, a close analysis of the specific provisions criticized by network neutrality proponents suggest that last-mile providers have experimented with tiered pricing and use restrictions in precisely the way that theory would suggest.

1. Prohibitions on Reselling Bandwidth or Acting as an Internet Service Provider

Consider first restrictions on reselling bandwidth, acting as an Internet service provider (ISP), or attaching equipment that makes network service available to users residing outside the subscriber's premises.⁹³ When analyzed under the framework laid out above, such restrictions makes perfect sense. A last-mile provider who finds that transaction costs render deploying usage-based pricing uneconomical may find it beneficial to turn to a flat-rate price set equal to average congestion costs imposed by an average user. Even though such usage would be unmetered at the margin, it is possible that it could be calibrated to lead an equilibrium that approaches efficient pricing.⁹⁴ Reselling bandwidth or acting as an ISP would upset this balance by having a single connection serve multiple end users despite the fact that the cost of service was calibrated to reflect the network demands imposed by a single user. This would in turn create economic inefficiency by allowing those end users to impose congestion costs that far exceed the amount that they paid for the service. Prohibiting end users from reselling bandwidth or acting as an ISP would thus appear to represent a necessary concomitant way to facilitate flat-rate pricing.

⁹³ See Wu, *supra* note 11, at 158, 160, 162.

⁹⁴ See *supra* notes 66-67 and accompanying text.

2. Restrictions on Home Networking

Another practice that has drawn the ire of network neutrality proponents are restrictions on home networking.⁹⁵ Such restrictions may make sense for reasons similar to those justifying restrictions on the resale of bandwidth. Home networking technologies permit multiple computers to access the Internet through a single connection. This would be unproblematic under usage-sensitive pricing, since each subscriber would be forced to compensate the network owner and other users for the additional contribution to network congestion.

The situation is quite different if transaction costs make it more economical for network owners to rely on flat-rate pricing. In that case, the network owner sets the flat-rate price so that it equals to the congestion costs imposed by the average subscriber. Calibrating this price becomes significantly more difficult if the number of computers attached to any link varies, since bandwidth usage would vary from customer to customer depending on the number of computers attached. Furthermore, the absence of any restrictions on the number of computers attached to a single connection can give rise to an adverse selection problem, as high-volume end users take advantage of information asymmetries to consume greater network resources without compensating the network and lower value users for them.

The result will be to increase the flat-rate charged, which simultaneously excludes users from access and forces low-volume users to cross subsidize those who place more intensive demands on the Internet. It should thus come as no surprise that network owners have begun to experiment with tiered pricing, with those attaching multiple computers paying more for their service. Such an approach is perfectly sensible when viewed through the lens of congestion economics.

⁹⁵ See LESSIG, *supra* note 11, at 157-58; Wu, *supra* note 11, at 161; Saltzer, *supra* note 11.

3. Restrictions on Attaching Devices

Another area of controversy are restrictions on end users' right to attach devices, such as gaming consoles, Internet phones, and WiFi routers. On some occasions, network providers have prohibited the attachment of certain equipment altogether.⁹⁶ On other occasions, the providers have required customers wishing to attach such equipment to pay an additional charge.⁹⁷ The economics of congestion reveals why such measures may be quite sensible in cases when transaction costs render usage-sensitive pricing infeasible. To the extent that online gaming consoles, Internet telephones, and home networking equipment are associated with bandwidth-intensive applications, prohibiting them or requiring end users employing them to pay more for their use may represent a sensible use of proxies for high-volume uses.⁹⁸ The absence of such limits will increase the cost of access, thereby reducing the number of people able to

⁹⁶ See Wu, *supra* note 11, at 162.

⁹⁷ See Schatz & Squeo, *supra* note 12.

⁹⁸ The restrictions on attaching devices to the Internet are in some tension with the FCC's approach towards the attachment of handsets and other customer premises equipment (CPE) to the public telephone network. With respect to telephony, the FCC has recognized the customer's right to interconnect any device that would improve the utility of the telephone system "so long as the interconnection does not adversely affect the telephone company's operations or the telephone system's utility for others." Use of the Carterfone Device in Message Toll Telephone Service, 13 F.C.C.2d 420, 424 (1968); see also *Hush-a-Phone Corp. v. United States*, 238 F.2d 266, 269 (D.C. Cir. 1956) (recognizing every subscriber's right "to use his telephone in ways which are privately beneficial without being publicly detrimental"). As a result, the FCC promulgated its Part 68 rules that allow the interconnection of any device that complies with certain designated standards. CITE. As part of the second *Computer Inquiry*, the FCC also prohibited common carriers from bundling CPE with telecommunications services. Amendment of Section 64.702 of the Commission's Rules and Regulations, Final Decision, 77 F.C.C.2d 384, 442-45 ¶¶ 149-155 (1980) [hereinafter *Computer II* Final Decision], *aff'd sub nom.* *Computer & Communications Indus. Ass'n v. FCC*, 6693 F.2d 198 (D.C. Cir. 1982).

The FCC has since acknowledged that these decisions were issued in a technological environment that is very different than that surrounding the Internet. See *Wireline Broadband NPRM*, *supra* note 2, at 3040-42 ¶¶ 43-48. For example, telephone service in the 1950s and 1960s was provided over dedicated lines. Consequently, usage by one person had very little impact on the quality of service provided to other users. In addition, at the time these rules were promulgated, network providers faced little competition. Since that time, the increasing competitiveness of the industry has led to a substantial deregulation of CPE. In 2000, the FCC eliminated the government's role in establishing the technical criteria for CPE and turned those functions over to private bodies. See 2000 Biennial Regulatory Review of Part 68 of the Commission's Rules and Regulations, Report and Order, 15 F.C.C.R. 24944 (2000). The FCC subsequently abolished the prohibition on bundling CPE with telecommunications services. See *Policy and Rules Concerning the Interstate, Interexchange Marketplace*, Report and Order, 16 F.C.C.R. 7418 (2001).

connect to the Internet. It will also effectively allow high-volume users to free ride on the contributions made by low-volume users.

4. Restrictions on Operating File Servers

Similar reasoning justifies restrictions on end users' ability to operate servers holding files for retrieval by other users. Prominent examples include webpage hosting, game servers, and peer-to-peer file sharing of music.⁹⁹ Operating a file server for peer-to-peer sharing of music represents one of the quintessential bandwidth-intensive uses of network. Hosting webpage content and gaming systems can place significant demands on the network as well. Restrictions on such high-bandwidth uses are quite reasonable when transaction costs render direct metering impractical. Allowing end users to operate file servers raises particular problems once one acknowledges that network owner will inevitably take the usual network usage patterns of typical users into account when designing their networks. Since most end users download files more frequently than they upload files, it is typical for network owners to allocate bandwidth asymmetrically.¹⁰⁰ In that case, allowing end users to operate file servers will place particular pressure on a system designed with different usage patterns in mind which will degrade the quality of service for other users.

5. Limits on Commercial Uses.

The final type of restriction that has drawn criticism from network neutrality proponents are bans on commercial use. Some acceptable use policies prohibit commercial uses outright.¹⁰¹ Others simply require end users who wish to use their connections for commercial purposes to

⁹⁹ See LESSIG, *supra* note 11, at 156; Wu, *supra* note 11, at 159-60; Bar et al., *supra* note 11, at 25; Saltzer, *supra* note 11.

¹⁰⁰ See LESSIG, *supra* note 11, at 159; Wu, *supra* note 11, at 162-63.

¹⁰¹ See Wu, *supra* note 11, at 160-61.

subscribe to a higher priced service.¹⁰² The defensibility of such provisions again turns on whether the restricted activities are correlated with more intensive consumption of network resources. If so, it is reasonable to ask those who make greater use of network resources and who impose greater congestion costs on other uses either to forego such behavior or to internalize the costs they impose on others.

6. The Insufficiency of Capacity Expansion and Tiered Pricing as Alternatives

Network neutrality proponents concede that restrictions on content, applications, and devices may be justified by the needs of network management, and yet still argue against such restrictions.¹⁰³ These arguments bear close scrutiny, since it is the persuasiveness of these justifications for overriding the needs of network management that will determine the overall convincingness of network neutrality proposals.

For example, Lessig acknowledges that the need to preserve quality of service may justify some discrimination among applications, but suggests that this problem can be solved simply by increasing capacity. Although Lessig recognizes that the prospect of unlimited bandwidth represents a classic example of the impossible economic free lunch, he nonetheless states, “I’m willing to believe in the potential of essentially infinite bandwidth. And I am happy to imagine the scarcity-centric economist proven wrong.”¹⁰⁴

Relying on capacity expansion to solve the problems related to congestion ignores the problems associated with the inherent impossibility of perfect forecasting of demand and the fact that capacity cannot be expanded instantaneously. This necessarily implies that situations will exist in which network owners underestimate the growth in network demand. When that occurs,

¹⁰² See *id.* at 152; Bar et al., *supra* note 11, at 26.

