

BEYOND NETWORK NEUTRALITY

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I. INTRODUCTION

U.S. Internet policy has reached a crossroads. After years of delay, the Supreme Court's recent *Brand X* decision has cleared the way for the Federal Communications Commission ("FCC") to resolve how to fit the leading broadband technologies, such as cable modems and digital subscriber line ("DSL") services, into the existing regulatory regime.¹ Having largely failed to take the Internet into consideration when enacting the Telecommunications Act of 1996,² Congress is preparing to reenter the fray as it begins work on its second major overhaul of the communications laws in less than a decade.³ The demands that end users are placing on the Internet are changing just as rapidly, as evidenced by the increasing popularity of bandwidth-intensive applications, such as streaming media and Internet telephony (also known as "voice over Internet protocol" or "VoIP"). In the meantime, a host of new communications platforms are waiting in the

1. Despite the growing importance of the Internet throughout the late 1990s, the FCC avoided addressing the proper regulatory classification of broadband services until 2002. 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 (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 (2002) [hereinafter Wireline Broadband NPRM]. The Ninth Circuit soon brought these proceedings to an abrupt halt by holding that the FCC's determination that cable modem systems constitute "information services" was barred by stare decisis. See *Brand X Internet Servs. v. FCC*, 345 F.3d 1120 (9th Cir. 2003). The Supreme Court eventually overturned the Ninth Circuit and upheld the FCC's authority to resolve these issues. See *Nat'l Cable & Telecomm. Ass'n v. Brand X Internet Servs.*, 125 S. Ct. 2688 (2005).

2. See, e.g., Kevin Werbach, *A Layered Model for Internet Policy*, 1 J. ON TELECOMM. & HIGH TECH. L. 37, 42 (2002) ("The 1996 Act simply did not contemplate the radical changes the Internet would bring to the communications world.")

3. See, e.g., Stephen Labaton, *What U.S. Businesses Are Looking for During Bush's 2nd Term: New Telecom Rules*, INT'L HERALD TRIB., Nov. 5, 2004, at 19.

wings, such as third-generation mobile communications devices (“3G”) and wireless hotspots employing WiFi technology.

As of today, most Internet users communicate through a suite of nonproprietary protocols known as the transmission control protocol/Internet protocol (“TCP/IP”). Widespread adoption of TCP/IP has given the Internet a nearly universal interoperability that allows all end users to access Internet applications and content on a nondiscriminatory basis. Commentators, led by Lawrence Lessig,⁴ have long been concerned that cable modem and DSL systems will use their control of the “last mile” of the network to block or slow access to content and applications that threaten their proprietary operations. The concern is that the resulting reduction in interoperability would impair the environment for competition and innovation in the market for Internet content and applications.

Elsewhere, I address proposals that attempt to preserve the transparency of the Internet by regulating last-mile providers’ relationships with *end users*.⁵ This Article focuses instead on proposals to regulate last-mile providers’ relationships with *network and content providers*. Some call for mandating interconnection of broadband networks along standardized interfaces such as TCP/IP.⁶ Others argue in favor of a presumption that any discriminatory access agreements are anti-competitive, leaving the precise regulatory requirements to be developed over time through case-by-case adjudications.⁷ Although these proposals vary considerably in both their terminology and details, they can comfortably be aggregated within the broad rubric of “network neutrality.”

4. See LAWRENCE LESSIG, *THE FUTURE OF IDEAS* 46–48, 155–76, 246–49 (2001).

5. See Christopher S. Yoo, *Network Neutrality and the Economics of Congestion*, 94 GEO. L.J. (forthcoming 2006).

6. See, e.g., LESSIG, *supra* note 4, at 46–48, 155–76, 246–49; Mark Cooper, *Open Communications Platforms: The Physical Infrastructure as the Bedrock of Innovation and Democratic Discourse in the Internet Age*, 2 J. ON TELECOMM. & HIGH TECH. L. 177 (2003); Mark A. Lemley, *Antitrust and the Internet Standardization Problem*, 28 CONN. L. REV. 1041, 1062–65 (1996); Lawrence B. Solum & Minn Chung, *The Layers Principle: Internet Architecture and the Law*, 79 NOTRE DAME L. REV. 815, 851, 878 (2004); Werbach, *supra* note 2, at 65–67; Tim Wu, *The Broadband Debate, A User’s Guide*, 3 J. ON TELECOMM. & HIGH TECH. L. 69 (2004); cf. James B. Speta, *A Common Carrier Approach to Internet Interconnection*, 54 FED. COMM. L.J. 225, 268–79 (2002) (proposing mandatory interconnection among Internet carriers). These proposals are related to early calls for forcing cable modem systems to provide access to all Internet service providers. See 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 (2001). It is also similar to the complaint that network owners are creating “walled gardens” that favor proprietary content. See, e.g., LESSIG, *supra* note 4, at 156; Hernan Galperin & Francois Bar, *The Regulation of Interactive Television in the United States and the European Union*, 55 FED. COMM. L.J. 61, 62–64, 69–72 (2002).

7. See, e.g., Philip J. Weiser, *Toward a Next Generation Regulatory Strategy*, 35 LOY. U. CHI. L.J. 41, 74–76 (2003); cf. Lawrence Lessig, *Re-Marking the Progress in Frischmann*, 89 MINN. L. REV. 1031, 1040 (2005) (offering a weaker version of network neutrality that places a “thumb on the scale” in favor of full interoperability).

The various sides of the debate differ over whether last-mile providers are blocking access to content and applications. Leading cable modem and DSL providers have asserted that they have not blocked access to any content or applications and that competitive forces would preclude any future attempt to do so.⁸ Indeed, the FCC and leading congressional proponents of network neutrality have repeatedly noted the lack of evidence of any such activity.⁹ However, the potential danger stemming from last-mile providers' ability to block access to certain applications was underscored when a small telecommunications carrier known as Madison River Communications prevented its DSL customers from accessing the ports needed for VoIP service.¹⁰ Allegations of similar interruptions of VoIP service by minor service providers soon followed.¹¹

The regulatory measures taken by the FCC following *Brand X* have further heightened these concerns. The FCC followed its initial decision that cable modem systems represent "information services"¹² with a decision declaring that DSL is also an information service that is exempt from the access requirements imposed on telecommunications carriers by Title II of the Communications Act of 1934 as amended.¹³ At the same time, the FCC repealed the access and interoperability requirements established during the *Computer Inquiries* and rejected calls for imposing alternative access requirements or nondiscrimination requirements on the ground that competition ren-

8. See National Cable and Telecommunications Association, Cable Provides Open Connectivity for the Internet 1 (June 2004) (noting that cable modem providers do not restrict end users' ability to access content), available at http://www.ncta.com/pdf_files/IssueBriefs/OpenInternet.pdf; 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 (noting telephone and cable companies' insistence that competition will ensure that they will not block access to Internet content).

9. See Cable Modem Declaratory Ruling and NPRM, *supra* note 1, at 4845 ¶ 87 (noting that the FCC was unaware of any allegation that a cable operator had denied or slowed access to any content or network provider); 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"); Schatz & Squeo, *supra* note 8 (quoting FCC Chairman Kevin Martin as saying "[w]e haven't seen any evidence of this being a problem" and noting that "[C]ongressional proponents of net-neutrality legislation acknowledge that it isn't a problem now"); cf. Lemley & Lessig, *supra* note 6, at 955 (conceding that the risks of nonneutrality had not yet come to pass).

10. See Madison River Commc'ns, LLC, Order, 20 F.C.C.R. 4295 (2005).

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

12. See Cable Modem Declaratory Ruling and NPRM, *supra* note 1, at 4820–39 ¶¶ 34–71.

13. See Appropriate Framework for Broadband Access to the Internet over Wireline Facilities, Report and Order and Notice of Proposed Rulemaking, 20 F.C.C.R. 14,853, 14,862–65, ¶¶ 12–17 (2005) [hereinafter Wireline Broadband Order].

dered any such regulation unnecessary.¹⁴ The FCC's rationale appears to foreclose the possibility left open in an earlier proceeding of imposing similar access regulations on cable modem systems.¹⁵

At the same time, the FCC explicitly reserved the right to revisit this decision should circumstances warrant doing so¹⁶ and issued a policy statement recognizing the agency's intent to preserve consumers' rights to access content and run applications as they see fit.¹⁷ The policy statement recognized an exception for "reasonable network management" and conceded that it lacked legal effect until incorporated into formal rules.¹⁸ In addition, a statement released by FCC Chairman Kevin Martin in conjunction with the policy statement expressed his confidence that competition would remain sufficiently robust that such regulation would prove unnecessary.¹⁹ The debate spilled over onto the front page of the *Wall Street Journal*, which predicted that network neutrality will be a major issue as Congress considers overhauling the communications laws.²⁰

There can be no question that interoperability provides substantial economic benefits. Making Internet applications and content universally accessible increases the value of the network to both end users and providers of applications and content. Indeed, as the FCC has recognized, the benefits from network neutrality are often so compelling that the vast majority of network owners can be expected to adhere to it voluntarily.²¹ Furthermore, network neutrality harkens back to the regime of mandatory interconnection and interface standardization used so successfully by the courts and the FCC to foster competition in telephone equipment (known as "customer premises equipment" or "CPE"),²² long distance,²³ and "enhanced services" (services that use

14. *Id.* at 14,865–98 ¶¶ 18–85, 14,904–05 ¶¶ 96–97; *see also* Nat'l Cable & Telecomm. Ass'n v. Brand X Internet Servs., 125 S. Ct. 2688, 2708 (2005) (noting that the FCC "remains free to impose special regulatory duties on facilities-based ISPs under its Title I ancillary jurisdiction").

15. *See* Cable Modem Declaratory Ruling and NPRM, *supra* note 1, at 4839–41 ¶¶ 72–74, 4843–48 ¶¶ 83–95.

16. *See* Wireline Broadband Order, *supra* note 13, at 14904 ¶ 96.

17. Appropriate Framework for Broadband Access to the Internet over Wireline Facilities, Policy Statement, 20 F.C.C.R. 14986 (2005).

18. *Id.* at 14988 n.15.

19. 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.

20. *See* Schatz & Squeo, *supra* note 8.

21. Wireline Broadband Order, *supra* note 13, at 14,892–94 ¶¶ 74–76, at 14,901–02 ¶ 91, 14,904–05 ¶¶ 96–97; *see also* 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, 83–84 (2000).

22. *See* PETER W. HUBER ET AL., FEDERAL TELECOMMUNICATIONS LAW 662–79 (2d ed. 1999). The FCC's landmark *Carterfone* decision overturned AT&T's "foreign attachments" policy, which prohibited customers from interconnecting any CPE not manufactured by AT&T's equipment subsidiary, Western Electric. *Carterfone* instead ruled that customers have the right to attach any device to the telephone system "so long as the interconnection

modems to enable telephone networks to convey computer-related traffic in addition to voice communications).²⁴ Concepts like openness and neutrality also seem to promote such widely held values as equality of treatment and freedom of choice. The recent surge of merger activity in the cable and telecommunications industries appears to make concerns about gatekeeper control by network owners all the more plausible.

That said, when deciding whether to impose network neutrality as a regulatory mandate, the key question is not whether network neutrality provides substantial benefits. Instead, the key inquiry is whether circumstances exist in which deviations from network neutrality would create benefits that would be foreclosed if network neutrality were imposed. As the Supreme Court recognized in assessing the parallel question under the antitrust laws, a business practice

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 Services, Decision, 13 F.C.C.2d 420, 424 (1968). The FCC eventually standardized the interface and required AT&T to allow the attachment of any CPE that complied with certain designated standards. See *Proposals for New or Revised Classes of Interstate and Foreign Message Toll Telephone Service (MTS) and Wide Area Telephone Service (WATS)*, First Report and Order, 56 F.C.C.2d 593 (1975) (codified as amended at 47 C.F.R. §§ 68.1–614), *aff'd sub nom.* N.C. Utils. Comm'n v. FCC, 552 F.2d 1036 (4th Cir. 1977). Similar CPE interconnection and standardization requirements were later imposed on the newly divested Bell Operating Companies ("BOCs") by the court overseeing the breakup of AT&T. See HUBER ET AL., *supra*, at 418–19.

23. After the advent of microwave transmission made long distance competition feasible, the FCC (at the goading of the D.C. Circuit) eventually required AT&T to interconnect with all long distance carriers. The breakup of AT&T, in which the court required the BOCs to interconnect with all long distance carriers, further reinforced the obligation to interconnect. The court also ordered the BOCs to redesign and reprogram their switches to incorporate a standardized interface by 1986. This so-called "equal access" mandate was later extended to non-Bell local telephone companies as well. See HUBER ET AL., *supra* note 22, at 751–90.