¹⁰³ See *supra* note 42 and accompanying text.

¹⁰⁴ See LESSIG, *supra* note 11, at 47.

some form of network management may prove to be the only viable short-run solution.¹⁰⁵ Over the longer term, there is no compelling reason to believe that bandwidth will necessarily increase faster than demand,¹⁰⁶ especially in light of the fact that the number of potential connections goes up geometrically with the number of computers added to the system.¹⁰⁷ Finally, capacity expansion and network management represent alternative approaches to dealing with the problems of congestion. Given that the relative costs of each solution are likely to be different and likely to vary over time, it would seem imprudent to precommit to one solution over the other.

Other commentators urge network owners to solve congestion problems through tiered pricing.¹⁰⁸ Although tiered pricing would solve some of the problems associated with congestion costs, it would also require the establishment of mechanisms for monitoring bandwidth usage and for bringing enforcement actions against those who exceed the bandwidth limits. As a result, it would require the incurrence of transaction costs that are quite similar to those required to implement a regime of usage-sensitive pricing. To the extent that the transactions costs are large to render usage-sensitive pricing uneconomical, they will also probably preclude the use of tiered pricing as a solution as well.

The proposed alternatives to restrictions on content, applications, and devices ultimately do not prove convincing. As network neutrality proponents implicitly acknowledge, the inadequacy of the proffered justifications for mandating network neutrality mitigates in favor of allowing network owners to realize the benefits for network management that can result from exclusivity arrangements.

¹⁰⁵ See Yoo, *supra* note 10, at 22-23, 75.

¹⁰⁶ See MacKie-Mason & Varian, *supra* note 32, at 260.

¹⁰⁷ See Spulber & Yoo, *supra* note 53, at 1698.

¹⁰⁸ See Wu, *supra* note 11, at 154.

B. A Broader Perspective on Consumer Welfare

The foregoing analysis demonstrates the error of equating freedom with consumer welfare. It suggests that, contrary to the suggestions of network neutrality proponents, allowing some restrictions on end users' ability to access content, run applications, and attach devices may in fact be welfare enhancing. In so doing, it underscores the often-overlooked downside to the image of competition advanced by network neutrality proponents, in which end users and providers of content and applications are able to contract with each other freely in what amounts to a spot market.¹⁰⁹ Use of the alternative institutional forms can in fact benefit consumers by effectively lowering the prices paid by low-volume end users. In addition, increasing the economic efficiency of the overall pricing system should lower the price of basic access, which in turn should increase the number of people able to benefit from the network's services.

In this sense, the debate over network neutrality bears a number of striking parallels to the debate over vertical integration under the antitrust laws.¹¹⁰ Until the mid-1970s, the Supreme Court clearly embraced a vision of competition quite similar to that espoused by network neutrality proponents. Fueled by a scholarly literature that was largely distrustful of vertically integrated enterprises,¹¹¹ the Supreme Court invalidated a wide range of exclusive dealing contracts, tying, and other vertical contractual arrangements on the grounds that they infringed

¹⁰⁹ See LAWRENCE LESSIG, CODE AND OTHER LAWS OF CYBERSPACE (1999).

¹¹⁰ See generally Alan J. Meese, *Farewell to the Quick Look: Redefining the Scope and Content of the Rule of Reason*, 68 ANTITRUST L.J. 461, 466-77 (2000) (providing an overview of the shift in antitrust policy).

¹¹¹ See, e.g., JOE S. BAIN, INDUSTRIAL ORGANIZATION 381 (2d ed. 1968); ADOLPH A. BERLE, JR., & GARDINER C. MEANS, THE MODERN CORPORATION AND PRIVATE PROPERTY 350-51 (1932); ARTHUR BURNS, THE DECLINE OF COMPETITION: A STUDY OF THE EVOLUTION OF THE AMERICAN INDUSTRY 462-521 (1936); EDWARD S. CHAMBERLIN, THE THEORY OF MONOPOLISTIC COMPETITION 122-23 (3d ed. 1938). See generally Herbert Hovenkamp, *The Antitrust Movement and the Rise of Industrial Organization*, 68 TEX. L. REV. 105, 153-66 (1989) (surveying the intellectual history of the hostility towards vertical integration).

on consumers' freedom of choice.¹¹² The Court invalidated other exclusivity arrangements as an impermissible restriction on manufacturers' ability to access all channels of distribution.¹¹³

Over time, however, the Court began to realize that this atomistic vision of competition often exacted a steep price.¹¹⁴ Economic theorists began to show the existence of circumstances under which vertical integration and vertical contractual restraints could promote efficiency, either by eliminating downstream monopoly pricing¹¹⁵ or by rationalizing the proportions of variable inputs.¹¹⁶ Even more important was the realization that vertical integration could also yield transaction cost efficiencies that could not be realized in the world of unfettered buyer and trader freedom.¹¹⁷ In particular, economists began to recognize how vertical integration and vertical contractual restraints that simulate vertical integration (such as exclusive dealing

¹¹² See *United States v. Brown Shoe Co.*, 370 U.S. 294, 344 (1962) (holding that exclusive dealing contracts "conflict with the central policy of [the antitrust laws] against contracts which take away freedom of purchasers to buy in an open market"); *Times-Picayune Publ'g Co. v. United States*, 345 U.S. 594, 605 (1953) (concluding that tying arrangements represent an improper interference with "buyers' independent judgment" about the merits of the product).

¹¹³ See *United States v. Topco Assocs., Inc.*, 405 U.S. 596, 610-11 (1972) (invalidating exclusive sales territories as an unlawful restriction on individual seller's right not to be foreclosed from any one sector of the economy); *Albrecht v. Herald Co.*, 390 U.S. 145, 152-53 (1968) (holding that price fixing agreements "'cripple the freedom of traders and thereby restrain their ability to sell in accordance with their judgment'" (quoting *Kiefer-Stewart Co. v. Joseph E. Seagram & Sons, Inc.*, 340 U.S. 211, 213 (1951))), *overruled by State Oil Co. v. Khan*, 522 U.S. 3 (1997); *Klor's, Inc. v. Broadway-Hale Stores, Inc.*, 359 U.S. 207, 212-13 (1959) (concluding that group boycotts "cripple the freedom of traders and thereby restrain their ability to sell in accordance with their own judgment" and "takes from Klor's its freedom to buy appliances in an open competitive market," and "deprives manufacturers and distributors of their freedom to sell to Klor's")).

¹¹⁴ See generally Christopher S. Yoo, *Vertical Integration and Media Regulation in the New Economy*, 19 YALE J. ON REG. 171, 189-90, 192-200, 260-64 (2002) (reviewing the potential efficiencies from vertical integration).

¹¹⁵ See, e.g., Fritz Machlup & Martha Taber, *Bilateral Monopoly, Successive Monopoly, and Vertical Integration*, 27 ECONOMICA 101 (1960); Joseph J. Spengler, *Vertical Integration and Antitrust Policy*, 58 J. POL. ECON. 347 (1950).

¹¹⁶ See, e.g., Lionel W. McKenzie, *Ideal Output and the Interdependence of Firms*, 61 ECON. J. 785 (1951); John M. Vernon & Daniel A. Graham, *Profitability of Monopolization by Vertical Integration*, 79 J. POL. ECON. 924 (1971).

¹¹⁷ See, e.g., R.H. Coase, *The Nature of the Firm*, 4 ECONOMICA 386 (1937).

contracts, tying, and territorial exclusivity) can reduce the transaction costs needed to protect against opportunism.¹¹⁸

The Supreme Court eventually embraced this vision in its landmark *Sylvania* decision by accepting the reduction of the transaction costs needed to guard against opportunism as a pro-competitive business justification for entering into exclusivity agreements.¹¹⁹ In the process, the Court rejected buyer and trader freedom as independent values under the antitrust laws and instead limited the scope of antitrust analysis to competitive effects.¹²⁰ In so doing, the Court implicitly reaffirmed the principle that the antitrust laws were enacted for “the protection of *competition*, not *competitors*.”¹²¹ If competition is sufficiently robust, the reduction in freedom of some consumers or manufacturers does not rise to the level of antitrust concern, since any consumer who wishes to avoid the strictures of the exclusivity arrangement can do so simply by shifting their purchases to another provider.¹²²

Sylvania marked a sea change in antitrust law. Thereafter the debate shifted away from the impact on individual buyers and traders and instead focused on increasingly sophisticated analyses of whether or not particular exclusivity arrangements promote economic welfare.¹²³

¹¹⁸ See, e.g., OLIVER E. WILLIAMSON, *MARKETS AND HIERARCHIES* 20-40, 82-131 (1975); Benjamin Klein, Robert G. Crawford, & Armen A. Alchian, *Vertical Integration, Appropriable Rents, and the Competitive Contracting Process*, 21 J.L. & ECON. 297 (1978); Lester G. Telser, *Why Should Manufacturers Want Fair Trade?*, 3 J.L. & ECON. 86 (1960).

¹¹⁹ *Continental T.V., Inc. v. GTE Sylvania, Inc.*, 433 U.S. 36, 54-55 (1977).

¹²⁰ *Id.* at 53 n.21 (rejecting the proposition that “the Sherman Act was intended to prohibit restriction on the autonomy of independent business” even in the absence of harm to competition).

¹²¹ See *Brown Shoe Co. v. United States*, 370 U.S. 294, 320 (1962) (offering the classic statement of this proposition. For more recent statements, see *NYNEX Corp. v. Discon, Inc.*, 525 U.S. 128, 135 (1998); *Brooke Group Ltd. v. Brown & Williamson Tobacco Corp.*, 509 U.S. 209, 224 (1993); *Atlantic Richfield Co. v. USA Petroleum Co.*, 495 U.S. 328, 338 (1990); *Cargill, Inc. v. Monfort of Colorado, Inc.*, 479 U.S. 104, 110 (1986); *Brunswick Corp. v. Pueblo Bowl-O-Mat, Inc.*, 429 U.S. 477, 488 (1977).

¹²² See *Jefferson Parish Hosp. Dist. No. 2 v. Hyde*, 466 U.S. 2, 11-12 (1984); *N. Pac. Ry. Co. v. United States*, 356 U.S. 1, 6-7 (1958).

¹²³ See, e.g., Jonathan B. Baker, *Recent Developments in Economics that Challenge Chicago School Views*, 58 ANTITRUST L.J. 645 (1989); Herbert Hovenkamp, *Antitrust After Chicago*, 84 MICH. L. REV. 213, 255-83 (1985);

Thereafter, antitrust law has become increasingly hospitable to vertical integration and vertical contractual restraints.¹²⁴

The parallels between the debates over vertical integration and network neutrality are striking. The image of end user and application/content provider freedom that lies at the center of network neutrality is quite reminiscent of the preference for buyer and trader freedom that dominated pre-*Sylvania* antitrust law. The fact that the Court has since rejected this vision and has acknowledged that exclusivity arrangements can often promote competition by reducing transaction costs is quite striking. This history of vertical integration thus cautions against taking too narrow a vision of competition and taking too skeptical a position with respect to exclusivity.

The increasing hospitality towards exclusivity arrangements will have the inevitable effect of giving vertically integrated a greater degree of control, which in turn will limit the freedom of both consumers and manufacturers. In the absence of a network neutrality mandate, end users and content/applications providers should expect periodic changes in terms under which they are able to obtain access to the network. Although such transitions can impose costs that at times can rise to the level of antitrust concern,¹²⁵ the Court has recognized that this point can be taken too far. Change represents an integral part of the way that markets reach equilibrium and adjust to changes in technology, demand, factor costs, and other exogenous shocks. Regulators may be tempted to impose regulations in order to protect consumers and providers from the effects of such changes. Such regulations should be undertaken with great

Michael S. Jacobs, *An Essay on the Normative Foundations of Antitrust Economics*, 74 N.C. L. REV. 219, 240-50 (1995).

¹²⁴ See, e.g., *State Oil Co. v. Khan*, 522 U.S. 3 (1997); *Spectrum Sports, Inc. v. McQuillan*, 506 U.S. 447, 459 (1993); *Bus. Elecs. Corp. v. Sharp Elecs. Corp.*, 485 U.S. 717 (1988); *Barry Wright Corp. v. ITT Grinnell Corp.*, 724 F.2d 227, 236-37 (1st Cir. 1983) (Breyer, J.). See generally Yoo, *supra* note 114, at 187-205 (tracing this shift in vertical integration doctrine).

¹²⁵ See *Eastman Kodak Co. v. Image Technical Servs., Inc.*, 504 U.S. 41 (1992).

care, since any such intervention threatens to forestall the process of adjustment and experimentation that is essential to the health of a well-functioning market.¹²⁶

C. The Impact of Exclusivity on Innovation

Network neutrality proponents do not simply justify their arguments on the need to preserve the autonomy of end users and providers of applications, content, and devices for its own sake. They also argue that network neutrality is essential to creating and preserving the framework supposedly needed to promote innovation on the Internet. The concern is that in promoting their own interests, network owners will make decisions that hurt the interests of the public as a whole.¹²⁷

Both the FCC and network neutrality proponents recognize that it is typically in the best interests of network owners to encourage innovation in applications and content to the greatest extent possible.¹²⁸ Network owners' financial success depends on making sure that consumers derive maximum value from their network connections. Since innovation in applications and content only serves to increase a network's value, network owners should have every incentive to encourage such innovation. To the extent that innovation is best promoted by an open architecture, network owners can generally be expected to embrace it in the absence of some element that leads to market failure.¹²⁹ The failure of closed networks such as Gopher, the

¹²⁶ See Christopher S. Yoo *The Rise and Demise of the Technology-Specific Approach to the First Amendment*, 91 GEO. L.J. 245, 272-75 (2003).

¹²⁷ See *Ex parte* Letter of Timothy Wu and Lawrence Lessig, *supra* note 11, at 3-9; LESSIG, *supra* note 11, at 156, 168, 175; Mark A. Lemley & Lawrence Lessig, *The End of End-to-End: Preserving the Architecture of the Internet in the Broadband Era*, 48 UCLA L. REV. 925, 932, 945-46 (2001); Wu, *supra* note 11, at 145, 155.

¹²⁸ See Broadband Access Order, *supra* note 21, at 40-42 ¶¶ 74-76; *Ex parte* Letter of Timothy Wu and Lawrence Lessig, *supra* note 11, at 7; LESSIG, *supra* note 11, at 161; Wu, *supra* note 11, at 142-43, 155.

¹²⁹ See Joseph Farrell & Philip J. Weiser, *Modularity, Vertical Integration, and Open Access Policies: Towards a Convergence of Antitrust and Regulation in the Internet Age*, 17 HARV. J.L. & TECH. 85, 104 (2003); James B. Speta, *Handicapping the Race for the Last Mile?: A Critique of Open Access Rules for Broadband Platforms*, 17 YALE J. ON REG. 39, 76 (2000); cf. Stuart Minor Benjamin, *Spectrum Abundance and the Choice*

French Minitel network, and the early proprietary services provided by CompuServe and Prodigy,¹³⁰ attests to the market's ability to discipline network owners who attempt to impose closed architectures on consumers who prefer open ones.

From this perspective, absent market failure, mandating network neutrality is either unnecessary or counterproductive. If innovation is better promoted by open architectures, network owners can be expected to embrace network neutrality voluntarily, in which case regulatory intervention would be unnecessary. If innovation is better promoted by closed architectures, mandating network neutrality would only serve to frustrate the very goals that network neutrality would purport to promote.

1. The Inapplicability of Network Economic Effects

It is for this reason that network neutrality arguments necessarily depend on the presence of some externality that creates market failure by driving a wedge between the private benefits captured by network owners and the benefits that accrue to society as a whole.¹³¹ To supply this critical element, network neutrality proponents turn to the branch of economics concerning *network economic effects*.¹³² Network economic effects arise when the value of the network is determined by the number of other users connected to the same network.¹³³ The value of a network to an innovator depends on the number of customers it can reach through the network.

Between Private and Public Control, 78 N.Y.U. L. REV. 2007, 2086-89 (2003) (making a similar point in the context of spectrum-based networks).

¹³⁰ See LESSIG, *supra* note 11, at 43 (Gopher); Benjamin, *supra* note 129, at 2086 (Prodigy and CompuServe); Lemley & Lessig, *supra* note 127, at 936 (Minitel); Speta, *supra* note 129, at 86 (Prodigy and CompuServe).

¹³¹ See LESSIG, *supra* note 11, at 162, 168, 175; Wu *supra* note 11, at 151, 153.

¹³² See generally Mark A. Lemley & David McGowan, *Legal Implications of Network Economic Effects*, 86 CAL. L. REV. 479 (1998) (surveying the literature on network economic effects).

¹³³ A classic example is the choice between VHS and Beta formats for video cassette recorders (VCRs). In choosing which type of VCR to buy, consumer cared less about the technical capabilities of each format and more about which format was adopted by other consumers.

The larger the number, the more valuable the network.¹³⁴ The problem is that end users who join a network are typically unable to capture the benefits created by their adoption decision. Some scholars regard the presence of these unappropriable benefits as a positive *network externality* that will cause overall utilization of the network to drop below efficient levels.¹³⁵ These theorists also suggest that the presence of network externalities can turn exclusivity into a competitive weapon. By providing exclusive access to certain content, the owners of the largest networks can leave end users who wish to access that content no choice but to join their network.