24. The first and second *Computer Inquiries* required major local telephone companies that wished to provide enhanced services to do so through a separate subsidiary and to provide tariffs that permitted all providers of enhanced services to interconnect with their networks. The court presiding over the breakup of AT&T imposed similar requirements on the BOCs. The third *Computer Inquiry* allowed major local telephone companies to forego the separate subsidiary requirement so long as they complied with regulatory systems called "comparably efficient interconnection" ("CEI") and "open network architecture" ("ONA"). CEI and ONA require local telephone companies to interconnect with unaffiliated enhanced service providers on nondiscriminatory terms. See *id.* at 1088–95, 1107–55. The FCC also required the BOCs to "make available standardized hardware and software interfaces that are able to support transmission, switching, and signaling functions identical to those utilized in the enhanced service provided by the carrier." *Computer III Further Remand Proceedings: Bell Operating Company Provision of Enhanced Services*, Report and Order, 14 F.C.C.R. 4289, 4298 ¶ 13 (1999) (citing Amendment of Sections 64.702 of the Commission's Rules and Regulations (Third Computer Inquiry), Report and Order, 104 F.C.C.2d 958, 1039 ¶ 157 (1986), *vacated and remanded on other grounds sub nom.* California v. FCC, 905 F.2d 1217 (9th Cir. 1990)) (internal quotations omitted). The regime created by the third *Computer Inquiry* was eventually overturned on judicial review. See California v. FCC, 39 F.3d 919, 925–30 (9th Cir. 1994); California v. FCC, 905 F.2d 1217, 1230–39 (9th Cir. 1990). The remand proceedings were eventually rolled into the broadband proceedings opened in 2002. See Wireline Broadband NPRM, *supra* note 1, at 3024 ¶ 8.

should not be declared illegal per se unless the challenged practice evinces such a “pernicious effect on competition” and such a “lack of any redeeming virtue” that nothing would be lost if it were “presumed to be . . . illegal without elaborate inquiry as to the precise harm [it] ha[s] caused or the business excuse for [its] use.”²⁵ In the absence of a clear competitive harm, the standard response under competition policy is to forbear from categorically prohibiting the challenged practice and instead to evaluate its effect on competition on a case-by-case basis.²⁶

This approach allows policymakers to steer a middle course when facing uncertainty about the competitive impact of conflicting business models. Rather than presumptively favoring one particular architecture and placing the burden of proof on parties wishing to deviate from it, adopting a more restrained regulatory posture permits policymakers to avoid committing to either side of the debate and instead permit both approaches to go forward until the economic implications become clearer. The approach I am proposing would have its biggest impact with respect to practices that could possibly promote or harm competition and for which it is difficult to anticipate how competition will be affected. Presumptions in favor of a particular architecture effectively foreclose the potential benefits of alternative approaches even when there is no clear indication that permitting such a deviation would cause any demonstrable harm. A more restrained approach would give the benefit of the doubt to ambiguous cases and permit them to go forward unless and until there was a concrete showing of anticompetitive harm. Any other rule would short-circuit the process of experimentation with new products and alternate organizational forms that is essential to a properly functioning market. Such tolerance is particularly appropriate in light of network neutrality proponents’ acknowledgement that standardization can lead to market failure, that deviating from universal interoperability and interconnectivity can yield substantial benefits, and that determining whether a particular practice will help or harm competition is often difficult, if not impossible.²⁷ In addition, a less categorical and more restrained approach is particularly appropriate when technological change is transforming the economic impact of various practices. A better understanding of the potential benefits of deviating from network neu-

25. *N. Pac. Ry. Co. v. United States*, 356 U.S. 1, 5 (1957).

26. *See White Motor Co. v. United States*, 372 U.S. 253, 262–63 (1963).

27. *See* LESSIG, *supra* note 4, at 46–48, 167–75; Mark Cooper, *Open Access to the Broadband Internet: Technical and Economic Discrimination in Closed, Proprietary Networks*, 71 U. COLO. L. REV. 1011, 1050–52 (2000); Lemley & Lessig, *supra* note 6, at 939; Tim Wu, *Network Neutrality, Broadband Discrimination*, 2 J. ON TELECOMM. & HIGH TECH. L. 141, 147–49 (2003).

trality is thus essential for any proper assessment of the relevant tradeoffs.²⁸

In this Article, I would like to explore whether imposing network neutrality would forestall the realization of important economic benefits. What emerges is a fascinating picture that is more complex than that suggested by the current literature. My analysis reveals that network neutrality is based on assumptions about the uniformity of consumer demand and the infeasibility of entry that, while having some validity during the early days of the Internet, no longer hold true. In addition, it suggests that the term “network neutrality” is something of a misnomer. Adoption of any standardized interface has the inevitable effect of favoring certain applications and disfavoring others. For example, TCP/IP routes packets anonymously on a “first come, first served” and “best efforts” basis. Thus, it is poorly suited to applications that are less tolerant of variations in throughput rates, such as streaming media and VoIP, and is biased against network-based security features that protect e-commerce and ward off viruses and spam. Contrary to what the nomenclature might suggest, network neutrality is anything but neutral. Indeed, using regulation to standardize interfaces has the unfortunate effect of forcing the government to act as the central planner of the technological evolution of the network.

Economic theory suggests that network neutrality proponents are focusing on the wrong policy problem. One of the basic tenets of vertical integration theory is that any chain of production will only be as efficient as its least competitive link. As a result, competition policy should focus on identifying the link that is the most concentrated and the most protected by entry barriers and design regulations to increase its competitiveness. In the broadband industry, the level of production that is the most concentrated and protected by barriers to entry is the last mile. This implies that decisions about Internet regulation should be guided by their impact on competition in that portion of the industry. Rather than adopt this orientation, network neutrality advocates direct their attention to preserving and promoting competition among providers of content and applications, which is the level of production that is already the most competitive and the most likely to remain that way.

28. The existing critiques of network neutrality are important but do not provide extended evaluation of the underlying economics. See Bruce M. Owen & Gregory L. Rosston, *Local Broadband Access: Primum Non Nocere or Primum Processi? A Property Rights Approach*, 11–12 (AEI-Brookings Joint Center for Regulatory Studies, Related Publication No. 03-19, Aug. 2003), available at <http://www.aei.brookings.org/admin/authorpdfs/page.php?id=285>; John E. Lopatka & William H. Page, *Internet Regulation and Consumer Welfare: Innovation, Speculation, and Cable Bundling*, 52 HASTINGS L.J. 891 (2001); Adam Thierer, *Are “Dumb Pipe” Mandates Smart Public Policy? Vertical Integration, “Net Neutrality,” and the Network Layers Model*, 3 J. ON TELECOMM. & HIGH TECH. L. 275 (2005).

Once one makes improving the competitiveness of the last mile the central goal of broadband policy, network neutrality becomes potentially more problematic and counterproductive. For example, network neutrality can exacerbate the impact of up-front, fixed costs and network economic effects, which are the most commonly identified sources of market failure that justify the regulation of telecommunications markets. Specifically, the existing debate has largely overlooked how product differentiation can ameliorate both of these effects and allow smaller producers to survive despite having lower sales volumes and higher per-unit costs. Such solutions are quite common in other industries. For example, it is the same mechanism that allows specialty stores to survive despite competition from low-cost, mass-market discounters. Differentiation allows them to retain those customers who place a higher value on a particular type of product despite the fact that prices may be somewhat higher.

A similar solution is possible in the broadband industry. Allowing network owners to differentiate their networks can better satisfy the increasing heterogeneity of end user demand. In addition, increasing the number of dimensions along which networks compete can mitigate supply-side and demand-side economies of scale. Restated in terms of the Internet, network diversity might make it possible for three different last-mile networks to coexist: one optimized for traditional Internet applications such as e-mail and website access; another incorporating security features to facilitate e-commerce and to guard against viruses, spam, and other undesirable aspects of life on the Internet; and a third that prioritizes packets in the manner needed to facilitate time-sensitive applications such as streaming media and VoIP. Each would survive by catering to the market segment that places the highest value on a particular type of service.

Extended to its logical conclusion, this analysis suggests that public policy would be better served if Congress and the FCC were to embrace a “network diversity” principle that permits network owners to deploy proprietary protocols and to enter into exclusivity agreements with content providers. Preventing network owners from differentiating their offerings would forestall this process. In other words, standardization of TCP/IP would have the effect of narrowing the dimensions of competition, forcing networks to compete solely on the basis of price and network size. The commodification of bandwidth would foreclose one avenue for mitigating the advantages enjoyed by the largest players.

At the same time, network neutrality threatens to reduce incentives to increase competition through the construction of new networks. Eliminating the potential for short-run supracompetitive returns would also thwart one of the primary mechanisms upon which markets rely to stimulate entry. Furthermore, by providing all applica-

tions and content providers with access to the existing network, network neutrality deprives would-be builders of alternative network capacity of their natural strategic partners. Concerns about reducing investment incentives carry little weight when last-mile competition is infeasible, as was arguably the case when interconnection and standardization were mandated with respect to CPE, long distance, and enhanced services. They are paramount when entry by new last-mile providers is ongoing and other last-mile technologies are waiting in the wings. Under these circumstances, regulation imposed to curb market concentration can turn into the cause, rather than the consequence, of market failure.

What emerges is a vision of competition that is quite different from that envisioned by the current debate. This is not to say that network diversity would be a panacea. The analytical framework laid out in this Article underscores the complexity of the underlying welfare calculus. Just to highlight a couple of considerations, the aggregate demand and the cost structure may cause the level of competition to be insufficiently robust to yield the benefits I have identified. Furthermore, the viability of network diversity depends in no small part on the relative heterogeneity of consumer preferences. If there is no variance in what end users want from networks, there will be no sub-segments for smaller network owners to target. In addition, some degree of deadweight loss and redundant entry may be endemic under network diversity, and it is possible that the welfare increases associated with greater product diversity will not completely offset these losses. Furthermore, given that entry is never instantaneous, welfare analysis of network diversity requires balancing the short-run static efficiency losses from allowing network owners to earn short-run supracompetitive profits against the long-run dynamic efficiency gains resulting from stimulating the entry of competing networks. In short, determining whether network neutrality or network diversity would lead to a more socially beneficial outcome is a context-specific inquiry that cannot be determined a priori. The absence of simple policy inferences renders the regulatory decision about whether to impose network neutrality quite complex. Indeed, network neutrality proponents have suggested that many of the problems I have identified can be addressed through other means.²⁹

There are, however, a number of institutional considerations that suggest that network diversity might well be the better approach. To the extent that regulatory solutions take the form of ex ante rules, they are poorly suited to the context-specific determinations suggested by network diversity theory. Even a presumption that discriminatory access arrangements are anticompetitive would prevent network owners

29. See LESSIG, *supra* note 4, at 46–48, 167–75; Wu, *supra* note 6, at 147–49.

from experimenting with network diversity, since they would presumably be foreclosed from adopting any practice that deviated from interoperability and interconnectivity unless they can demonstrate clear benefits. Network neutrality proponents concede the difficulties in distinguishing practices that are economically justified from those that will harm competition.³⁰ Because of the inherent ambiguity of many business practices, competition policy's usual response is not to put the burden of demonstrating economic benefits on parties who wish to adopt a practice, but rather to place the burden on the opponents of the practice and to permit the practice to occur until opponents can demonstrate anticompetitive harm.

In addition, the regulatory tools needed to implement the regime of interconnection, standardization, rate regulation, and nondiscrimination implicit in network neutrality have long been criticized as difficult to implement and unlikely to be effective in industries like broadband, where the services provided vary in quality and where technology is changing rapidly. Regulatory lag creates the danger that restrictions will persist long after the conditions that justified their imposition have dissipated. Even worse, by reducing investment incentives, network neutrality can itself become the means through which market concentration is cemented into place. Indeed, one of the principal drawbacks about regimes of mandatory interconnection and interface standardization is that they implicitly presuppose that regulation will continue indefinitely. Network diversity, in contrast, is better at facilitating competitive entry. As such, it has the advantage of having embedded within it a built-in exit strategy.

Even these arguments, while carrying considerable persuasive force, fall short of providing a definitive resolution of these issues, and the debate all too often risks collapsing into battles over ideology. Competition policy offers a potential solution by implicitly recognizing that the best response in the face of uncertainty is forbearance. Until it is clear whether adhering to or deviating from complete interoperability would be the better course of action, competition policy would counsel in favor of permitting both architectures to go forward. Intervening by mandating network neutrality would have the inevitable effect of locking the existing interfaces into place and of foreclosing experimentation into new products and alternative organizational forms that transcend traditional firm boundaries.

The decision to permit network diversity to emerge, then, does not necessarily depend on a conviction that it would yield a substantively better outcome, but rather from a "technological humility" that permits exploration to proceed until policymakers can make a clearer assessment of the cost-benefit tradeoff. Although preserving the status

30. See *supra* note 27 and accompanying text.

quo might be preferable if allowing such experimentation would inflict irreversible and catastrophic harm, neither would seem to be the case with respect to network neutrality. In this sense, network diversity is not the mirror image of network neutrality, in that it does not call for the imposition of any mandatory obligations. Rather, network diversity adopts the more modest position that regards regulatory forbearance as the appropriate course of action when confronted with ambiguity.

The balance of my argument is organized as follows. In Part II, I demonstrate how network neutrality proponents are focusing on the wrong policy problem by supporting regulation to preserve competition in applications and content, which are the portions of the industry that are already the most competitive and the most likely to remain that way. Instead, regulation should be directed toward fostering competition in the last mile, which is the industry segment that is the most concentrated and the most protected by entry barriers.

In Part III, I analyze the potential drawbacks to network neutrality, explaining how network neutrality narrows consumer choice, disfavors certain applications, reinforces sources of market failure in the last mile, and dampens investment in alternative network capacity, which in turn threatens to entrench the existing oligopoly into place. I draw on the economic literature on product differentiation and network economic effects to lay out the case in favor of network diversity. In the process, I engage arguments about the “end-to-end” principle, which has played a prominent role in the existing debate. I also show how network neutrality necessarily relies upon regulatory tools that have become suspect in a world in which communications have become increasingly decommodified. I also briefly discuss the deficiencies of attempts to offer noneconomic justifications for network neutrality.

In Part IV, I consider the policy implications that emerge from the debate between network neutrality and network diversity. I begin by clarifying a common misunderstanding about the relationship between network diversity and the innovation-based theory of competition articulated by Joseph Schumpeter.³¹ I then detail the complexity of the welfare analysis indicated by network diversity, showing that the economic resolution of this debate turns on a number of context-specific determinations that cannot be determined a priori. I also outline a number of institutional considerations tending to militate against network neutrality, including a brief discussion that considers whether these issues should be resolved under antitrust law. Part V closes by directly engaging the arguments offered by network neutrality propo-

31. *See* JOSEPH A. SCHUMPETER, CAPITALISM, SOCIALISM AND DEMOCRACY 81–86 (3d ed. 1950).

nents and by offering a tentative resolution of these countervailing considerations.

II. NETWORK NEUTRALITY'S MISPLACED FOCUS ON APPLICATIONS AND CONTENT

Network neutrality's central concern is that owners of cable modem and DSL systems will use their control over the last mile to harm application and content providers. This Part demonstrates how network neutrality is fundamentally a concern about vertical integration. Section A maps network neutrality onto the two leading approaches for modeling the vertical structure of the broadband industry. Section B draws on the insights of vertical integration theory to show that network neutrality proponents are focusing on the wrong policy problem. Broadband policy would be better served if regulation was targeted not at preserving and promoting competition in applications and content, but rather at increasing competition in the last mile.

A. The Relationship Between Network Neutrality and Vertical Integration

Regulations that compel access to bottleneck facilities are inherently about vertical integration.³² That this is the case can be easily seen if the broadband industry is mapped onto the vertical chain of production that characterizes most industries.³³ The initial stage is known as manufacturing and consists of the companies that create the products and services that end users actually consume. The final stage is known as retailing and is comprised of the companies responsible for delivering those products and services to end users. Although it is theoretically possible for retailers to purchase products directly from manufacturers, in some cases logistical complications create the need for an intermediate stage between manufacturers and retailers. Firms operating in this intermediate stage, known as wholesalers, assemble goods purchased directly from manufacturers into complete product lines and distribute them to retailers. Formal vertical integration through mergers, and de facto vertical integration through exclusivity arrangements between manufacturers and retailers or between manufacturers and wholesalers, are a common economic feature, appearing in industries varying from shoes to cars.³⁴

32. See 3A PHILIP E. AREEDA & HERBERT HOVENKAMP, *ANTITRUST LAW* ¶ 771, at 169–71 (2d ed. 2002); LESSIG, *supra* note 4, at 165–66; Wu, *supra* note 6, at 84–85.

33. See Christopher S. Yoo, *Vertical Integration and Media Regulation in the New Economy*, 19 *YALE J. ON REG.* 171, 182, 250–51 (2002).

34. See, e.g., *White Motor Co. v. United States*, 372 U.S. 253 (1963); *Brown Shoe Co. v. United States*, 370 U.S. 294 (1962).

The broadband industry fits easily into this vertical structure. The manufacturing stage is composed of the companies that produce web-page content and Internet-based services, such as e-commerce and VoIP. The retail stage includes DSL providers, cable modem systems, and other last-mile technologies. Conceptualizing the chain of distribution in this manner makes clear that the practices toward which network neutrality directs its attention, which are uniformly about last-mile providers favoring proprietary applications and content, are essentially forms of vertical integration.

The emphasis on vertical integration remains clear even if network neutrality is viewed through the “layered model” that has become an increasingly popular way to conceive of the structure of the Internet. The leading approach disaggregates networks into four horizontal layers that cut across different network providers.³⁵ The bottommost layer is the *physical layer*, which consists of the hardware infrastructure used to route and transmit the data packets that make up a particular form of communications. The second layer is the *logical layer*, which is composed of the protocols used to route packets to their proper destination and to ensure that they arrive intact. The third layer is the *applications layer*, which is comprised of the particular programs and functions used by consumers. The fourth layer is the *content layer*, which consists of the particular data being conveyed.

The differences between the layers can be illustrated in terms of the most common Internet application: e-mail. The physical layer consists of the telephone or cable lines, e-mail servers, routers, and backbone facilities needed to convey the e-mail from one location to another. The logical layer consists of the SMTP protocol employed by the network to route the e-mail to its destination. The application layer consists of the e-mail program used, such as Microsoft Outlook. The content layer consists of the particular e-mail message sent.

35. See Werbach, *supra* note 2, at 59–64; Richard S. Whitt, *A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model*, 56 FED. COMM. L.J. 587, 624 (2004). The layered model is related to the Open Systems Interconnection (“OSI”) model developed by the International Standards Organization (“ISO”) in the 1980s, which divides seven different layers. Because some of these distinctions have greater relevance for technologists than for policy analysts, the four-layer model combines some of these layers. See Werbach, *supra* note 2, at 59. Note that other versions of the layered approach use different numbers of layers. See LESSIG, *supra* note 4, at 23–25 (employing a three-layer model of physical, code, and content layers); Yochai Benkler, *From Consumers to Users: Shifting the Deeper Structures of Regulation Towards Sustainable Commons and User Access*, 52 FED. COMM. L.J. 561, 562 (2000) (employing the same approach); Solum & Chung, *supra* note 6, at 816 (proposing a six-layer model); Kevin Werbach, *Breaking the Ice: Rethinking Telecommunications Law for the Digital Age*, 4 J. ON TELECOMM. & HIGH TECH. L. (forthcoming 2005) (revising his initial four-layer model into a three-layer model); Timothy Wu, *Application-Centered Internet Analysis*, 85 VA. L. REV. 1163, 1189–92 (1999) (proposing a different, four-layer model); *infra* note 166 and accompanying text.

The layered model underscores the extent to which network neutrality is focused on vertical integration. The concern is that owners of the physical layer will use their control over the logical layer to give preferential treatment to proprietary applications and content. Network neutrality thus proposes regulating the logical layer to preserve competition in the applications and content layers.

B. The Insights of Vertical Integration Theory

One of the key insights of vertical integration theory is that any vertical chain of production will only be efficient if every link is competitive.³⁶ The intuitions underlying that literature can be easily illustrated through a hypothetical example based on the Supreme Court's landmark *Terminal Railroad* decision, the seminal case for mandating interconnection to a bottleneck facility.³⁷ Suppose that a railway company controlled the only bridge across the Mississippi River at St. Louis and that it was using its control of the bridge either to give preferential treatment to its proprietary rolling stock or to forbid competing carriers from using the bridge altogether. One might be tempted to require the bridge owner to allow other railway networks to interconnect to its bridge and to require it to provide access to the bridge to all comers on reasonable and nondiscriminatory terms. Indeed, that is precisely the type of solution sanctioned by the Supreme Court.³⁸

Vertical integration theorists have pointed out that this type of compulsory sharing of a monopoly facility represents something of a competition policy anomaly.³⁹ When confronted with a concentrated market, the conventional response is to deconcentrate the problematic market, either by breaking up the existing monopoly or by facilitating entry by a competitor. The elimination of horizontal concentration allows private ordering to dissipate the supracompetitive prices and reductions in output associated with monopoly.

Compelling interconnection to the bottleneck resource deviates from the conventional approach by leaving the monopoly in place and simply requiring that it be shared. As a result, it fails by itself to reduce prices below or increase output above monopoly levels. For example, suppose that the monopoly price for shipping goods between two points across the bridge is \$100 and that the cost of providing the rolling stock for that shipment is \$35.⁴⁰ A bridge monopolist who had

36. See Christopher S. Yoo, *Would Mandating Broadband Network Neutrality Help or Hurt Competition?: A Comment on the End-to-End Debate*, 3 J. ON TELECOMM. & HIGH TECH. L. 23, 59–60 (2004).

37. *United States v. Terminal R.R. Ass'n of St. Louis*, 224 U.S. 383 (1912).

38. See *id.* at 411–12.

39. See, e.g., 3A AREEDA & HOVENKAMP, *supra* note 32, ¶ 771b, at 171–73.

40. The example is adapted from one offered by then-Chief Judge Breyer, who in turn adapted it from the leading antitrust treatise. See *Town of Concord v. Boston Edison Co.*,

vertically integrated into rolling stock would be expected to charge \$100 for the combined services. Now consider what would occur if regulators forced the bridge owner to provide all railroad companies nondiscriminatory access to its bridge. Absent price controls, the bridge owner would simply charge \$65 to use its bridge. Since the market for rolling stock is competitive, the railroad companies would set their prices equal to their costs and charge \$35. In the end, customers still pay \$100.

Thus, forcing a bridge monopolist to provide nondiscriminatory access to its bridge provides no consumer benefits, since vertical disintegration does nothing to displace the bridge monopoly that is the real source of market failure.⁴¹ In essence, the Supreme Court focused on the wrong policy problem. It makes little sense to protect the market for rolling stock. That market was already quite competitive, and the barriers to entering that portion of the industry were quite low. Rather than attempting to foster competition among railways, it should have focused its efforts on increasing the competitiveness of the market for bridges. In other words, competition policy would be better promoted if attention were focused on the level of production that is the most concentrated and the most protected by entry barriers.

The same economic reasoning holds true for broadband. Suppose that vertical integration in broadband were banned altogether and that every last-mile provider were forced to divest its ownership interests in any content or applications provider. Would doing so reduce the market power of the last-mile providers? The answer is clearly “no.” The market power exercised by DSL and cable modem providers exists because of the limited number of options that end users have for obtaining last-mile services. The number of options will remain the same regardless of whether or not last-mile providers hold ownership stakes in content and application providers or whether unaffiliated content and application providers are granted nondiscriminatory access. Vertical disintegration thus has no effect on last-mile providers’ ability to extract supracompetitive returns. Consumers will receive benefits only by promoting entry by alternative network capacity.

This analysis emphasizes the extent to which network neutrality proponents are focusing on the wrong policy problem. By directing their efforts towards encouraging and preserving competition in the market for application and content, they are concentrating on the segments of the industry that are already the most competitive and the most likely to remain that way. This is not to say that the previous

915 F.2d 17, 32 (1st Cir. 1990) (Breyer, C.J.) (citing 3 PHILIP AREEDA & DONALD F. TURNER, *ANTITRUST LAW* ¶ 728, at 199 (1978)).

41. Indeed, if the market for rolling stock were also uncompetitive, double marginalization theory indicates that vertical integration can actually enhance welfare. See Yoo, *supra* note 33, at 192–93, 260–61.

regulations designed to foster competition in CPE, long distance, and enhanced services were misguided. Focusing on promoting competition in complementary services may make sense when entry by alternative network capacity is impossible, as was arguably the case when the FCC mandated access to network transmission in order to promote competition in CPE,⁴² long distance,⁴³ and enhanced services.⁴⁴

The FCC has recognized, however, that the increasing availability of last-mile alternatives has undercut the continued appropriateness of this approach. For example, the FCC has ruled that the local telephone companies created by the breakup of AT&T now face sufficient competition to justify permitting them to offer in-region long-distance service in every state except Alaska and Hawaii.⁴⁵ In addition, in eliminating the regulatory requirements imposed by the *Computer Inquiries*, the FCC recognized that those rules “were developed before separate and different broadband technologies began to emerge and compete for customers” and could no longer be justified under contemporary circumstances.⁴⁶ Lastly, the FCC has acknowledged that the increase in competition has weakened the ability of last-mile providers to discriminate in favor of proprietary CPE. The FCC has concluded that the growth in competition among local exchange carriers justified abolishing its prohibition of bundling CPE with telecommunications services.⁴⁷ Even though local exchange markets were not yet perfectly competitive, the FCC concluded that the level of competition and the consumer benefits of bundling sufficiently mitigated the risk of anticompetitive harm.⁴⁸ The FCC has subsequently abandoned its previous role in establishing the technical criteria for interconnect-

42. See, e.g., GERALD W. BROCK, TELECOMMUNICATION POLICY FOR THE INFORMATION AGE: FROM MONOPOLY TO COMPETITION 152 (1994) (explaining that mandatory interconnection requirements are based on the assumption that customers’ premises are accessible only through the local telephone network).

43. See, e.g., *Verizon Commc’ns Inc. v. FCC*, 535 U.S. 467, 475 (2002) (noting that at the time of the breakup of AT&T, local telephone service was thought to be a natural monopoly); WILLIAM BAUMOL & J. GREGORY SIDAK, TOWARD COMPETITION IN LOCAL TELEPHONY 7–10 (1994) (noting the same);

44. See, e.g., Wireline Broadband NPRM, *supra* note 1, at 3037 ¶ 36 (“[W]ith respect to technology, the core assumption underlying the *Computer Inquiries* was that the telephone network is the primary, if not exclusive, means through which information service providers can obtain access to customer.”); *Nat’l Cable & Telecomm. Ass’n v. Brand X Internet Servs.*, 125 S. Ct. 2688, 2711 (2005) (quoting the above-quoted language from the Wireline Broadband NPRM with approval); Cable Modem Declaratory Ruling and NPRM, *supra* note 1, at 4825 ¶ 44 (quoting the same).

45. See RBOC Applications to Prove In-Region, InterLATA Services Under § 271 (Feb. 25, 2005), http://www.fcc.gov/Bureaus/Common_Carrier/in-region_applications/ (reporting that the FCC has ruled that local telephone companies are subject to sufficient competition to permit them to offer in-region long-distance service in every state except Alaska and Hawaii).

46. See Wireline Broadband Order, *supra* note 13, at 14,876–77 ¶ 42.

47. See Policy and Rules Concerning the Interstate, Interexchange Marketplace, Report and Order, 16 F.C.C.R. 7418, 7424 ¶ 10 (2001).

48. *Id.* at 7436–37 ¶¶ 30–31, 7438–40 ¶¶ 33–36.

ing CPE,⁴⁹ although the FCC stopped short of repealing the interconnection requirements altogether.⁵⁰

The rationale underlying previous examples of mandated interconnection and standardization, as well as the evolution of regulatory policy since those restrictions were initially adopted, indicates that broadband policy would be better served if such efforts were directed towards identifying and increasing the competitiveness of the last mile, which remains the industry segment that is the most concentrated and protected by entry barriers. Restated in terms of the layered model, decisions about whether to regulate the logical layer should not be driven by a desire to preserve and promote competition in the application and content layers. Such decisions should instead be guided by their impact on competition in the physical layer.

III. THE SHORTCOMINGS OF NETWORK NEUTRALITY AND THE CASE FOR NETWORK DIVERSITY

Having determined that the central goal of broadband policy should be to foster greater competition in the last mile, the next logical step is to assess whether network neutrality would further or hinder that goal. The analysis will examine two different dimensions of economic performance: “static efficiency” and “dynamic efficiency.” Static efficiency holds the quantity of inputs and the available technology constant and asks whether goods and services are being produced using the fewest resources and are being allocated to those consumers who place the highest value on them. Static efficiency is traditionally measured according to the most familiar metrics of economic welfare, such as the maximization of consumer and total surplus and the minimization of average cost and deadweight loss.

This analysis reveals that network neutrality may impair static efficiency in two ways. First, standardization necessarily reduces economic welfare by limiting product variety. Second, and more importantly for our purposes, network neutrality can impede the emergence of competition in the last mile by reinforcing the economic characteristics that drive markets for telecommunications networks towards natural monopoly (i.e., high up-front costs and network economic effects). To the extent that network neutrality is imposed to limit monopoly or oligopoly power, it can have the perverse effect of entrenching industry concentration by short-circuiting one of the most natural ways to mitigate market failure. Network neutrality is also hamstrung by the practical consideration that the regulatory tools traditionally used to promote static efficiency are unlikely to work well

49. See 2000 Biennial Regulatory Review of Part 68 of the Commission’s Rules and Regulations, Report and Order, 15 F.C.C.R. 24,944, 24,951–53 ¶¶ 20–23 (2000).

50. See *id.* at 24949–50 ¶¶ 16–17.

in industries undergoing rapid technological change. Those tools are also unlikely to be effective when the demands that end users are placing on the network are becoming increasingly heterogeneous in terms of quality of service and content.

While static efficiency represents the most widely accepted measure of economic performance, it raises an important question by failing to take into account the fact that the distribution of inputs and technology is itself subject to change and optimization. Such considerations fall within the realm of dynamic efficiency, which treats input availability and technology as endogenous. Put another way, while static efficiency optimizes placement along a production possibility frontier, dynamic efficiency also addresses the prospect that the production possibility frontier could shift outwards. Indeed, the growing importance of technology and infrastructure and the accelerating pace of technological change have made dynamic efficiency an increasingly important consideration in the modern economy.