Network neutrality proponents invoke network economic effects by arguing that exclusivity arrangements can prevent content and applications providers from reaching the critical mass of potential customers needed to support their products. The inability to reach these customers lowers the incentive to invest in innovative content and applications.¹³⁶

The problem with this argument is that it ignores the fact that network externality theory is subject to a number of caveats and limiting conditions.¹³⁷ For example, network neutrality advocates overlook the fact that network economics create two effects that push in opposite directions.¹³⁸ On the one hand, a person adopting a new technology increases the value of the new network. The inability to capture this benefit can create a reluctance to switch networks often called *excess friction*. At the same time, any decision to switch networks necessarily reduces the value of the old network. The fact that end users who switch networks do not bear these costs can create an eagerness to switch networks known as *excess momentum*. The

¹³⁴ See LESSIG, *supra* note 11, at 171.

¹³⁵ See, e.g., Michael L. Katz & Carl Shapiro, *Network Externalities, Competition, and Compatibility*, 75 AM. ECON. REV. 424 (1985).

¹³⁶ See *Ex parte* Letter of Timothy Wu and Lawrence Lessig, *supra* note 11, at 8; LESSIG, *supra* note 11, at 171; Wu *supra* note 11, at 151.

¹³⁷ The discussion that follows is based on Yoo, *supra* note 114, at 278-85; and Spulber & Yoo, *supra* note 51, at 925-30.

¹³⁸ See Yoo, *supra* note 114, at 278-79 (citing Joseph Farrell & Garth Saloner, *Installed Base and Compatibility: Innovation, Product Preannouncements, and Predation*, 76 AM. ECON. REV. 940, 941-42 (1986)).

ambiguity of this balance is demonstrated dramatically by comparing the positions taken by network neutrality proponents with the concern traditionally associated with network economics. Network neutrality is concerned that network owners will be *too eager* to deviate from the current regime of universal interoperability.¹³⁹ The traditional focus on lock-in is networks will be too *reluctant* to deviate from the established standard.¹⁴⁰

Whether end users switch networks too frequently or not frequently enough from the standpoint of social welfare depends upon which of these two effects dominates. Such a question is an empirical question that cannot be answered *a priori*. Indeed, a formal model developed by Michael Katz and Carl Shapiro suggests competition between proprietary standards is more likely to lead to the adoption of the socially optimal technology than is competition in which one or both of the competing standards are nonproprietary.¹⁴¹

Furthermore, the arguments advanced by network neutrality proponents overlook the fundamental difference between networks in which end users are physically interconnected (called *direct network externalities*) and networks in which the relationship between end users are mediated by a market (called *indirect network externalities*).¹⁴² Direct network externalities do not represent an economic problem. Because they within a physical network that can be owned, the network owner is in an ideal position to capture the benefits created by increases in network size. Thus, even if end users are unable to appropriate all of the benefits associated with

¹³⁹ See LESSIG, *supra* note 111, at 48, 168, 171, 176.

¹⁴⁰ See, e.g., Brian W. Arthur, *Competing Technologies, Increasing Returns, and Lock-In by Historical Events*, 99 ECON. J. 116 (1989); Farrell & Saloner, *supra* note 138, at 941-43; Michael L. Katz & Carl Shapiro, *Systems Competition and Network Effects*, J. ECON. PERSP., Spring 1994, at 93, 108; cf. Mark A. Lemley, *Antitrust and the Internet Standardization Problem*, 28 CONN. L. REV. 1041, 1045-54 (1996) (arguing that Internet standards are subject to lock-in).

¹⁴¹ Michael L. Katz & Carl Shapiro, *Technology Adoption in the Presence of Network Externalities*, 94 J. POL. ECON. 822 (1986).

¹⁴² See Katz & Shapiro, *supra* note 135, at 424; Joseph Farrell & Garth Saloner, *Standardization, Compatibility, and Innovation*, 16 RAND J. ECON. 70, 70-71 (1985).

their adoption decisions, the network owner can internalize these benefits by charging prices that reflect their benefits new users confer on incumbents. Indeed, the owner of a physical has every incentive to maximize the value of the network in this manner.¹⁴³ The fact that the benefits resulting from any increase in the network's value would accrue directly to the network owner effectively aligns social benefits with private benefits.¹⁴⁴

Finally, concerns about network economic effects are ameliorated still further by the fact that the broadband industry is undergoing rapid growth. A host of new technologies, including third-generation mobile communications devices (3G), broadband over powerline (BPL), and wireless hotspots employing WiFi technology, are waiting in the wings. The deployment of wireless technologies is particularly important, because the fact that the primary resource needed to construct a network infrastructure can be resold for value upon exit promises to bring the broadband industry within the theory of contestable markets.¹⁴⁵ When that is the case, new platform entrants should find it easier to vie for new customers. In addition, application and content providers will be less concerned about current market shares of broadband providers and more about the relative market positions that will obtain in the future. In short, it is the market of tomorrow, not the market of today, that will determine the behavior of applications and content

¹⁴³ See S.J. Liebowitz & Stephen E. Margolis, *Are Network Externalities a New Source of Market Failure?*, 17 RES. LAW & ECON. 1, 11-13 (1995); S.J. Liebowitz & Stephen E. Margolis, *Network Externality: An Uncommon Tragedy*, 8 J. ECON. PERSP. 133, 137, 141-44 (1994).

¹⁴⁴ Network neutrality proponents more plausibly argue that negotiating exclusivity arrangements can result in transaction and coordination costs. See LESSIG, *supra* note 11, at 162, 171. At the same time, the FCC has recognized that imposing nondiscrimination requirements create transaction costs of their own. See Broadband Access Order, *supra* note 21, at 35-40 ¶¶ 65-73, 53 ¶ 97. The fact that transaction cost considerations push in both directions effectively undercuts any attempt to derive simple policy inferences with respect to network neutrality. Moreover, the reduction in transaction costs made possible by the Internet and the proliferation of institutional solutions, such as centralized transaction clearinghouses, makes it likely that over time the balance will shift in favor of permitting greater exclusivity.

¹⁴⁵ See WILLIAM J. BAUMOL ET AL., *CONTESTABLE MARKETS AND THE THEORY OF INDUSTRY STRUCTURE* 288-301 (rev. ed. 1988).

providers.¹⁴⁶ The imminent arrival of alternative broadband platforms thus suggests, notwithstanding suggestions to the contrary,¹⁴⁷ that the fact that cable modem systems have established an initial lead over other technologies may not have any enduring significance.

2. The Lack of Concentration in a Properly Defined Market

Furthermore, a close examination of the leading models of network economic effects reveals that anticompetitive outcomes necessarily depend on the existence of a dominant network owner with market power.¹⁴⁸ It is a common misperception that the broadband markets are sufficiently concentrated to justify regulatory intervention.¹⁴⁹ On the contrary, once the relevant markets that network neutrality is designed to protect have been properly identified, it becomes clear that the concentration levels fall short of those traditionally associated with anticompetitive concern.

The key to understanding this important insight is recognizing that application and content providers care about the total number of users they can reach. So long as their total potential customer base is sufficiently large, it does not really matter whether they are able to reach users in any particular city. This point is well illustrated by a series of recent decisions regarding the market for cable television programming. As the FCC and the D.C. Circuit recognized, a television programmer's viability does not depend on its ability to reach viewers in any particular cities, but rather on the total number of viewers it is able to reach nationwide. So

¹⁴⁶ See Michael L. Katz & Carl Shapiro, *Product Introduction with Network Externalities*, 40 J. INDUS. ECON. 55, 67, 73 (1992); S.J. Liebowitz & Stephen E. Margolis, *Should Technology Choice Be a Concern of Antitrust Policy*, 9 HARV. J.L. & TECH. 283, 292, 312 (1996).

¹⁴⁷ See LESSIG, *supra* note 11, at 161.

¹⁴⁸ See Spulber & Yoo, *supra* note 51, at 923, 926; cf. Yoo, *supra* note 114, at 202-05, 265-67 (noting that the post-Chicago theories supporting the monopoly leverage theory of vertical integration depend on the assumption that the markets are highly concentrated and protected by entry barriers).

¹⁴⁹ See LESSIG, *supra* note 11, at 159; Jerry A. Hausman et al., *Residential Demand for Broadband Telecommunications and Consumer Access to Unaffiliated Internet Content Providers*, 18 YALE J. ON REG. 129, 155 (2001); Lemley & Lessig, *supra* note 127, at 952; Daniel L. Rubinfeld & Hal J. Singer, *Open Access to Broadband Networks: A Case Study of the AOL/Time Warner Merger*, 16 BERKELEY TECH. L.J. 631, 649 (2001).

long as a cable network can reach a sufficient number of viewers to ensure viability, the fact that a particular network owner may refuse carriage in any particular locality is of no consequence.¹⁵⁰ Simply put, it is national reach, not local reach, that matters. This in turn implies that the relevant geographic market is a national one, not a local one.