In terms of dynamic efficiency, my analysis draws on the literature exploring the impact of compulsory access on investment incentives in order to examine how mandating interconnection can discourage the build-out of new last-mile technologies. Mounting empirical evidence confirms that the imposition of interconnection and standardization regimes of the type envisaged by network neutrality proponents to redress concentration in the last mile may in fact have the opposite effect. Network diversity, in contrast, would avoid these problems and could facilitate entry by new last-mile providers.

These conclusions suggest that society might be better off if policymakers were to embrace a *network diversity* principle. I close by offering a few brief observations about the noneconomic justifications offered in support of network neutrality. I find that while they are analytically coherent, they are insufficiently theorized to provide a basis for a coherent regulatory regime.

A. Network Neutrality and Static Efficiency

This Section evaluates network neutrality in terms of static efficiency. It first discusses how compulsory standardization of protocols like TCP/IP can reduce economic welfare both by reducing product variety and by favoring certain applications over others. Close analysis reveals that mandating interconnection is inherently nonneutral. Then, the Section describes how network neutrality can have the perverse effect of reinforcing the sources of market failure that have historically been regarded as the reason that markets for last-mile technologies have remained so concentrated. This analysis suggests that broadband policy might well be better off if Congress and the FCC were to embrace network diversity as a central guiding principle.

1. The Potential Welfare Gains from Network Diversity and the Inherent Nonneutrality of Network Neutrality

The regime of mandatory interconnection and protocol standardization envisioned by network neutrality proponents would have a potentially dramatic impact on static efficiency that is often obscured under the price-theoretic approach that dominates law and economics scholarship. Price-theoretic analyses assume, explicitly or implicitly, that competing goods serve as perfect substitutes for one another. This in turn allows economic welfare to be determined solely by price. Consumer surplus is created when consumers pay prices that are less than the maximum they would be willing to pay, and producer surplus is created when producers receive prices that exceed the minimum price they would be willing to accept. In a price-theoretic world, then, economic welfare consists solely of the sum of consumer and producer surplus.

A different situation obtains when products are differentiated.⁵¹ The economics of product differentiation acknowledge that utility can also increase by allowing consumers to obtain goods that fit better with their ideal preferences.⁵² The welfare benefits from product differentiation are not observable in the classic price-quantity space that dominates economic analysis. They nonetheless remain an important potential source of economic welfare. Conversely, standardization can “prevent the development of promising but unique and incompatible new systems.”⁵³ The concomitant reduction in product variety can represent an important, but often overlooked, source of welfare loss.⁵⁴

These problems appear more acute when the focus is shifted from standardization in the abstract to the particular form of standardization favored by network neutrality proponents. Adoption of any set of protocols has the inevitable effect of favoring certain types of applications and disfavoring others. Even worse, standardization also has the inevitable effect of putting the government in the position of picking technological winners and losers. In addition, to be effective, such intervention would likely be required at an early stage when the un-

51. For an overview of the economics of product differentiation, see Christopher S. Yoo, *Copyright and Product Differentiation*, 79 N.Y.U. L. REV. 212, 236–46, 251–67 (2004).

52. See Yoo, *supra* note 33, at 271–72; Christopher S. Yoo, *Rethinking the Commitment to Free, Local Television*, 52 EMORY L.J. 1579, 1617–18 (2003).

53. Michael L. Katz & Carl Shapiro, *Systems Competition and Network Effects*, 8 J. ECON. PERSP. 93, 110 (1994).

54. See *id.* (noting that “the primary cost of standardization is loss of variety: consumers have fewer differentiated products to pick from”); Joseph Farrell & Garth Saloner, *Standardization, Compatibility, and Innovation*, 16 RAND J. ECON. 70, 71 (1985) (counting “reduction in variety” as one of the “important social costs” of standardization).

derlying technology is still in a state of flux.⁵⁵ In short, it appears that the term “network neutrality” is something of a misnomer.

Consider TCP/IP, which remains the de facto standard set of protocols on the Internet.⁵⁶ Given the Internet’s meteoric success, it is tempting to treat the status quo as the relevant baseline and to place the burden on those who would deviate from it,⁵⁷ although, as I will discuss later, there are significant conceptual problems associated with taking such an approach.⁵⁸ As noted earlier, one of the distinguishing features of TCP/IP is that it routes packets anonymously on a “first come, first served” basis without regard to the application with which they are associated. It also transmits packets on a “best efforts” basis without any guarantee of success.

This approach to routing packets was uncontroversial when usage restrictions prohibited commercial use of the Internet and the network was used primarily by technology-oriented academics to share text-based communications that were not particularly sensitive to delays of up to a second. In recent years, however, the environment in which the Internet operates has changed radically.⁵⁹ The transformation of the Internet from a medium for academic communication into a mass market phenomenon has greatly complicated the decisions faced by network owners.⁶⁰ Indeed, the number of possible connections increases exponentially with network size.⁶¹ The commercialization made possible by the privatization of the Internet has greatly increased the heterogeneity and variability of Internet usage. The shift from text-based applications, such as e-mail, to more bandwidth-intensive applications, such as webpage downloading and file transfers, has dramatically increased the volume of end-user demand. The emergence of applications that are increasingly sensitive to delay (even at the cost of lower accuracy and increased distortion⁶²) such as VoIP and streaming video, has created demand for even greater reliability in throughput rates and quality of service and is creating pressure for the deployment of “policy-based routers,” which break from TCP/IP by assigning higher priority to packets associated with time-

55. See Timothy F. Bresnahan, *New Modes of Competition: Implications for the Future Structure of the Computer Industry*, in *COMPETITION, INNOVATION AND THE MICROSOFT MONOPOLY: ANTITRUST IN THE DIGITAL MARKETPLACE* 155, 200–03 (Jeffrey A. Eisenach & Thomas M. Lenard eds., 1999).

56. For a preliminary version of this argument, see Yoo, *supra* note 36, at 34–37.

57. See Lemley & Lessig, *supra* note 6, at 929, 957, 971; Wu, *supra* note 6, at 91.

58. See *infra* note 289 and accompanying text.

59. See generally Marjory S. Blumenthal & David D. Clark, *Rethinking the Design of the Internet: The End-to-End Arguments vs. the Brave New World*, 1 *ACM TRANSACTIONS ON INTERNET TECH.* 70 (2001).

60. See Yoo, *supra* note 36, at 35.

61. 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, 1698 (2005).

62. See Jeffrey K. MacKie-Mason & Hal R. Varian, *Economic FAQs About the Internet*, *J. ECON. PERSP.*, Summer 1994, at 75, 87.

sensitive applications.⁶³ Furthermore, the unexpected interactions among network components that are the hallmark of complex systems can be quite sensitive to variability of demand.⁶⁴ Increases in the variability of network traffic can thus greatly impede network performance even if, on average, utilization of network capacity remains quite low.⁶⁵

Furthermore, the packet anonymity inherent in TCP/IP may be interfering with network owners' attempts to add security features designed to foster e-commerce or to protect against viruses and other hostile elements that are proliferating on the Internet. In addition, the Internet's shift away from academically-oriented users who enjoyed a similar degree of institutional support and shared certain common institutional norms has increased the justification for moving responsibility for system maintenance and management away from end users and towards the network's core.⁶⁶

These considerations make network management quite challenging. Although it is theoretically possible for network owners to respond to some of these demands by expanding bandwidth,⁶⁷ the fact that application designers are waiting in the wings with ever more bandwidth-intensive applications dictates that there is no compelling reason to believe that bandwidth will necessarily increase faster than demand, especially in light of the fact that the number of potential connections goes up exponentially with the number of computers added to the system.⁶⁸ In addition, decisions about capacity expansion can be difficult when facing uncertainty about the magnitude, heterogeneity, and variability of the demand that will be placed on the network. Decisionmaking is complicated still further by the "lumpiness" of network capacity created by the indivisibility of fixed costs and the fact that increasing network capacity typically takes a considerable amount of time.⁶⁹

In such an environment, it seems counter-productive to tie network owners' hands by limiting the number of ways in which they can manage network demand. An example from the early days of the Internet illustrates the point nicely. In 1987, end users began to rely

63. See Yoo, *supra* note 36, at 35–36; David D. Clark, *Adding Service Discrimination to the Internet*, 20 TELECOMM. POL'Y 169, 174 (1996); James B. Speta, *A Vision of Internet Openness by Government Fiat*, 96 NW. U. L. REV. 1553, 1574 (2002) (book review).

64. See Spulber & Yoo, *supra* note 61, at 1702–05.

65. See Jeffery K. MacKie-Mason & Hal R. Varian, *Some FAQs About Usage-Based Pricing*, 28 COMPUTER NETWORKS & ISDN SYS. 257, 259 (1995).

66. Yoo, *supra* note 36, at 35, 36–37.

67. See LESSIG, *supra* note 4, at 47. For a more detailed discussion of this argument, see *infra* notes 269–270 and accompanying text.

68. See *supra* note 61 and accompanying text.

69. See Daniel F. Spulber & Christopher S. Yoo, *Access to Networks: Economic and Constitutional Connections*, 88 CORNELL L. REV. 885, 912 (2003); Spulber & Yoo, *supra* note 61, at 1715, 1722.

increasingly on personal computers instead of dumb terminals to connect to what was then the NSFNET. The increased functionality provided by the shift to personal computers increased the intensity of the demands that end users were placing on the network. The resulting congestion caused terminal sessions to run unacceptably slowly, and the fact that fixed cost investments could not be made instantaneously created an inevitable delay in adding network capacity. This is precisely the type of technology- and demand-driven exogenous shock that makes network management so difficult. NSFNET's interim solution was to reprogram its routers to give terminal sessions higher priority than file transfer sessions until additional bandwidth could be added.⁷⁰ Indeed, such solutions need not be temporary: in a technologically dynamic world, one would expect that the relative costs of different types of solutions to change over time. Sometimes increases in bandwidth would be cheaper than reliance on network management techniques, and vice versa. It would thus be short-sighted to tie network managers' hands by limiting their flexibility in their choice of network management solutions.

Network neutrality also can restrict the network's functionality.⁷¹ A close analysis of the "end-to-end argument"⁷² — often invoked as one of the foundations of network neutrality⁷³ — demonstrates this point. The end-to-end argument asserts that application-specific functionality should be confined to the hosts operating at the edge of the network and that the core of the network should be as simple and general as possible. The rationale underlying this argument is based in cost-benefit analysis. Increasing the functions performed in the core of the network can improve the functionality of the network, but only at the cost of reduced network performance. The problem is that all applications would have to bear the costs associated with the reduction in performance even if they gain no compensating benefits. This tradeoff can be avoided if the core of the network performs only those functions that benefit almost all applications and if higher-level, application-specific functions are confined to the servers operating at the network's edge.

Although the end-to-end argument is frequently invoked in support of network neutrality, such claims are misplaced. The architects of the end-to-end argument candidly reject calls to elevate end-to-end

70. See MacKie-Mason & Varian, *supra* note 65, at 259.

71. The discussion that follows draws on the more extended analysis in Yoo, *supra* note 36, at 41–46.

72. See generally J.H. Saltzer et al., *End-to-End Arguments in System Design*, 2 ACM TRANSACTIONS ON COMPUTER SYS. 277 (1984) (providing the seminal statement of end-to-end).

73. See, e.g., LESSIG, *supra* note 4, at 34–48, 156–61; Cooper, *supra* note 6, at 180–81; Lemley & Lessig, *supra* note 6, at 930–34; Solum & Chung, *supra* note 6, at 823–38; Wu, *supra* note 6, at 146.

into a regulatory mandate as “too simplistic.”⁷⁴ Correct application of the cost-benefit tradeoff lying at the heart of the end-to-end argument requires “subtlety of analysis” and can be “quite complex.”⁷⁵ Indeed, the architects of end-to-end acknowledge that circumstances exist under which application of end-to-end would do more harm than good.⁷⁶ Properly construed, end-to-end calls for implementation on a case-by-case basis rather than a blanket regulatory prohibition.⁷⁷

There is no reason to believe a priori that giving preference to innovations operating at the network’s edge over innovations in the network’s core will prove to be beneficial in all cases. Two examples from the early days of the Internet illustrate the problem. The introduction of digital transmission technologies required the deployment of protocols that were not interoperable with the existing analog network. This necessitated the introduction of computer processing into the core of the network to engage in “protocol conversion.”⁷⁸ The emergence of “voice messaging services,” such as voice mail and advance calling, posed similar problems. Voice messaging services appeared to function best when their capabilities were designed directly into the telephone switch.⁷⁹ Both developments were inconsistent with the regime of transparency and interoperability envisioned by the second *Computer Inquiry* as well as the simplistic reading of the end-to-end argument. After considerable regulatory wrangling, the FCC permitted the deployment of both innovations, notwithstanding their in-

74. See Saltzer et al., *supra* note 72, at 280; *accord id.* at 285 (calling end-to-end a guideline rather than an absolute rule).

75. *Id.* at 281, 284. To take but one example, the desirability of end-to-end depends in part on the length of the file. If a system drops one message per one hundred messages sent, the probability that all packets will arrive correctly decreases exponentially as the length of the file (and thus the number of packets composing the file) increases. See *id.* at 280–81; see also Clark, *supra* note 63, at 171.

76. See David P. Reed et al., *Commentaries on “Active Networking and End-to-End Arguments,”* IEEE NETWORK, May/June 1998, at 69, 69 n.1 (noting that “[t]here are some situations where applying an end-to-end argument is counterproductive” while suggesting that such circumstances will be rare).

77. See *id.* at 70; Blumenthal & Clark, *supra* note 59, at 71, 80; *accord* Samrat Bhat-tacharjee et al., *Active Networking and the End-to-End Argument*, 1997 PROC. INT’L CONF. ON NETWORK PROTOCOLS 220, 221; *cf.* Dale N. Hatfield, *Preface*, 8 COMMLAW CONSPECTUS 1, 3 (2000).

78. See Amendment of Sections 64.702 of the Commission’s Rules and Regulations (Third Computer Inquiry), Report and Order, 104 F.C.C.2d 958, 979–80 ¶¶ 33–34 (1986) [hereinafter *Computer III Phase I Order*], *vacated and remanded on other grounds sub nom.* California v. FCC, 905 F.2d 1217 (9th Cir. 1990); Petition for Waiver of Section 64.702 of the Commission’s Rules, Memorandum Opinion and Order, 100 F.C.C.2d 1057 (1985); Petition of AT&T Co. for Limited and Temporary Waiver of 47 CFR Section 64.702 Regarding Its Provision of Unregulated Services Externally to the AT&T-C Network, Memorandum Opinion and Order, 59 Rad. Reg. 2d (P&F) 505 (Common Carrier Bur. rel. Nov. 27, 1985) (FCC 84-561); Communications Protocols under Section 64.702 of the Commission’s Rules and Regulations, Memorandum Opinion, Order and Statement of Principles, 95 F.C.C.2d 584, 594 ¶ 22, 595 ¶ 24 (1983).

79. *Computer III Phase I Order*, *supra* note 78, at 971–73 ¶¶ 17–19, 1109–14 ¶¶ 307–317.

consistency with the commitment to interoperability.⁸⁰ Had the FCC adhered to its policy of preserving the ability of unaffiliated providers to obtain transparent access to the network, these innovations would not have been allowed to emerge.

Simply put, any choice of standardized protocol has the inevitable effect of favoring certain applications and disfavoring others, just as TCP/IP discriminates against applications that are time sensitive and end-to-end favors innovation at the edge over innovation in the core. As I will subsequently discuss in some detail, whether mandating network neutrality would be socially beneficial is a complicated question that depends on myriad considerations, including the level of aggregate demand, heterogeneity of network uses, the variability in network traffic flows, end users' need for network reliability, and the extent to which technological change is reorganizing the natural boundaries between levels that were previously separated by a natural interface, notwithstanding the many claims to the contrary.⁸¹ In short, the desirability of complete standardization and interoperability is an empirical question that cannot be answered a priori.

Indeed, the nonneutrality inherent in the choice of baseline principles becomes even clearer when the debates about network neutrality are viewed through the lens of the broader debates about jurisprudence. In essence, it is the same insight driving the critique of Herbert Wechsler's espousal of so-called "neutral principles"⁸² as well as the failure of attempts to advance a value-neutral conception of equality.⁸³ The choice of underlying baseline is an inherently normative judgment. In other words, although there is hope that principles can be neutrally applied once they have been established, the choice of foundation principles is inevitably never neutral.

It would thus be a mistake to regard network neutrality as inherently neutral,⁸⁴ as the engineering embodiment of a competitive mar-

80. See Implementation of the Non-Accounting Safeguards of Sections 271 and 272 of the Communications Act of 1934, First Report and Order and Further Notice of Proposed Rulemaking, 11 F.C.C.R. 21,905, 21,955–58 ¶¶ 100–105 (1996), *aff'd sub nom.* Bell Atl. Tel. Cos. v. FCC, 131 F.3d 1044 (D.C. Cir. 1997); Computer III Phase I Order, *supra* note 78, at 1100–09 ¶ 289–306, 1112–14 ¶¶ 313–317; Petitions for Waiver of Section 64.702 of the Commission's Rules and Regulations to Provide Certain Types of Protocol Conversion with their Basic Network, Memorandum Opinion and Order, FCC 84-561 (F.C.C. rel. Nov. 28, 1984); Petition for Waiver of Section 64.702 of the Commission's Rules, Memorandum Opinion and Order, 100 F.C.C.2d 1057 (1985).

81. See *infra* notes 157–163 and accompanying text.

82. See Herbert Wechsler, *Toward Neutral Principles of Constitutional Law*, 73 HARV. L. REV. 1 (1959).

83. See Peter Westen, *The Empty Idea of Equality*, 95 HARV. L. REV. 537 (1982).

84. See, e.g., LESSIG, *supra* note 4, at 37, 156; Wu, *supra* note 6, at 91. Lessig's later work concedes that no network design is neutral and instead describes network neutrality as an attempt to eliminate certain kinds of discrimination. Lessig, *supra* note 77, at 1042. For the reasons stated above, reconstructing network neutrality in terms of discrimination and equality simply restates the underlying normative issues in different terms without resolving them. See *supra* notes 82–83 and accompanying text.

ket,⁸⁵ or as the best way to reflect technological humility,⁸⁶ as some network neutrality proponents have suggested. At best, it represents a casual empirical conjecture about how competition and innovation can best be promoted under current circumstances. At worst, it represents an attempt to use engineering principles to impart legitimacy to a naked normative commitment.⁸⁷ Like any baseline principle, it must be supported by substantial normative and empirical justification before being imposed as an absolute mandate. Until that occurs, the more technologically humble position would appear to be permitting network diversity through nonregulation, rather than mandating the use of any particular set of protocols.⁸⁸

Indeed, the ambiguity in the end-to-end argument is arguably reflected in the evolution of Lessig's views over time. His initial writings referred to end-to-end as a "principle" that should not be "violated."⁸⁹ His more recent work regards end to end as a policy that constitutes a "thumb on the scale of any network design."⁹⁰ While this retreat from regarding end-to-end as an absolute principle is welcome, its transformation into a policy preference does not completely address the analytical shortcomings I have identified. Erecting a policy preference in favor of the end-to-end argument has the inevitable consequence of foreclosing deviations from interoperability when the effect of those deviations is ambiguous. In a world in which it is difficult, if not impossible, to forecast with any degree of confidence which practices are likely to prove successful, such an approach could well foreclose a wide range of developments that would be welfare enhancing. As a result, it would be more appropriate to adopt policies that permit experimentation with different business models and to

85. See Wu, *supra* note 27, at 145–46 (arguing that network neutrality is the best way to promote "meritocratic" competition based on the "survival-of-the-fittest"); Gerald Faulhaber, Comments at Workshop on the Policy Implications of End-to-End at Stanford Law School (Dec. 1, 2000) (noting that network neutrality proponents seem to regard the end-to-end argument as the engineering analog to a competitive market), available at <http://cyberlaw.stanford.edu/e2e/papers/Fal.pdf>.

86. See LESSIG, *supra* note 4, at 35, 39.

87. In the words of the then-Executive Director of the Computer Science and Telecommunications Board of the National Research Council:

Although the embrace of engineering principles such as [end-to-end] appears to impart a legitimacy to certain kinds of advocacy, that advocacy reaches beyond the engineering to the ideology long associated with the Internet. It is an ideology that associates the Internet with freedoms of various kinds, autonomy for the users, and innovation.

Marjory S. Blumenthal, *End-to-End and Subsequent Paradigms*, 2002 L. REV. MICH. ST. U.-DET. C.L. 709, 710.

88. See *infra* Part V.

89. See, e.g., Lawrence Lessig, *Foreword*, 52 STAN. L. REV. 987, 991, 993–94 (2000); Lawrence Lessig, *Open Code and Open Societies: Values of Internet Governance*, 74 CHI.-KENT L. REV. 1405, 1414–15 (1999).

90. Lessig, *supra* note 7, at 1040.

forbid changes in practice only after the demonstration of clear anti-competitive effects.

2. Network Diversity and the Causes of Market Failure in the Last Mile

There is also considerable danger that mandating interconnection, nondiscrimination, rate regulation, and standardization would reinforce the very sources of market failure that network neutrality is supposed to redress. The central concern of network neutrality is that DSL and cable modem providers are using their control over the last mile to restrict the ability of applications and content providers to reach end users. In this respect, it is motivated by the same policy concerns animating regulatory intervention into markets for CPE, long distance, and enhanced services. Two factors are typically cited as the reasons for the high degree of concentration in markets for last-mile services. The classic source of market concentration is the supply-side economies of scale that arise when entry requires significant, up-front investments. More recently, attention has also focused on the demand-side economies of scale created by “network economic effects,” which arise when the value of the network is largely determined by the number of people connected to it. Both forces tend to give the large players a decisive advantage. In the most extreme case, they create natural monopolies.

Interestingly, my analysis reveals that network neutrality can have the perverse effect of reinforcing both of these sources of market failure.⁹¹ In other words, network neutrality can actually make matters worse by short-circuiting one of the most promising ways that smaller players use to survive when confronted with unexhausted returns to scale. If true, this raises the specter that network neutrality could be the source of, rather than the solution to, market failure.

a. Supply-Side Determinants of Natural Monopoly: Large, Up-Front Investments

How network neutrality can reinforce the supply-side forces that tend to concentrate markets for network services is best understood in terms of the classic source of scale economies: large, up-front, sunk-cost investments.⁹² Although the issue is not free from dispute,⁹³ the

91. For a preliminary sketch of this argument, see Yoo, *supra* note 36, at 60–65.

92. For more formal discussions of the impact of large, up-front costs on market concentration, see Yoo, *supra* note 51, at 226–27, 232–33; Yoo, *supra* note 52, at 1596–98. As the theory of contestable markets demonstrates, large, up-front investments are not economically problematic unless they are “sunk,” i.e., unrecoverable upon exit. Firms that are able to recoup their up-front investments if forced to exit the market will not be deterred from entering in the first place. The ongoing prospect of potential entry can discipline price in much

high up-front investments needed to establish the wires and central offices needed to establish telephone service have historically been regarded as turning local telephony into a natural monopoly.⁹⁴ The presence of large, up-front capital investments gives the largest firms a decisive economic advantage. The ability to spread those investments over a larger customer base allows them to underprice their smaller competitors.⁹⁵ This allows them to capture a still larger share of the market, which in turn causes the cost advantage to widen still further. Eventually, the cost advantage enjoyed by the largest player widens to the point where it is able to drive all of its competitors out of the market.⁹⁶ In that case, even markets that are initially competitive are doomed to collapse into monopolies.

Natural monopoly does not necessarily imply that entry will never occur. A smaller rival can try to enter by dropping its price so low that it is able to generate sufficient volume to leapfrog over the largest player and become the low-cost producer. Such gambits are difficult to execute, since pricing below cost requires incurring substantial economic losses, and the dominant player can match any such price cuts while incurring smaller economic losses.⁹⁷ It makes no difference

the same manner as direct competition. See WILLIAM J. BAUMOL ET AL., *CONTESTABLE MARKETS AND THE THEORY OF INDUSTRY STRUCTURE* 288–93 (rev. ed. 1987). Historically, investments in network infrastructure have not been transferable to other uses upon exit and thus were properly regarded as sunk. The emergence of spectrum-based transmission technologies has the potential of converting the investments needed to enter the local telephone market from sunk costs into fixed costs, a development that promises to revolutionize the telephone industry. See Christopher S. Yoo, *The Death of the Telephone Model of Regulation* (forthcoming 2006).

93. See Yoo, *supra* note 92 (reviewing the dispute over whether local telephone service has historically been and currently remains a natural monopoly).

94. See, e.g., HUBER ET AL., *supra* note 22, at 2; JEAN-JACQUES LAFFONT & JEAN TIROLE, *COMPETITION IN TELECOMMUNICATIONS* 3 (2000).

95. For example, if a producer must incur \$1,000 in up-front costs to enter the market, the up-front costs would contribute the following amounts toward unit (i.e., average) cost:

Quantity	Contribution to Unit Cost	Quantity	Contribution to Unit Cost
100	\$10.00	600	\$1.67
200	\$5.00	700	\$1.43
300	\$3.33	800	\$1.25
400	\$2.50	900	\$1.11
500	\$2.00	1000	\$1.00

If the impact from the amortization of up-front costs dominates the impact of variable costs, average cost will decline. Note that the impact of up-front costs tends to decay exponentially as the quantity over which the up-front costs are spread increases.

96. When a single firm will be able to serve the entire market at a lower cost than could two producers, a market is said to be “subadditive.” See BAUMOL ET AL., *supra* note 92, at 17–19.

97. See WILLIAM W. SHARKEY, *THE THEORY OF NATURAL MONOPOLY* (1982). If anything, the supracompetitive rents may give the incumbent greater incentive and a greater ability to fight to protect its monopoly. See Bresnahan, *supra* note 55, at 163; Richard J. Gilbert & David M.B. Newbery, *Preemptive Patenting and the Persistence of Monopoly*, 72 AM. ECON. REV. 514 (1982); Stephen C. Salop et al., *A Bidding Analysis of Special Interest Regulation: Raising Rivals’ Costs in a Rent Seeking Society*, in *THE POLITICAL ECONOMY*

from the standpoint of competition policy which player emerges. *Horizontal competition*, in which multiple producers vie with each other *within* a market, is unsustainable. The best that one could hope for is a form of *vertical competition*, in which a succession of monopolists competes *for* the market.⁹⁸

What has been largely overlooked is how allowing networks to differentiate themselves can also alleviate the economies of scale associated with declining average costs.⁹⁹ It is the fact that price is the only dimension along which firms can compete that gives the largest players their decisive advantage. A different equilibrium can obtain if competitors are allowed to compete along dimensions other than price. If so, a smaller player may be able to survive notwithstanding lower sales volumes and higher unit costs (and thus higher prices) by tailoring its network towards services that a subsegment of the market values particularly highly. The greater value provided by the differentiation of the network allows a specialized provider to generate sufficient revenue to cover its up-front costs even though its volume is significantly smaller than that of the leading players.

How product differentiation can mitigate the tendency towards natural monopoly caused by significant fixed costs is most easily understood through the theory of “monopolistic competition” pioneered by Edward Chamberlin.¹⁰⁰ Monopolistic competition adopts the same assumptions as the standard natural monopoly model except for two: it allows for the possibility of new entry and it relaxes the assumption that competing products constitute perfect substitutes.

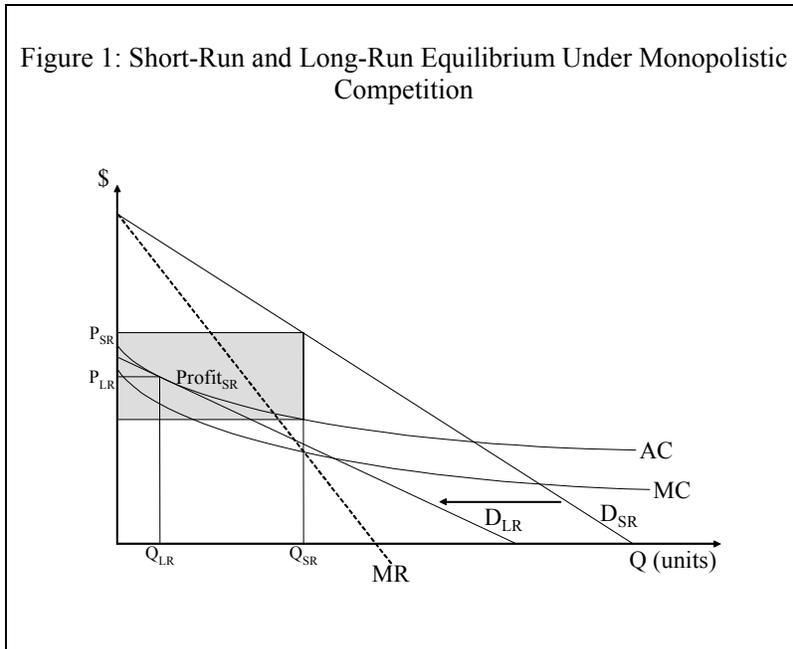
In the short run, firms engaged in monopolistic competition set price in exactly the same manner as monopolists. Should the resulting equilibrium price exceed average cost, the producer may earn short-run supracompetitive profits. Were products undifferentiated, this short-run equilibrium would be stable. Because competition would be restricted to a single dimension — price — further entry would be futile, since scale economies would allow the producer with the highest volume to seize the entire market.