When the relevant market is properly defined in this manner, it becomes clear that the broadband market is too unconcentrated for vertical integration to pose a threat to competition. What matters is not the percentage of broadband subscribers that any particular provider controls in any geographic area, but rather the percentage of nationwide pool of subscribers that that provider controls. As of the end of 2004, the two largest providers controlled only 20% and 14% of the national broadband market,¹⁵¹ levels not generally associated with anticompetitive levels of concentration. Indeed, when the concentration levels for the broadband industry are calculated as of the end of 2004, the Hershman-Hirfindahl Index is only 987, well below the threshold of 2800 used by the FCC when evaluating wireless mergers for anticompetitive effects¹⁵² as well as the threshold of 1800 established by the Federal Trade Commission and the Justice Department for determining when vertical integration would be a cause for

¹⁵⁰ See *Time Warner Entm't Co. v. FCC*, 240 F.3d 1126, 1131-32 (D.C. Cir. 2001) (citing Implementation of Section 11(c) of the Cable Television Consumer Protection and Competition Act of 1992, Third Report and Order, 14 F.C.C.R. 19098, 19114-18 ¶¶ 40-50 (1999)).

¹⁵¹ See Christopher S. Yoo, *Network Neutrality and Competition: A Complex Relationship*, in NET NEUTRALITY OR NET NEUTERING: SHOULD BROADBAND INTERNET SERVICES BE REGULATED? __, __ fig. 2 (Thomas M. Lenard & Randolph J. May eds., forthcoming 2006).

¹⁵² See Applications of Nextel Communications, Inc. and Sprint Corp. for Consent to Transfer Control of Licenses and Authorizations, Memorandum Opinion and Order, FCC 05-148, slip op. at 27 ¶ 63 (rel. Aug. 8, 2005), available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-05-148A1.pdf; Applications of Western Wireless Corp. and Alltel Corp. for Consent to Transfer Control of Licenses and Authorizations, Memorandum Opinion and Order, 20 F.C.C.R. 13053, __ ¶¶ 46-47 (2005); Applications of AT&T Wireless Services, Inc. and Cingular Wireless Corp. for Consent to Transfer Control of Licenses and Authorizations, Memorandum Opinion and Order, 19 F.C.C.R. 21522, 21568 ¶¶ 106-107 (2004).

anticompetitive concern.¹⁵³ The imminent arrival of 3G, WiFi, BPL, and other new broadband technologies promises to further deconcentration of this market in the near future.

D. The Danger of Prophylactic Intervention in the Face of Uncertainty

Network neutrality proponents argue in the alternative that regulatory intervention is needed because broadband network owners often fail to appreciate the benefits to innovation provided by open network architectures.¹⁵⁴ Lessig has argued that the incumbent's inability to perceive their long-term business interests justifies mandating network neutrality.¹⁵⁵ Others contend that regulators should use the threat of regulation to educate network owners about their true long-term interests.¹⁵⁶

Even if true, this observation fails to serve as a justification for imposing network neutrality. Network owners' misperception of their long-term business interests is generally not considered to be a valid justification for regulatory intervention.¹⁵⁷ The irony is that although network neutrality proponents invoke the rhetoric of a Darwinian, survival-of-the-fittest

¹⁵³ See U.S. Department of Justice & Federal Trade Commission, Non-Horizontal Merger Guidelines §§ 4.131, 213, 57 Fed. Reg. 41,552 (1992), *available at* <http://www.usdoj.gov/atr/public/guidelines/2614.htm>. See generally Yoo, *supra* note 46, at 52-53 (discussing HHI and the relevant guideline thresholds).

¹⁵⁴ See *id.* at 30-38, 176; Lemley & Lessig, *supra* note 127, at 937-38; *cf.* Wu *supra* note 11, at 143 (arguing that "incumbents may occasionally become set in their ways"); *id.* at 145 (arguing that network owners "suffer from cognitive biases (such as a predisposition to continue with current ways of doing business)"); *id.* at 155 (arguing that network owners may refuse to adopt network neutrality "for irrational reasons" or from a failure to appreciate obsolescence).

¹⁵⁵ In Lessig's words:

Dinosaurs should die. . . . And innovators should resist efforts by dinosaurs to keep control. Not because dinosaurs are evil; not because they can't change; but because the greatest innovation will come from those outside these old institutions. Whatever the scientists at Bell Labs understood, AT&T didn't get it. Some may offer a theory to explain why AT&T wouldn't get it. But this is a point most understand without needing to invoke a fancy theory.

LESSIG, *supra* note 11, at 176.

¹⁵⁶ See Wu *supra* note 11, at 154, 156.

¹⁵⁷ See, e.g., William Baxter, *Legal Restrictions on Exploitation of the Patent Monopoly: An Economic Analysis*, 76 YALE L.J. 267, 318 (1966); Farrell & Weiser, *supra* note 129, at 116; Louis Kaplow, *Extension of Monopoly Power Through Leverage*, 85 COLUM. L. REV. 515, 549 (1985).

competition among applications and content,¹⁵⁸ they fail to follow the reasoning to its logical conclusion. Taking the evolutionary analogy seriously would imply that companies that adopt flawed business plans should not be saved from those mistakes by regulation or guided away from them by education. The collapse of a broadband network should not reduce competition over the long term, since the physical network assets will continue to exist, awaiting redeployment by another entity. It would create some short-run transition costs, but such costs are inevitable in any market-based system and must be tolerated if society is to enjoy the benefits that markets provide.

Furthermore, any proposed regulatory solution must take care to avoid the classic nirvana fallacy: Just because a market-based outcome is suboptimal does not mean that a government-imposed outcome would be any better. Determining the best course of action thus requires an exercise in the comparative second best. In other words, arguments in favor of regulatory correction of suboptimal business decisions are coherent only if one presumes that regulatory authorities would be better at perceiving what would be in network owners' best interests than would the network owners themselves.

Such an assertion is difficult to maintain once one recognizes the inherent difficulties in determining which business strategies will ultimately prove successful¹⁵⁹ as well as the existence of sound economic reasons that can plausibly justify the restrictions in question.¹⁶⁰ The same foresight difficulties that have allegedly led network owners astray are likely to plague regulators as well. Indeed, Lessig notes that both AT&T and the leading computer experts failed to

¹⁵⁸ See *Ex parte* Letter of Timothy Wu and Lawrence Lessig, *supra* note 11, at 5-6; Wu *supra* note 11, at 145.

¹⁵⁹ See Timothy F. Bresnahan, *New Modes of Competition: Implications for the Future Structure of the Computer Industry*, in COMPETITION, INNOVATION AND THE MICROSOFT MONOPOLY 155, 200-01 (Jeffrey A. Eisenach & Thomas M. Lenard eds. 1999); cf. Wu *supra* note 11, at 145 (acknowledging that "the most promising path of development is difficult to predict in advance").

¹⁶⁰ See *supra* note 42 and accompanying text.

appreciate the potential of the Internet.¹⁶¹ If the experts in the academy and in the industry are unable to make correct assessments of what would best foster innovation, there is little reason to believe that the experts in the government will do any better.

Finally, regulatory intervention is especially problematic when, as here, it is meant to forestall a perceived danger that has not yet materialized.¹⁶² Commentators have cautioned about the dangers of regulating on the basis of predictive harms¹⁶³ and have attempted to cabin the problem by reserving such regulation for circumstances in which the consequences from the failure to act are potentially catastrophic and irreversible.¹⁶⁴ Neither precondition would appear to be satisfied in the case of network neutrality. As important as innovation on the Internet is, reduced innovation does not constitute the type of catastrophic harm that would justify regulatory intervention in the absence of a concrete showing of competitive harm. Allowing networks to become noninteroperable should not be irreversible. As the experience in reconfiguring local telephone switches for independent long distance providers demonstrates, courts and policymakers have been able to retrofit network interfaces to accommodate neutrality.¹⁶⁵

E. Limited Anticompetitive Possibilities

This is not to say that all exclusivity arrangements on the Internet are innocent. Indeed, under my approach such restrictions would not be justified when the transaction costs of metering bandwidth usage are relatively low. Another anticompetitive problem can arise in a

¹⁶¹ See LESSIG, *supra* note 11, at 32-33, 42.

¹⁶² See *supra* notes 12-13 and accompanying text.

¹⁶³ See 3 PHILIP AREEDA & HERBERT HOVENKAMP, ANTITRUST LAW ¶ 701(d), at _ (rev. ed. 1996); Stuart Minor Benjamin, *Proactive Legislation and the First Amendment*, 99 MICH. L. REV. 281 (2000).

¹⁶⁴ See CASS R. SUNSTEIN, LAWS OF FEAR: BEYOND THE PRECAUTIONARY PRINCIPLE 58-61, 109-17 (2005).