OF REGULATION: PRIVATE INTERESTS IN THE REGULATORY PROCESS 102 (Edward T. Rogowsky & Bruce Yandle eds., 1984).

98. Indeed, some commentators have proposed using periodic franchise bidding to induce a form of vertical competition. The hope is that iterated franchise bidding would effectively make sunk cost investments more like recoupable fixed costs. See Harold Demsetz, *Why Regulate Utilities?*, 11 J.L. & ECON. 55, 63 (1968); Richard A. Posner, *The Appropriate Scope of Regulation in the Cable Television Industry*, 3 BELL J. ECON. 98, 113–16 (1972). These proposals have been criticized for requiring as extensive government intervention as conventional rate regulation. See Oliver E. Williamson, *Franchise Bidding for Natural Monopolies — in General and with Respect to CATV*, 7 BELL J. ECON. 73 (1976).

99. See Yoo, *supra* note 51, at 248–49; Yoo, *supra* note 52, at 1603.

100. EDWARD HASTINGS CHAMBERLIN, *THE THEORY OF MONOPOLISTIC COMPETITION* (8th ed. 1962). For a more complete discussion of the literature on monopolist competition, see Yoo, *supra* note 51, at 236–41, 246–48, 252–64; Yoo, *supra* note 52, at 1602–18.



Allowing for the possibility of product differentiation causes the short-run equilibrium to become unstable. New producers can enter despite cost disadvantages by offering a product with attributes that differ from those offered by the incumbent. Entry by a new product causes the demand curve confronting existing products to shift inwards, as some customers shift their purchases to the new product. Under classic Chamberlinian monopolistic competition, entry by other variants continues until all of the supracompetitive returns have been dissipated, which occurs when the demand curve becomes tangent to the average cost curve.¹⁰¹

The result is an equilibrium in which multiple players co-exist despite the presence of unexhausted economies of scale. Even though entrants may operate at a cost disadvantage vis-à-vis their larger rivals, they are able to survive by offering products designed to appeal to a smaller subsegment of the customer base. Conversely, preventing product differentiation could cause the market to devolve into a natural monopoly. Note also the key role played by short-run supracompetitive profits in this model. It is the presence of these profits that stimulates entry in the first place.

101. See CHAMBERLIN, *supra* note 100, at 194–95. The indivisibility of fixed costs may lead to an exception known as the “integer problem” in which n firms might earn small profits while $n + 1$ firms would run losses. Any such profits should not be particularly significant if the economy is sufficiently “large” (i.e., fixed costs are small relative to the size of the overall market). See Yoo, *supra* note 51, at 239–40.

How could such differentiation occur in the context of broadband? One way is through protocol nonstandardization, such as through the adoption of a different routing protocol. As discussed above, all protocols necessarily favor certain applications over others.¹⁰² If discrete subgroups of end users place sufficiently different valuations on different types of applications, multiple networks will be able to coexist simply by targeting their networks towards the needs of different subgroups.¹⁰³ If demand is sufficiently heterogeneous, the greater utility derived from allowing consumers to access consumer services that they value more highly can more than compensate for any cost disadvantages resulting from the reduction in volume. Indeed, it is conceivable that network diversity might make it possible for three different last-mile networks to coexist: one optimized for traditional Internet applications such as e-mail and website access, another incorporating security features to facilitate e-commerce and to guard against viruses and other hostile aspects of Internet life, and a third that prioritizes packets in the manner needed to facilitate time-sensitive applications such as streaming media and VoIP.

Network diversity allows for greater experimentation with different ways to take advantage of technological differences. Consider, for example, the fact that wireless telephone networks in the U.S. have employed incompatible standards. The initial standard, known as Time Division Multiple Access (“TDMA”), is being replaced by Global System for Mobile Communications (“GSM”) and Code Division Multiple Access (“CDMA”) without significantly inconveniencing consumers.¹⁰⁴ In some cases wireless carriers are using different transmission protocols for voice and data communications in order to utilize the characteristics of the transmission medium in order to meet the different technical demands of each application.¹⁰⁵ The experience with wireless telephony highlights the economic benefits that can flow from competition among standards. Had the U.S. followed Europe’s example and adopted a uniform standard for second-generation wireless telephony, it would have precluded the realization of the benefits associated with CDMA, which supports a broader range of data services, makes more efficient use of spectrum, and provides the most

102. See *supra* Part III.A.1.

103. See Yoo, *supra* note 36, at 63; Speta, *supra* note 63, at 1569.

104. See Neil Gandal et al., *Standards in Wireless Telephone Networks*, 27 TELECOMM. POL’Y 325, 326–27 (2003).

105. See Submission of Telus Communications, Inc., Telecommunications Policy Review 49–50 ¶ 121 (Aug. 15, 2005) (citing VIERI VANGHI ET AL., THE CDMA2000 SYSTEM FOR MOBILE COMMUNICATIONS 363 (2004)), available at [http://www.telecomreview.ca/epic/internet/intprp-gecrt.nsf/vwapj/TELUS-Submission.doc/\\$FILE/TELUS-Submission.doc](http://www.telecomreview.ca/epic/internet/intprp-gecrt.nsf/vwapj/TELUS-Submission.doc/$FILE/TELUS-Submission.doc).

straightforward migration path to the next generation of wireless technologies.¹⁰⁶

Entering into exclusivity arrangements with respect to content represents another possible means for differentiating one's network.¹⁰⁷ One of the best current examples is the manner in which direct broadcast satellite ("DBS") provider DirecTV is using an exclusive programming package known as "NFL Sunday Ticket" to enhance its ability to compete with cable television. Indeed, it appears that exclusive access to NFL Sunday Ticket constitutes one of the major factors helping DBS emerge as a viable competitor to cable. If regulators were to view this exclusivity arrangement solely in static terms, they might be tempted to appease cable customers who have expressed frustration at their inability to purchase NFL Sunday Ticket by requiring that the package be made available on both platforms. Doing so would reduce DBS's ability to compete by eliminating one of the primary inducements to shift from cable to DBS.¹⁰⁸ In other words, banning exclusivity would only serve to entrench the dominant position that local cable operators have historically enjoyed over multichannel video distribution, which has long represented one of the central policy problems confronting the television industry.

Another example that should be familiar to practicing lawyers is Lexis's efforts to differentiate itself from Westlaw. In past years, Lexis attempted to distinguish its services by obtaining exclusive access to the full-text version of the *New York Times*.¹⁰⁹ More recent efforts include Lexis's acquisition of the exclusive rights to the Shepard's citator system.¹¹⁰ This exclusivity arrangement is doubtless a source of frustration to those who previously accessed Shepard's through Westlaw. That said, these exclusivity rights have helped Lexis to survive despite the significant advantages West enjoys by virtue of its role in publishing case reporters. It also has forced Westlaw to develop a new product called Key Cite to compete with Shepard's.

These examples illustrate how using nonstandardized protocols and exclusive access to content — the precise practices that network neutrality would condemn — can in fact facilitate competition in the last mile. The implication is that public policy may be better served if

106. See *id.* at 329–30; Philip J. Weiser, *The Internet, Innovation, and Intellectual Property Policy*, 103 COLUM. L. REV. 534, 586–87 (2003).

107. See Carl Shapiro, *Exclusivity in Network Industries*, 7 GEO. MASON L. REV. 673, 678 (1999) (noting how exclusivity "can serve to differentiate products and networks").

108. Interestingly, the NFL's decision to start its own cable network may alter the current situation.

109. See Marydee Ojala, *Online, Past, Present and Future: Repetition, Reinvention, or Reincarnation*, ONLINE, Jan. 11, 1997, at 63.

110. See Robert C. Berring, *Legal Information and the Search for Cognitive Authority*, 88 CAL. L. REV. 1673, 1700 n.87 (2000); Tobe Liebert, *The New Generation of Citators*, EXPERIENCE, Fall 1999, at 28, 29.

Congress and the FCC were to reject network neutrality in favor of a network diversity principle that would allow networks to differentiate their services in precisely this manner. It is possible that such network diversity may take some time to emerge. Indeed, the seminal analyses of production differentiation recognize that the initial industry entrants may well prefer to offer products that are quite similar.¹¹¹ As entry increases, providers should begin to find it profitable to pursue more targeted strategies.¹¹² Thus, policymakers should avoid imposing regulations that would foreclose the emergence of network diversity even in the absence of the imminent arrival of a new entrant offering differentiated services. Humility about policymakers' ability to predict which business models will prove successful further underscores the importance of leaving open this possibility.

b. Demand-Side Determinants of Natural Monopoly: Network Economic Effects

The other force supposedly driving markets for telecommunications networks toward monopoly is network economic effects.¹¹³ Network economic effects exist when the number of people connected to a network determines the network's value, and the network becomes more valuable as more people become part of it.¹¹⁴ Because the value of telecommunications networks increase with the number of people attached to them, they have long been regarded as a paradigmatic case in which network economic effects arise.¹¹⁵ Thus, network economic effects are often described as creating demand-side econo-

111. See Harold Hotelling, *Stability in Competition*, 39 *ECON. J.* 41, 53–55, 56–57 (1929) (providing the classic analysis of the tendency towards excessive sameness in markets for differentiated products).

112. See Peter O. Steiner, *Program Patterns and Preferences, and the Workability of Competition in Radio Broadcasting*, 66 *Q.J. ECON.* 194, 200 (1952) (providing a classic application of Hotelling's approach in the context of electronic communications).

113. See, e.g., Bresnahan, *supra* note 55, at 159–61; Jerry A. Hausman et al., *Residential Demand for Broadband Telecommunications and Consumer Access to Unaffiliated Internet Content Providers*, 18 *YALE J. ON REG.* 129, 161–64 (2001); Michael L. Katz & Carl Shapiro, *Network Externalities, Competition, and Compatibility*, 75 *AM. ECON. REV.* 424 (1985); Lemley & Lessig, *supra* note 6, at 942; Glen O. Robinson, *The "New" Communications Act: A Second Opinion*, 29 *CONN. L. REV.* 289, 323–25 (1996).

114. One oft-cited example of network economic effects is the battle between Beta and VHS formats for video cassettes. Consumers choosing between the two formats purportedly cared less about the technical capabilities of each particular format and focused more on which format would be adopted by other consumers. See, e.g., W. Brian Arthur, *Positive Feedbacks in the Economy*, 262 *SCI. AM.* 92, 92 (1990). Interestingly, close analysis of the historical record contradicts that VHS's emergence as the prevailing format for videocassettes was the result of network economic effects. See STAN J. LIEBOWITZ & STEPHEN E. MARGOLIS, *WINNERS, LOSERS AND MICROSOFT* 120–27 (rev. ed. 2001).

115. See, e.g., Katz & Shapiro, *supra* note 113, at 424; Mark A. Lemley & David McGowan, *Legal Implications of Network Economic Effects*, 86 *CAL. L. REV.* 479, 546 (1998); S.J. Liebowitz & Stephen E. Margolis, *Network Externality: An Uncommon Tragedy*, 8 *J. ECON. PERSP.* 133, 139–40 (1994).

mies of scale that tend to favor the largest networks. If significant enough, these demand-side scale economies can give rise to a form of vertical competition that is quite similar to the one that can be created by supply-side economies of scale.¹¹⁶ The presence of network economic effects means that an individual's decision to change networks creates costs and benefits for other network users that the person making the adoption decision does not bear. Many economists argue that the increase in the network's value to other users represents a *network externality* and that the inability to internalize these costs and benefits can lead to inefficient outcomes.¹¹⁷

The claim that network economic effects can be a source of market failure is subject to a number of caveats and criticisms that I have addressed in detail in other work and will not address at length here.¹¹⁸ The most important point for our purposes is the fact that differentiation can ameliorate the demand-side economies of scale created by network economic effects.¹¹⁹ If the smaller network is optimized for particular functions that a particular group of end users values particularly highly, those end users may be willing to join the smaller network notwithstanding the presence of network economic effects. The increase in value provided by network diversity can more than compensate for any reductions in value resulting from market size.¹²⁰ Conversely, network neutrality threatens to preempt this po-

116. See Bresnahan, *supra* note 55, at 166–73.

117. See, e.g., Joseph Farrell & Garth Saloner, *Installed Base and Compatibility: Innovation, Product Preannouncements, and Predation*, 76 AM. ECON. REV. 940, 941 (1986); Katz & Shapiro, *supra* note 113, at 100.

118. See Yoo, *supra* note 51, at 278–85; Spulber & Yoo, *supra* note 69, at 921–33. A few brief comments will suffice to demonstrate my concerns. First, arguments that network externalities can lead to market failure are misplaced in the context of physical networks that can be owned, such as wireline telecommunications networks. Even if individual users may not be in a position to internalize all of the costs and benefits created by their network adoption decisions, the network owner will almost certainly be in a position to do so. Second, network externalities can plausibly cause market failure only when the relevant markets are highly concentrated. As I will subsequently demonstrate, once the relevant geographic markets are properly defined, this is not the case with respect to last-mile broadband providers. See *infra* notes 274–275 and accompanying text. Furthermore, current market shares are less significant in markets like broadband, which are undergoing explosive growth, when it is the network that will exist in the future, not the one that exists today, that determines consumer choice. Third, network neutrality advocates overlook the fact that any decision to switch networks necessarily involves two offsetting externalities. On the one hand, a person adopting a new technology increases the value of the new network. The inability to capture this benefit may make network users too reluctant to switch networks. At the same time, any decision to switch networks necessarily reduces the value of the old network. The fact that the end user switching networks does not bear these costs may make it too eager to switch. Whether end users switch networks too frequently or not frequently enough depends upon which of these two effects dominates.

119. See Yoo, *supra* note 51, at 271–72.

120. See Katz & Shapiro, *supra* note 53, at 106 (“Customer heterogeneity and product differentiation tend to . . . sustain multiple networks. If the rival systems have distinct features sought by certain customers, two or more systems may be able to survive by catering to consumers who care more about product attributes than network size.”).

tential solution by narrowing the dimensions along which firms can compete. Mandating the use of standardized protocols threatens to commodify bandwidth and force providers to compete solely on the basis of price and network size, which would in turn reinforce the advantages enjoyed by the largest players. There is thus a real danger that network neutrality could short-circuit one of the most sensible market-based solutions to the problems of market concentration.

This dynamic is well illustrated by a simple, formal model put forth by Joseph Farrell and Garth Saloner.¹²¹ The model hypothesizes the existence of two groups of network users, one with a preference for standard *A* and another with a preference for standard *B*. To reflect the value of network economic effects, the model includes a variable to represent the increase in utility that would be generated if both groups adopted the same standard. To reflect the value of diversity, it includes variables to represent the utility that each group would derive if permitted to use its preferred standard rather than the other standard.

This simple model permits the comparison of three different states: standardization on group *A*'s preferred standard, standardization on group *B*'s preferred standard, and incompatibility. The utility parameters make it possible to determine whether each possible outcome represents a stable equilibrium or whether a group can increase its utility by deviating from the status quo. The model also allows for some basic welfare comparisons by determining which of these three possible outcomes provided the greatest utility.¹²²

The results under this model depend on whether the value created by the network economic effects exceeds the value of product diversity or vice versa. For example, suppose that both groups begin by adopting the standard preferred by group *A*. Group *B* users will shift to their preferred standard only if the utility they would derive from changing standards exceeds the decrease in utility from being part of a smaller network. Whether such a shift will be efficient depends on the magnitude of the utility group *B* derives from network diversity relative to the magnitude of returns to scale created by network economic effects. The same logic applies to the reciprocal case in which both groups begin by adopting the standard preferred by group *B*. In short, standardization is an equilibrium only if the utility created by network economic effects exceeds the utility created by network diversity for both groups.

Furthermore, the possible equilibria have different welfare characteristics. When incompatibility is optimal, it is necessarily a stable equilibrium. Standardization, on the other hand, may be a stable equi-

121. Joseph Farrell & Garth Saloner, *Standardization and Variety*, 20 *ECON. LETTERS* 71 (1986).

122. *Id.* at 72.

librium even when it is not optimal. In this way, the model highlights the tradeoff inherent in the choice between standardization and variety. Indeed, it shows that circumstances exist under which there is too much standardization in equilibrium and where society would be better off if the networks were permitted to deviate from the standard.¹²³

This model operationalizes the intuitions about how network diversity can overcome the demand-side economies of scale created by network economic effects. So long as consumer preferences are sufficiently heterogeneous, network diversity can mitigate whatever demand-side economies of scale exist by virtue of network economic effects in much the same manner as it mitigates the supply-side economies of scale created by fixed costs. In addition, to the extent that different groups of end users derive utility from adopting one standard over another, network diversity can increase welfare by allowing end users to consume network services that lie closer to their ideal preferences. The presence of multiple, incompatible networks may thus reflect nothing more than the network owners' attempts to satisfy the underlying heterogeneity in consumer demand.¹²⁴

Indeed, a more elaborate formal model compares competition between nonproprietary standards with competition between proprietary standards. When the competing standards are nonproprietary, the market invariably tends to collapse into a natural monopoly centered on the first mover. The equilibria are more indeterminate when the competing standards are proprietary, with some scenarios favoring the first mover and some scenarios favoring the second. Equally importantly, this model shows that competition between proprietary standards may be more likely to lead to the adoption of the socially optimal technology.¹²⁵

It is thus far from clear that standardization and interconnection will yield the benefits envisioned by network neutrality proponents. The ambiguity of whether standardization will promote or hinder competition and economic welfare is demonstrated dramatically by the contradictory positions taken by network neutrality proponents. Rather than follow Lessig's concern that network owners will be too eager to deviate from the existing standard,¹²⁶ other scholars have drawn on the more traditional concern that network economic effects

123. *Id.* at 73.

124. See Katz & Shapiro, *supra* note 53, at 106 (noting that "market equilibrium with multiple incompatible products reflects the social value of variety"); S.J. Liebowitz & Stephen E. Margolis, *Should Technology Choice Be a Concern of Antitrust Policy?*, 9 HARV. J.L. & TECH. 283, 292 (1996) ("Where there are differences in preference regarding alternative standards, coexistence of standards is a likely outcome.").

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

126. See LESSIG, *supra* note 4, at 48, 168, 171, 176; Solum & Chung, *supra* note 6, at 818–19.

may cause a welfare-reducing standard to become locked in.¹²⁷ The underlying uncertainty suggests that arguments that interoperability is essential to preserving competition are too simplistic.

3. Implementation Difficulties Caused by the Decommodification of Network Usage

The FCC discovered that mandating interconnection and standardizing interfaces were not sufficient by themselves to induce competition in complementary services. A recalcitrant local telephone company could effectively turn interconnection and standardization into a dead letter simply by providing affiliated providers of complementary services with interconnections that were cheaper or substantially better in quality than those provided to unaffiliated providers. As a result, when mandating interconnection, the FCC has invariably found it necessary to prohibit local telephone companies from discriminating against unaffiliated providers of CPE,¹²⁸ long distance services,¹²⁹ and enhanced services.¹³⁰ The 1996 Act similarly forbids

127. See, e.g., Lemley, *supra* note 6, at 1045–54.

128. The FCC initially prohibited AT&T from discriminating against independently provided CPE that satisfied certain minimum standards of safety. See *Proposals for New or Revised Classes of Interstate and Foreign Message Toll Telephone Service (MTS) and Wide Area Telephone Service (WATS)*, First Report and Order, 56 F.C.C.2d 593 (1975), *aff'd sub nom. N.C. Utils. Comm'n v. FCC*, 552 F.2d 1036 (4th Cir. 1977) (codified as amended at 47 C.F.R. §§ 68.1–.614). The FCC also required the BOCs to file nondiscrimination compliance plans confirming their adherence to the nondiscrimination criteria negotiated with CPE vendor and customer groups. See *Furnishing of Customer Premises Equipment and Enhanced Services by the Bell Operating Telephone Companies and the Independent Telephone Companies*, Report and Order, 2 F.C.C.R. 143, 155 ¶¶ 80–84, *on reconsideration*, 3 F.C.C.R. 22, 26 ¶ 29 (1987), *aff'd sub nom. Ill. Bell Tel. Co. v. FCC*, 883 F.2d 104 (D.C. Cir. 1989). The FCC later delegated responsibility for establishing the technical requirements to industry-based standard-setting organizations. See *2000 Biennial Regulatory Review of Part 68 of the Commission's Rules and Regulations*, Report and Order, 15 F.C.C.R. 24,944 (2000).

129. As part of its efforts to promote competition in long distance prior to divestiture, the FCC required that AT&T interconnect with all long distance carriers on a nondiscriminatory basis. See *MTS and WATS Market Structure*, Report and Third Supplemental Notice of Inquiry and Proposed Rulemaking, 81 F.C.C.2d 177 (1980); *Lincoln Tel. & Tel. Co.*, 72 F.C.C.2d 724 (1979), *aff'd*, 659 F.2d 1092, 1094 (D.C. Cir. 1981). During the breakup of AT&T, the court guarded against any lingering BOC favoritism towards AT&T by ordering the BOCs to provide non-Bell long distance carriers with interconnections that were equal in type, quality and price to those offered to AT&T. See *United States v. AT&T*, 552 F. Supp. 131, 165, 195–96, 227 (D.D.C. 1982), *aff'd mem. sub nom. Maryland v. United States*, 460 U.S. 1001 (1983).

130. The first and second *Computer Inquiries* required that the local telephone companies make transmission services available through a tariff. Because tariffs establish uniform terms of service for all customers, the FCC concluded that the tariffing process was sufficient to ensure that interconnection was nondiscriminatory. At the same time, it explicitly reserved the enforcement authority to remedy any problems that might arise. See *Amendment of Section 64.702 of the Commission's Rules and Regulations (Second Computer Inquiry)*, Tentative Decision and Further Notice of Inquiry and Rulemaking, 72 F.C.C.2d 358, 435 ¶ 153 (1979) [hereinafter *Computer II Tentative Decision*]; *Regulatory and Policy Problems Presented by the Interdependence of Computer and Communication Services and*

incumbent local exchange carriers (“incumbent LECs” or “ILECs”) from discriminating in the rates charged for interconnection.¹³¹ It also requires that the interconnections provided to unaffiliated complementary service providers be equal in quality to those the ILEC provides to its own affiliates.¹³²

Even the addition of a nondiscrimination mandate proved insufficient to prevent local telephone companies from using their bottleneck position to harm competition. The local telephone companies could evade this restriction simply by charging everyone interconnection fees that were prohibitively expensive. As noted earlier in the discussion on vertical integration, so long as the local telephone company remained free to charge the monopoly price, compelling access to the bottleneck facility would not yield any consumer benefits.¹³³ Charging the monopoly price would be nondiscriminatory in that it would apply equally to affiliated and unaffiliated providers alike. At the same time, overcharging its affiliate would not affect the local telephone company’s bottom line, since any losses incurred by the affiliate would be offset dollar-for-dollar by higher profits earned by the local telephone operations. As a result, regulations mandating interconnection with independent providers of long distance and enhanced services have invariably been accompanied by direct regulation of the rates local telephone companies charge for interconnection.¹³⁴ This culminated in

Facilities, Final Decision and Order, 28 F.C.C.2d 267, 282–83 ¶ 42 (1971) [hereinafter Computer I Final Decision]. The third *Computer Inquiry* similarly prohibited favoring particular customers and required local telephone companies to provide unaffiliated enhanced service providers with interconnections that were equal in quality to those offered to the services used by their affiliates. See *Computer III Further Remand Proceedings: Bell Operating Company Provision of Enhanced Services*, Report and Order, 14 F.C.C.R. 4289, 4299 ¶ 13, (1999).

131. 47 U.S.C. § 251(c)(2)(D); see also *id.* § 251(c)(3) (requiring that access to unbundled network elements be nondiscriminatory).

132. *Id.* § 251(c)(2)(C).

133. See *supra* Part II.B.

134. For example, during the proceedings that provided the initial regulatory basis for the emergence of competition in long distance, the FCC required that interconnection charges be reasonable and indicated its willingness to take additional steps to enforce this requirement. See Establishment of Policies and Procedures for Consideration of Application to Provide Specialized Common Carrier Services in the Domestic Public Point-to-Point Microwave Radio Service and Proposed Amendments to Parts 21, 43, and 61 of the Commission’s Rules, First Report and Order, 29 F.C.C.2d 870, 940 ¶ 157 (1971), *aff’d sub. nom.* Wash. Utils. & Transp. Comm’n v. FCC, 513 F.2d 1142 (9th Cir. 1975). The court overseeing the breakup of AT&T also implicitly recognized the problem when it required that access tariffs be based on cost. See *United States v. AT&T (MFJ)*, 552 F. Supp. 131, 233 (D.D.C. 1982), *aff’d mem. sub. nom.* Maryland v. United States, 460 U.S. 1001 (1983). The first and second *Computer Inquiries* required that the rates charged for interconnection be reasonable and embodied in a tariff. See Computer II Tentative Decision, *supra* note 130, at 435 ¶ 153; Computer I Final Decision, *supra* note 130, at 269 ¶ 8, 269–70 ¶ 10. The third *Computer Inquiry* created an elaborate pricing scheme to ensure the reasonableness of interconnection rates under CEI and ONA. Amendment of Sections 64.702 of the Commission’s Rules and Regulations (Third Computer Inquiry), Report and Order 104 F.C.C.2d 958, 1046–53 ¶¶ 171–186 (1986) (discussing CEI), *vacated and remanded sub. nom.* California

the provision of the 1996 Act specifically requiring that rates charged by ILECs for interconnection be just, reasonable,¹³⁵ and “based on the cost . . . of providing the interconnection or network element.”¹³⁶

The fact that the regime of interconnection and standardization favored by network neutrality proponents inevitably also requires mandating nondiscrimination and rate regulation dramatically lowers the likelihood that it will be successful. Not only are the regulatory tools needed to implement nondiscrimination and rate regulation problematic; they are particularly ineffective in a world in which communications are becoming increasingly decommodified.

a. The Limitations of the Regulatory Tools

Consider the methodology for implementing rate regulation. The difficulties in estimating the appropriate rate base and rate of return and the perverse incentives created by the existing approaches to rate regulation are well documented. Ratemaking inevitably devolved into disputes over the proper measure of costs, the proper rate of return, and whether particular investments were prudent.¹³⁷ In addition, the classic ratemaking regime eliminates incentives to economize on costs and induces biases in the decision between capital and operating expenditures.¹³⁸ Although price caps were supposed to solve these problems, they have become bogged down in problems of their own.¹³⁹

v. FCC, 905 F.2d 1217 (9th Cir. 1990); Filing and Review of Open Network Architecture Plans, Memorandum Opinion and Order, 4 F.C.C.R. 1 (1988) (discussing ONA).

135. See 47 U.S.C. § 251(c)(2)(D); see also *id.* § 251(c)(3) (requiring that rates for access to unbundled network elements (“UNEs”) be just and reasonable).

136. See *id.* § 252(d)(1)(A)(i). The statute further required that cost be “determined without reference to a rate-of-return or other rate-based proceeding.” *Id.* The FCC implemented this provision by basing rates on replacement cost, rather than historical cost. See Implementation of the Local Competition Provisions in the Telecommunications Act of 1996, First Report and Order, 11 F.C.C.R. 15,499, 15,857–58 ¶¶ 701–707 (1996). Another corollary to interconnection arguably exists: unbundling. See Joseph D. Kearney & Thomas W. Merrill, *The Great Transformation of Regulated Industries Law*, 98 COLUM. L. REV. 1323, 1340–43, 1356 (1998); Weiser, *supra* note 7, at 69–70. I regard unbundling as an extension of the approach to interconnection, rather than a necessary corollary. In any event, the fact that the leading network neutrality proposals do not include an unbundling requirement obviates the need to address it further.