¹⁶⁵ See Gerald R. Faulhaber, *Policy-Induced Competition: The Telecommunications Experiments*, 15 INFO. ECON. & POL'Y 73, 81-83 (2003).

convergent world is when a broadband provider bars access to an Internet application that competes directly with its core business. One example is Madison River Communication's attempt to protect its local telephone business by blocking its DSL customers from using VoIP.¹⁶⁶ Similar concerns would be raised if a cable modem provider were to attempt to protect its core cable television business by prohibiting its cable modem customers from accessing streaming video.¹⁶⁷

As Chairman Martin has noted, to the extent that competition among transmission technologies is sufficiently robust, it should prove sufficient to forestall any anticompetitive consequences from exclusivity.¹⁶⁸ If a sufficient number of competitive options exist, any attempt to use exclusivity in an anticompetitive manner should be disciplined by the market, as end users who dislike the exclusivity arrangement will simply transfer their subscriptions to a different network. This is why courts and leading commentators have consistently condemned compelling access to communications networks whenever competition from alternative network platforms exists.¹⁶⁹ The broadband industry is already sufficiently competitive to undercut the justification for depriving last-mile providers of any control over the content and applications that can be accessed over their networks. The imminent arrival of new technologies, such as 3G, BPL, and WiFi, suggests that the competition will only intensify in the years to come.

In any event, even assuming that these preconditions were met, such considerations would not justify imposing a categorical requirement that all broadband networks make their networks available to all content and applications. At most, such considerations would justify a

¹⁶⁶ See *supra* notes 17, 40 and accompanying text.

¹⁶⁷ See *supra* note 41 and accompanying text.

¹⁶⁸ See Martin Comments on Policy Statement, *supra* note 25.

¹⁶⁹ See *United States Telecom Ass'n v. FCC*, 290 F.3d 415, 428-29 (D.C. Cir. 2002) (UNE access to broadband facilities); 3A PHILLIP E. AREEDA & HERBERT HOVENKAMP, *ANTITRUST LAW* ¶ 773b2, at 200-03 (2d ed. 2002) (essential facilities doctrine); *cf.* *AT&T Corp. v. Iowa Utils. Bd.*, 525 U.S. 366, 387-92 (1999) (emphasizing the importance of limiting UNE access to those elements that are truly necessary).

targeted response that either bars DSL providers from preventing their customers from accessing VoIP, as the FCC mandated in *Madison River*, or prohibits cable modem providers from stopping their customers from accessing streaming video. Under no circumstances would they provide support for the kind of blanket condemnation of restrictions on the applications end users can run through their broadband connections envisioned under network neutrality.

IV. ADDITIONAL JUSTIFICATIONS FOR END USER RESTRICTIONS

The economics of congestion thus suggest that imposing network neutrality as a regulatory mandate in many cases would be a policy mistake. Such concerns are reinforced by other economic considerations that lead to the same conclusion.

A. The Inevitability of Discrimination

Economic analyses of the telecommunications industry strongly suggest that discrimination is essentially inevitable and most likely beneficial. The reason that discrimination is so pervasive in telecommunications is best understood in terms of the classic model of natural monopoly, which posits that the presence of large, up-front capital investments¹⁷⁰ creates economies of scale that are not exhausted even when a single firm produces the entire market output (which means that the demand curve crosses the average cost curve at a point where the average cost curve is declining and lies above the marginal cost curve).¹⁷¹ This gives the largest firm a decisive cost advantage that eventually allows it to drive its competitors out of business.

¹⁷⁰ The theory of contestable markets has added the refinement that large, up-front investments are not economically problematic unless they are “sunk,” i.e., unrecoverable upon exit. See BAUMOL ET AL., *supra* note 145, at 288-93.

¹⁷¹ Although it is a sufficient condition for natural monopoly that the available economies of scale are unexhausted over the quantity of industry demand, that condition is not a necessary one. Natural monopoly results whenever a market is *subadditive*, i.e., whenever a single firm will be able to serve the entire market at a lower cost than could two producers. If the total industry demand lies just beyond the lowest point of the average cost curve (which is also called *minimum efficient scale*), it is possible for a market to be subadditive even though the monopolist is producing on the increasing portion of the average cost curve. See *id.* at 17-19.

Although the issue is not free from dispute,¹⁷² the high up-front investments needed to establish of the wires and central offices needed to establish a telecommunications network have historically been regarded as turning telecommunications carriers into natural monopolies.¹⁷³

Any profit-maximizing monopolist will produce at the level where its marginal revenue curve and its marginal cost curve intersect (represented in Figure 2 by P_{mon} and Q_{mon}). Because monopolists are not price takers, they set prices that are inefficiently high, in that they exceed marginal cost. The classic policy response is to impose some form of rate regulation to lower the price charged by the monopolist. At the same time, the price must allow the monopolist to recoup its costs of production, which implies that monopolist must be allowed to charge prices that equal or exceed average cost. If the monopolist must charge the same price to all customers, the lowest sustainable price is where the demand curve crosses the average cost curve (represented in Figure 2 by P_{sus}). The problem is that P_{sus} still exceeds efficient levels (represented in Figure 5 by P_{eff} and Q_{eff}) in that it still exceeds marginal cost, and the inefficient shortfall in production is represented by the difference between Q_{sus} and Q_{eff} . The only way that the monopolist can satisfy the consumers between Q_{sus} and Q_{eff} is by offering them service at a price below average cost and by making up the difference by charging other customers a price that exceeds average cost. In other words, the only way to maximize economic welfare without driving the monopolist into bankruptcy is price discrimination.

¹⁷² See Yoo, *supra* note _ (reviewing the dispute over whether local telephone service has historically been and currently remains a natural monopoly).

¹⁷³ See, e.g., HUBER ET AL., *supra* note 69, at 2; JEAN-JACQUES LAFFONT & JEAN TIROLE, COMPETITION IN TELECOMMUNICATIONS 3 (2000).

¹⁷⁴ See F.P. Ramsey, *A Contribution to the Theory of Taxation*, 37 ECON. J. 47 (1927).

efficient manner would be to allocate fixed cost in inverse proportion to the elasticities of demand and to fund fixed costs by transferring the surplus that would otherwise be captured by inframarginal consumers to the producer. Failing to discriminate in this manner would result in foregoing these welfare gains.

It is for this reason that economic commentators from a wide variety of perspectives support price discrimination as economically beneficial in industries, like telecommunications, that require substantial fixed-cost investments.¹⁷⁵ Commentators have also recognized that product differentiation can represent a particularly effective form of price discrimination, since product differentiation can serve to identify customers with particularly intense demands for certain product features and can be priced to extract a greater proportion of that surplus.¹⁷⁶ Because product differentiation segments the market in a particular way, it may well prove more efficient than usage-sensitive or tiered pricing. This suggests that giving last-mile providers the latitude to employ product differentiation as well as nonlinear pricing regimes may well result in an increase in economic welfare. As DirecTV's successful use of an exclusive programming package known as "NFL Sunday Ticket" illustrates, entering into exclusivity arrangements with respect to content represents an important means for differentiating one's network.¹⁷⁷

¹⁷⁵ See LAFFONT & TIROLE, *supra* note 173, at xv; F.M. SCHERER & DAVID ROSS, INDUSTRIAL MARKET STRUCTURE AND ECONOMIC PERFORMANCE 496-502 (3d ed. 1990); William J. Baumol & Daniel G. Swanson, *The New Economy and Ubiquitous Competitive Price Discrimination: Identifying Defensible Criteria of Market Power*, 70 ANTITRUST L.J. 661 (2003); Harold Demsetz, *The Private Production of Public Goods*, 13 J.L. & ECON. 293, 301-02 (1970); Benjamin Klein & John Shepard Wiley, Jr., *Competitive Price Discrimination as an Antitrust Justification for Intellectual Property Refusals to Deal*, 70 ANTITRUST L.J. 599 (2003); Michael E. Levine, *Price Discrimination Without Market Power*, 19 YALE J. ON REG. 1 (2002).

¹⁷⁶ See, e.g., Klein & Wiley, *supra* note 175, at 617 n.34; Levine, *supra* note 175, at 21; Michael J. Meurer, *Copyright Law and Price Discrimination*, 23 CARDOZO L. REV. 55, 72 (2001).

¹⁷⁷ See Yoo, *supra* note 10, at 36; cf. Carl Shapiro, *Exclusivity in Network Industries*, 7 GEO. MASON L. REV. 673, 678 (1999) (nothing how exclusivity "can serve to differentiate products and networks").

As I have argued at length elsewhere,¹⁷⁸ allowing networks to differentiate themselves can ameliorate the economic features of telecommunications market long thought to lead to market failure. For example, it can make it possible for the telecommunications network to serve users who would not otherwise receive network service. Network differentiation can also allow multiple networks to survive notwithstanding the presence of unexhausted economies of scale created by large, up-front sunk costs. Smaller players are able to continue to exist despite the cost disadvantages by offering products designed to have greater appeal to a smaller subsegments of the overall market. Network differentiation can also mitigate the impact of network economic effects. Simply put, a network that provides services that a subsegment of users values particularly highly can overcome the impact of network economic effects so long as the increase in utility provided by the differentiated network exceeds the reduction in utility associated with joining a smaller network.

This suggests that broadband policy would be better served if Congress and the FCC embraced a “network diversity” principle. More importantly for our purposes, it also provides yet another economic reason to question the prudence of imposing network neutrality as a matter of regulation.

B. The Inapplicability of the Historical Precedents

In building their case for regulations forbidding network owners from placing broad restrictions on end users’ ability to access content, run applications, and attach devices, network neutrality proponents attempt to invoke a series of judicial and regulatory precedents designed to prevent local telephone companies from blocking customers from attaching equipment

¹⁷⁸ See Yoo, *supra* note 10, at 28-39.

manufactured by other vendors.¹⁷⁹ Indeed, courts and the FCC have long recognized the customer's right to interconnect foreign devices.¹⁸⁰ As a result, the FCC promulgated rules that allow the interconnection of any device that complies with certain designated standards.¹⁸¹ As part of its second *Computer Inquiry*, the FCC also prohibited telephone companies from bundling CPE with telecommunications services.¹⁸²

It is far from clear that these precedents provide support for network neutrality. For example, the seminal court decision mandating interconnection of foreign CPE suggested that individual subscribers only ha the right to "use his telephone in ways which are privately beneficial without being publicly detrimental."¹⁸³ The leading administrative decision sounds a similar note, acknowledging the right to interconnect foreign CPE only "so long as the interconnection does not adversely affect the telephone company's operations or the telephone system's utility for others."¹⁸⁴ To the extent that the restricted content, applications, and devices impose unreasonable congestion costs on other users, they would appear to represent the type of public detriment and adverse effect on others that would justify restricting such conduct.

Furthermore, the FCC has since acknowledged that these positions were adopted in a technological environment that is far removed from than that surrounding the Internet.¹⁸⁵ My argument will focus on two key differences: the emergence of competitive providers of last-mile

¹⁷⁹ See *Ex parte* Letter of Timothy Wu and Lawrence Lessig, *supra* note 11, at 12; LESSIG, *supra* note 11, at 45, 148; Wu, *supra* note 11, at 142, 149, 169.

¹⁸⁰ See *Hush-a-Phone Corp. v. United States*, 238 F.2d 266 (D.C. Cir. 1956); *Use of the Carterfone Device in Message Toll Telephone Service*, 13 F.C.C.2d 420, 424 (1968).

¹⁸¹ See 47 C.F.R. §§ 68.1-.614.

¹⁸² See Amendment of Section 64.702 of the Commission's Rules and Regulations, Final Decision, 77 F.C.C.2d 384, 442-__ ¶¶ 149-155 (1980) [hereinafter *Computer II* Final Decision], *aff'd sub nom.* *Computer & Communications Indus. Ass'n v. FCC*, 6693 F.2d 198 (D.C. Cir. 1982).

¹⁸³ *Hush-a-Phone*, 238 F.2d at 269.

¹⁸⁴ *Carterfone*, 13 F.C.C.2d at 424.

¹⁸⁵ See *Broadband Access Order*, *supra* note 21, at 24 ¶ 42; *Wireline Broadband NPRM*, *supra* note 2, at 3040-42 ¶¶ 43-48.

services and the increasing use of telecommunications networks to convey media content. Both developments weaken the case for prohibiting exclusivity arrangements. They also provide reason to question the continued relevance of the precedents described above.

1. The Emergence of Competition

One the most important differences between the current technological environment and the one prevailing at the time the rules prohibiting local telephone companies from discriminating against so-called foreign attachments is the emergence of alternative last-mile technologies. At the time aforementioned rules were promulgated, local telephone companies faced little competition from other network providers. The absence of options strengthened the arguments for compelling access to the only available means for providing service.

The emergence of alternative network providers has rendered this justification considerably less compelling. The presence of competition drastically reduces the ability of network owners to use exclusivity arrangements to harm competition, since disgruntled consumers can simply transfer their subscriptions to another network. Moreover, compelling access can dampen the incentives for those device manufacturers shut out by exclusivity arrangements to help finance the buildout of alternative network capacity.¹⁸⁶ Rescuing these manufacturers from having to undertake these investments can thus have the perverse effect of entrenching whatever market concentration that exists by depriving would-be builders of new networks of their natural strategic partners.

Indeed, these insights underscore the extent to which network neutrality proponents are focusing on the wrong policy problem.¹⁸⁷ Economic theory has demonstrated that every vertical

¹⁸⁶ See Yoo, *supra* note 10, at 52-57; Yoo, *supra* note 114, at 246-47, 268-69.

¹⁸⁷ See Yoo, *supra* note 10, at 14-17; Yoo, *supra* note 46, at 59-60.

chain of production will only be efficient if every link is competitive. This suggests that the central goal of competition policy should be to identify the link in the chain of production that is the most concentrated and protected by entry barriers and to increase the competitiveness of that link. In the case of the Internet, the markets for applications and content already the most competitive and, given the low barriers to entry, the most likely to remain that way. Instead, the central policy focus should be on how to encourage greater entry by new last-mile providers. When competition is emerging and entry by alternative network providers is feasible, there are strong arguments that this goal can best be accomplished by permitting network owners to enter into exclusivity arrangements.

The regulatory history of the regulatory precedents invoked by network neutrality proponents largely confirms these insights, as the increase in competition has led the FCC to steadily roll back its role in regulating CPE. For example, in 2000 the FCC relinquished its role in establishing the technical criteria for CPE and turned those functions over to private standard-setting bodies.¹⁸⁸ The FCC subsequently abolished the prohibition on bundling CPE with telecommunications services.¹⁸⁹ Given the overall logic and direction of these regulations, they would appear to serve as only a weak precedent for regulating the Internet in the future.

2. The Growing Importance of Editorial Discretion

Another major change since the Part 68 rules were adopted is a fundamental change in the type of communications being transmitted. When the Part 68 rules were adopted, telecommunications networks carried only person-to-person communications. Today, the fact

¹⁸⁸ See 2000 Biennial Regulatory Review of Part 68 of the Commission's Rules and Regulations, Report and Order, 15 F.C.C.R. 24944 (2000).

¹⁸⁹ See Policy and Rules Concerning the Interstate, Interexchange Marketplace, Report and Order, 16 F.C.C.R. 7418 (2001).

that the Internet is increasingly used to convey media content, in the form of webpages, multimedia presentations; music downloads, and streaming video and audio.

The transformation of telecommunications networks into conduits for media content has made restrictions on content, applications, and devices considerably more justifiable.¹⁹⁰ Editors serve numerous functions, including guaranteeing quality and ensuring that customers receive an appropriate mix of material. For example, consider the situation that would obtain if a publication such as *Sports Illustrated* could not exercise editorial control over its pages. One particular issue of the magazine might consist solely of articles on one sport without any coverage of other sports. There would also be no way to guarantee the quality of the writing.

This insight is confirmed by Congress's and the Supreme Court's longstanding recognition of the benefits of editorial discretion when content is involved. The seminal statutes with respect to broadcasting reflect the critical role that editorial discretion plays when content is being transmitted.¹⁹¹ For example, Congress rejected proposals to provide a limited right of nondiscriminatory access in both the Radio Act of 1927 and the Communications Act of 1934 and instead enacted a provision specifically prohibiting regulating broadcasters as common carriers.¹⁹² In so doing, "Congress specifically dealt with—and firmly rejected—the argument that the broadcast facilities should be open on a nonselective basis."¹⁹³ The Supreme Court has concurred, repeatedly reiterating the importance of preserving broadcasters' editorial

¹⁹⁰ See Yoo, *supra* note 10, at 49-52.

¹⁹¹ See *FCC v. Midwest Video Corp.*, 440 U.S. 689, 702-05 (1979) (reviewing the legislative history of the Radio Act of 1927 and the Communications Act of 1934 with respect to whether they should be treated as common carriers); *Columbia Broad. Sys., Inc. v. Democratic Nat'l Comm.*, 412 U.S. 94, 105-10 (1973) (plurality opinion) (same).

¹⁹² Communications Act of 1934, ch. 652, § 3(h), 48 Stat. 1062, 1066 (codified as amended at 47 U.S.C. § 153(10)); Radio Act of 1927, ch. 169, § 17, 44 Stat. 1162, 1169-70 (superseded by the Communications Act of 1934).

¹⁹³ *Columbia Broad. Sys.*, 412 U.S. at 105 (plurality opinion); *accord id.* at 140 n.9 (Stewart, J., concurring); *id.* at 151-53 & n.2 (Douglas, J., concurring in the judgment).

discretion.¹⁹⁴ Exercise of such discretion inevitably favors some content over others, but as a plurality of the Supreme Court has acknowledged, “For better or worse, editing is what editors are for; and editing is selection and choice of material.”¹⁹⁵

The same pattern can be discerned with respect to cable television. At first, the FCC embraced requiring that cable operators make a portion of their channel capacity available on a nondiscriminatory basis,¹⁹⁶ only to see those regulations struck down by the Supreme Court as inconsistent with the policy in favor of preserving editorial control over content embodied in the Communications Act of 1934.¹⁹⁷ In the process, the Court emphasized “Congress’ stern disapproval . . . of negation of the editorial discretion otherwise enjoyed by broadcasters and cable operators alike.”¹⁹⁸

The Court’s subsequent decisions reiterated the importance of preserving cable operators’ editorial discretion.¹⁹⁹ Indeed, editorial discretion over content was so important that courts invalidated restrictions prohibiting local telephone companies from establishing cable television networks represented as an impermissible burden on the telephone companies’ First Amendment rights.²⁰⁰ Congress would later enact a provision which limited cable operators’ editorial control

¹⁹⁴ See *Ark. Educ. Television Comm’n v. Forbes*, 523 U.S. 666, 673-75 (1998); *FCC v. League of Women Voters of Cal., Inc.* 468 U.S. 364, 378-80 (1984); *Columbia Broad. Sys.*, 412 U.S. at 105 (plurality opinion); *id.* at 140 n.9 (Stewart, J., concurring); *id.* at 151-53 & n.2 (Douglas, J., concurring in the judgment).

¹⁹⁵ *Columbia Broad. Sys.*, 412 U.S. at 124 (plurality opinion).

¹⁹⁶ See Amendment of Part 76 of the Commission’s Rules and Regulations Concerning the Cable Television Channel Capacity and Access Channel Requirements of Section 76.251, Report and Order, 59 F.C.C.2d 294 (1976); Amendment of Part 74, Subpart K, of the Commission’s Rules and Regulations Relative to Community Antenna Television Systems, Notice of Proposed Rulemaking and Notice of Inquiry, 15 F.C.C.2d 417, 422 ¶ 26 (1968).

¹⁹⁷ See *FCC v. Midwest Video Corp.*, 440 U.S. 689, 699-707 (1979).

¹⁹⁸ *Id.* at 708.

¹⁹⁹ See *Turner Broad. Sys., Inc. v. FCC*, 512 U.S. 622, 636 (1994); *City of Los Angeles v. Preferred Communications, Inc.* 476 U.S. 488, 494 (1986); *cf. Leathers v. Medlock*, 499 U.S. 439, 444 (1984) (“Cable television provides to its subscribers news, information, and entertainment.”).

²⁰⁰ See *US West, Inc. v. United States*, 48 F.3d 1092 (9th Cir. 1995), *vacated and remanded*, 516 U.S. 1155 (1996); *Chesapeake & Potomac Tel. Co. v. United States*, 42 F.3d 181 (4th Cir. 1994), *vacated*, 516 U.S. 415 (1996); *S. New England Tel. Co. v. United States*, 886 F. Supp. 211 (D. Conn. 1995); *BellSouth Corp. v. United States*, 868 F. Supp. 1335 (N.D. Ala. 1994); *Ameritech Corp. v. United States*, 867 F. Supp. 721 (N.D. Ill. 1994);

over a portion of its channel capacity when it required cable operators to set aside a portion of their channel capacity for leased access to unaffiliated programmers.²⁰¹ A majority of the Court has recognized that leased access represents an intrusion into the cable operators' editorial discretion.²⁰² On a more practical level, regulations designed to guarantee access to content has proven quite difficult to implement.²⁰³ Indeed, the empirical evidence suggests that practical problems have rendered leased access largely ineffective.²⁰⁴

The same principles should apply to the Internet as it moves away from person-to-person communications to media content. Indeed, anyone confronting the avalanche of content available on the Internet can attest to the benefits provided by editorial filters. The fact that telecommunications networks now serve as the conduit for media content and not just person-to-person communications greatly expands the justification for allowing them to exercise editorial control over the information they convey. In the process, it further weakens the case in favor of network neutrality.

NYNEX Corp. v. United States, Civ. 93-323-P-C, 1994 WL 779761 (D. Me. Dec. 8, 1994). The issue had already been briefed and argued before the Supreme Court when it was rendered moot by a provision of the Telecommunications Act of 1996 eliminating the rule. See Telecommunications Act of 1996, Pub. L. No. 104-104, § 302(b)(1), 110 Stat. 56, 124 (repealing 47 U.S.C. § 533(b) (1994)).

²⁰¹ Cable Communications Policy Act of 1984, Pub. L. No. 98-549, sec. 2, § 611, 98 Stat. 2779, 2782 (codified as amended at 47 U.S.C. § 532).

²⁰² See *Denver Area Educ. Telecomms. Consortium*, 518 U.S. at 761 (plurality opinion) (noting that § 10(a) restored part of cable operators' editorial discretion over leased access channels); *id.* at 796 (Kennedy, J., concurring in part, concurring in the judgment in part, and dissenting in part) (noting that leased access represents a derogation of the cable operators' editorial control).

²⁰³ See Yoo, *supra* note 114, at 244-45.

²⁰⁴ See S. REP. NO. 102-92, at 30-32 (1991), reprinted in 1992 U.S.C.C.A.N. 1133, 1163-65; H.R. REP. NO. 102-628, at 39-40 (1992); *Time Warner Entm't Co. v. FCC*, 93 F.3d 957, 968-70 (D.C. Cir. 1996); Implementation of Sections of the Cable Television Consumer Protection and Competition Act of 1992: Rate Regulation, Order on Reconsideration of First Report and Order and Further Notice of Proposed Rulemaking, 11 F.C.C.R. 16933, 16937 ¶ 6 (1996); Donna M. Lampert, *Cable Television: Does Leased Access Mean Least Access?*, 44 FED. COMM. L.J. 245, 266-67 & n.122 (1992).

CONCLUSION

The debate over network neutrality reflects a fundamental difference of opinion over the lessons of the past. Network neutrality proponents argue that it is the transparent architecture that is responsible for the Internet's success and that the government should take steps to protect that architectures.²⁰⁵ Others contend that it is the tradition of nonregulation of Internet-based services that has been the driving force behind the Internet's success.²⁰⁶

An examination of economics of congestion provides a policy justification for the type of restrictions on content, applications, and devices that network neutrality would condemn. The textbook solution to the problem of congestion is usage-sensitive pricing. If transaction costs make that solution prohibitively expensive, the best second-best alternative may well be reliance on Coasean proxies that can be more easily metered than the actual good in question.

This framework suggests that the usage restrictions at issue here may well be justifiable. Each restriction is associated with bandwidth-intensive uses and thus may represent a plausible Coasean proxy for heavy consumption of network resources. As a result, if transaction costs render direct metering prohibitively expensive, network owners may well find it beneficial to impose restrictions on bandwidth-intensive network uses. Although exclusivity arrangements do place some limits on customer and producer freedom, those limits should not pose a threat to economic welfare so long as competition is sufficiently robust, since any frustrated customer would remain free to switch providers. In this sense, the resolution that I propose parallels the development of vertical integration theory by showing how transaction costs may render vertical

²⁰⁵ See LESSIG, *supra* note 11, at 44-45 Wu *supra* note 11, at 146, 149-50.

²⁰⁶ See *Computer II* Final Decision, *supra* note 98, at 433 ¶ 128 (concluding that “regulation of enhanced services is simply unwarranted”); Wireline Broadband NPRM, *supra* note 2, at 3022 ¶ 5 (embracing the policy goal that “broadband services should exist in a minimal regulatory environment”); Cable Modem Declaratory Ruling and Further NPRM, *supra* note 2, at 4802 ¶ 5, 4840 ¶ 73 (reaffirming the same policy goal); OXMAN, *supra* note 7, at 7-18 (tracing the development of the tradition of nonregulation of the Internet).

integration economically preferable to the type of atomistic competition that would arise under network neutrality.

Exclusivity arrangements may in fact promote consumer welfare in ways that are often overlooked. By placing limits on bandwidth-intensive services, restrictions on content, applications, and devices can have the effect of reducing or eliminating the de facto cross subsidy that low-intensity users pay high-intensity users. It can also expand consumption by lowering the price of basic access to the network. As a result, low-intensity users may well see the prices they pay for broadband services decrease.

My point is not that restrictions on content, applications, and devices are always innocuous. Certainly attempts by local telephone and cable companies to protect their core businesses provide the strongest cause for concern. To say that there are plausible justifications for allowing such restrictions is not to say that there are compelling justifications. Whether broadband providers can use their control over the last mile to cut off access to certain applications and content providers ultimately depends on the level of competition and the magnitude of the transaction costs.

My point is a more modest one. It is simply that a plausible case exists for rejecting calls for network neutrality. Not only might transaction costs justify allowing network owners to restrict applications and devices associated with intense bandwidth usage, the continuing emergence of competition among broadband providers promises to foreclose any real danger that such restrictions might harm competition. In the meantime, whatever risks that broadband providers will use their control over the last-mile to protect their legacy business models is more properly addressed targeted prohibitions of the type imposed by the FCC in *Madison River* rather than through the imposition of a more categorical nondiscrimination requirement. Nor do

restrictions on the ability to access content, run applications, and attach devices appear to post the risks of irreversible and catastrophic harm that would justify imposing prophylactic regulation in advance of a clearer demonstration of an actual problem. Given the ambiguity about whether mandating network neutrality would promote or impede economic welfare, the more technologically humble course would be to allow network owners to experiment with alternative business arrangements unless and until a clearer case for regulatory intervention can be established.