137. See, e.g., JAMES C. BONBRIGHT ET AL., *PRINCIPLES OF PUBLIC UTILITY RATES* 547–622 (2d ed. 1988); 1 ALFRED E. KAHN, *THE ECONOMICS OF REGULATION* 27–54 (1971); 2 *id.* at 47–94; W. KIP VISCUSI ET AL., *ECONOMICS OF REGULATION AND ANTITRUST* 364–74 (3d ed. 2000); George J. Stigler & Claire Friedland, *What Can Regulators Regulate? The Case of Electricity*, 5 J.L. & ECON. 1 (1962).

138. Harvey Averch & Leland Johnson, *Behavior of the Firm Under Regulatory Constraint*, 52 AM. ECON. REV. 1052 (1962).

139. See *U.S. Tel. Ass’n v. FCC*, 188 F.3d 521, 524–27 (D.C. Cir. 1999) (invalidating a price cap scheme as arbitrary and capricious); Jeffrey I. Bernstein & David E. Sappington, *Setting the X factor in Price-Cap Regulation Plans*, 16 J. REG. ECON. 5 (1999); Gregory J. Vogt, *Cap-Sized: How the Promise of the Price Cap Voyage to Competition Was Lost in a Sea of Good Intentions*, 51 FED. COMM. L.J. 349 (1999).

Indeed, some empirical studies have suggested that price cap regulation may have discouraged last-mile entry.¹⁴⁰

Ensuring that charges for interconnection are reasonable and non-discriminatory is all the more difficult when the product being regulated is not a commodity and instead varies in terms of quality.¹⁴¹ When product attributes are well defined and do not vary and the interface is relatively simple, interconnection and nondiscrimination can focus on availability and price. As the Supreme Court has noted, the situation becomes less tractable when products vary in terms of their quality and reliability and the complexity of the interface allows for myriad nonprice-related ways that network owners can provide discriminatory or substandard interconnection.¹⁴²

The implication is that regulators who wish to mandate interconnection must do more than just regulate price. They must also create an elaborate number of secondary regulations to police quality of service and other nonprice terms. In short, when the interface is complex, it forces the regulatory authorities to regulate almost all aspects of the business relationship.¹⁴³ While quality regulation is intrusive and hard to administer under the best of circumstances, it becomes almost insuperable when quality varies widely. Indeed, as the diversity of uses to which users are putting the Internet has increased, quality and reliability often becomes a product feature rather than a minimum standard that all providers must meet.¹⁴⁴ This in turn makes it much more difficult to regulate quality of service without harming consumers.

The FCC's experience in attempting to implement interconnection regimes attests to these difficulties. Consider the history of the FCC's attempt to foster competition in long distance. Early attempts

140. See Jaison R. Abel, *Entry into Regulated Monopoly Markets: The Development of a Competitive Fringe in the Local Telephone Industry*, 45 J.L. & ECON. 289 (2002).

141. See 1 KAHN, *supra* note 137, at 21–25; Eli M. Noam, *Towards an Integrated Communications Market: Overcoming the Local Monopoly of Cable Television*, 34 FED. COMM. L.J. 209, 219 (1982).

142. See *Verizon Commc'ns, Inc. v. Law Offices of Curtis V. Trinko, L.L.P.*, 540 U.S. 398, 414 (2004) (recognizing that interconnection disputes are “highly technical” and multifaceted “given the incessant, complex, and costly changing interaction of competitive and incumbent LECs implementing the sharing and interconnection obligations”); *AT&T v. Iowa Utils. Bd.*, 525 U.S. 366, 429 (1999) (Breyer, J., concurring in part and dissenting in part) (“The more complex the facilities, the more central their relation to the firm’s managerial responsibilities, the more extensive the sharing demanded, the more likely that [the administrative and social costs of compulsory sharing] will become serious.”); Gerald R. Faulhaber, *Policy-Induced Competition: The Telecommunications Experiments*, 15 INFO. ECON. & POL’Y 73, 77–86 (2003) (arguing that interconnection mandates are likely to succeed only when the interface is simple, is easy to monitor, and requires little information; and tracing the failure of the initial regulatory attempts to stimulate competition in long distance and the failure of UNE access to provide competition in local telephony).

143. See Yoo, *supra* note 51, at 244–46; LAFFONT & TIROLE, *supra* note 94, at 54–55; Faulhaber, *supra* note 142, at 81–82.

144. See, e.g., Christopher S. Yoo, *The Unfulfilled Promise of Korean Telecommunications Reform*, in *LEGAL REFORM IN KOREA* 169, 185–86 (Tom Ginsburg ed., 2004) (describing how network providers can compete on quality and reliability as well as price).

to force AT&T to connect its local telephone systems with MCI and other independent long distance providers became embroiled in protracted disputes over the reasonableness of AT&T's rates.¹⁴⁵ The early antitrust cases against AT&T similarly involved extensive allegations that AT&T had discriminated against its competitors when providing interconnection.¹⁴⁶ Following the breakup of AT&T, attempts to implement the equal access requirement were marked by extended controversies over the speed and diligence with which the BOCs were deploying this standardized interface.¹⁴⁷

The regulatory history of the Telecommunications Act of 1996 is no more comforting. The validity of the regime that the FCC developed to set interconnection rates under the 1996 Act, known as Total Element Long Run Incremental Cost ("TELRIC"), was not resolved until the Supreme Court's 2002 decision in *Verizon Communications, Inc. v. FCC*,¹⁴⁸ some six years after the passage of the 1996 Act. Courts have been even more frustrated by the FCC's inability to establish legally sufficient rules for defining the scope of the interconnection requirements.¹⁴⁹ In the meantime, complaints have mounted about the slow pace with which ILECs — defined to be companies offering local telephone service as of February 8, 1996 — are fulfilling interconnection requests.¹⁵⁰ Disputes over the quality of intercon-

145. See HUBER ET AL., *supra* note 22, at 136–40.

146. See *MCI Commc'ns Corp. v. AT&T*, 708 F.2d 1081, 1131–32 (7th Cir. 1983) (alleging that AT&T's interconnection procedures "utilized materials inadequate for the volume of business MCI was doing . . . and involved unduly complex and ineffective installation and maintenance procedures"); *United States v. AT&T*, 524 F. Supp. 1336, 1354–56 (D.D.C. 1981) (describing how AT&T used interconnection to discriminate against foreign CPE and long distance competitors); *cf. United States v. AT&T*, 552 F. Supp. 131, 188, 189–90 & n.238 (D.D.C. 1982) (noting the ease with which local telephone companies can design their networks to discourage competitors in long distance and information services), *aff'd mem. sub nom. Maryland v. United States*, 460 U.S. 1001 (1983).

147. See *United States v. W. Elec. Co.*, 569 F. Supp. 1057, 1062–69 (D.D.C. 1983); Investigation into the Quality of Equal Access Services, Memorandum Opinion and Order, 60 Rad. Reg. 2d (P&F) 417 (rel. May 23, 1986); MTS and WATS Market Structure, Phase III: Establishment of Physical Connections and Through Routes among Carriers, Report and Order, 100 F.C.C.2d 869 (1985); MTS and WATS Market Structure, Phase III: TDX Petition for Rulemaking, Memorandum Opinion and Order, 50 Fed. Reg. 4792 (F.C.C. Feb 1, 1985). See generally Faulhaber, *supra* note 143, at 81–83.

148. 535 U.S. 467 (2002).

149. See *U.S. Telecom Ass'n v. FCC*, 359 F.3d 554, 595 (D.C. Cir. 2004) (criticizing the FCC for its failure to develop lawful unbundling rules some eight years after the enactment of the Telecommunications Act of 1996). The courts have repeatedly invalidated the FCC's attempts to implement the interconnection requirements of the 1996 Act. See *AT&T v. Iowa Utils. Bd.*, 525 U.S. 366, 388–92 (1999); *U.S. Telecom Ass'n*, 359 F.3d at 564–77; *U.S. Telecom Ass'n v. FCC*, 290 F.3d 415 (D.C. Cir. 2002); *GTE Serv. Corp. v. FCC*, 205 F.3d 416, 422–24, 425–26 (D.C. Cir. 2000).

150. The most recent example of these disputes is the controversy surrounding "hot cuts," which is the point when the line of a customer who is changing from one local telephone company to another is disconnected from the old company's switch and is reconnected to the new company's switch. Until the line is reconnected, the telephone line will be out of service. Hot cuts are necessarily performed by the ILEC. The FCC initially ruled that the incumbent LECs' ability to delay completing hot cuts represented a sufficient impair-

nection have also provided the basis for the dispute that gave rise to the Supreme Court's *Trinko* decision.¹⁵¹

A similar pattern is seen in the regulatory experience with cable television.¹⁵² Because local distribution of cable programming required the deployment of a network of wires as extensive as that required to establish local telephone service, it too was regarded as a natural monopoly and subject to rate regulation. Subsequent empirical studies indicate that this effort was largely a failure. The evidence suggests that even though regulation caused nominal rates to drop, once other characteristics — such as the total number and quality of channels offered — are taken into account, rate regulation appears to have caused quality-adjusted rates to increase. Deregulation, conversely, caused quality-adjusted rates to fall.¹⁵³ Congress's and the FCC's attempt to give unaffiliated programmers the right to carriage on cable systems by enacting the so-called "leased access" requirements failed miserably amid claims of excessive prices, poor quality of service, and bad faith.¹⁵⁴ In the absence of comprehensive quality regulation, such problems appear to be intractable.¹⁵⁵

Finally, the tools needed to implement interconnection, nondiscrimination, rate regulation, and standardization do not function well in industries that are technologically dynamic. The existing approaches for regulating the reasonableness of interconnection rates are based on historical data, from which policymakers must attempt to anticipate and plan for change. It is for these reasons that regulation is thought to place a premium on predictability and continuity.¹⁵⁶ Such

ment to justify treating switching as a UNE, only to see that determination rejected on judicial review. See Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, Report, Order, Order on Remand and Further Notice of Proposed Rule-making, 18 F.C.C.R. 16,978, 17,263–78 ¶¶ 459–475 (2003), *rev'd sub nom.* U.S. Telecom Ass'n v. FCC, 359 F.3d 554, 568–71 (D.C. Cir. 2004). On remand, the FCC abandoned its position and ruled that the incumbent LECs' control of hot cuts was not sufficient to constitute impairment. See Unbundled Access to Network Elements, Order on Remand, 20 F.C.C.R. 2533, 2647–56 ¶¶ 210–221 (2005).

151. See *Verizon Commc'ns, Inc. v. Law Office of Curtis V. Trinko, L.L.P.*, 540 U.S. 398, 403–05 (2004).

152. For an overview, see Christopher S. Yoo, *Architectural Censorship and the FCC*, 78 S. CAL. L. REV. 669, 685–87 (2005).

153. See THOMAS W. HAZLETT & MATTHEW L. SPITZER, PUBLIC POLICY TOWARD CABLE TELEVISION 2, 69–177, 208 (1997); Gregory S. Crawford, *The Impact of the 1992 Cable Act on Household Demand and Welfare*, 31 RAND J. ECON. 422, 444–45 (2000).

154. 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, Order and Further Notice of Proposed Rule Making, 11 F.C.C.R. 16,933, 16,937 ¶ 6 (1996); Donna M. Lampert, *Cable Television: Does Leased Access Mean Least Access?*, 44 FED. COMM. L.J. 245, 266–67 & n.122 (1992).

155. See *supra* note 143 and accompanying text.

156. See 2 KAHN, *supra* note 137, at 11–14; Noam, *supra* note 141, at 219–20.

an approach is nonsensical when the industry being regulated is undergoing rapid technological change.

The problem is compounded all the more by the fact that improvements in technology can render obsolete an interconnection point that was once a natural boundary between market players. Consider what might happen after regulatory authorities compel interconnection. The forces of competition naturally cause firms operating on either side of the interconnection interface to try to expand into territory occupied by other firms. To the extent that network neutrality forecloses this from occurring, it can stifle an important source of competition.¹⁵⁷ Furthermore, more sweeping technological change can cause what was once a natural interface between two levels to shift or collapse. Requiring network owners to maintain standardized interfaces would have the inevitable effect of locking the existing interfaces into place. This government-imposed interconnection and standardization overlooks the extent to which the network (and not just the servers and applications running on it) can itself represent an important source of innovation.¹⁵⁸ It also has the unfortunate effect of inhibiting the emergence of new technologies that transcend the boundaries that previously separated different segments of the industry.¹⁵⁹

The voice messaging services discussed above provide one example of a technological change that reorganized the network's natural interfaces.¹⁶⁰ Another example is provided by the debate over "multiple ISP access" that represented the first round in the network neutrality debate.¹⁶¹ What has been largely overlooked is that the

157. See Bresnahan, *supra* note 55, at 166–68.

158. For example, network neutrality proponents often draw inspiration from the benefits from standardizing electric power. See *Ex parte* Letter of Timothy Wu and Lawrence Lessig at 3, Cable Modem Declaratory Ruling and NPRM, *supra* note 1 (F.C.C. filed Aug. 22, 2003) (CS Docket No. 02-52), available at http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6514683884; Wu, *supra* note 35, at 1165. These arguments overlook the fact that the early years of the electric power industry witnessed an extended period of competition during which the initial standard, direct current ("DC"), was ultimately supplanted by a superior technology, alternating current ("AC"). Focusing policy too narrowly on how best to promote competition in the devices attached to the network can obscure the fact that innovation can also come from the network itself. Indeed, had the government standardized at an early stage in the industry, it would likely have deprived consumers of the technological benefits of an architecture based on AC current. See Yoo, *supra* note 36, at 66.

159. I therefore disagree with proposals advocating regulation to keep existing interfaces open. See Werbach, *supra* note 2, at 65–66; Whitt, *supra* note 35, at 653–54; cf. Cooper, *supra* note 6, at 180 (advocating ensuring the openness of the physical layer by mandating the interconnection and interoperability inherent in end-to-end); Solum & Chung, *supra* note 6, at 844–54 (advancing a principle of layers integrity).

160. See *supra* note 79 and accompanying text.

161. See Lemley & Lessig, *supra* note 6. This debate was originally framed in terms of "open access" to cable modem systems. The FCC has since changed the terminology to "multiple ISP access." Inquiry Concerning High-Speed Access to the Internet over Cable

move towards proprietary ISPs is primarily the result of an exogenous change in the underlying technology. In the original narrowband world, in which end users connected to the Internet through conventional telephone lines, the telephone company providing the end user connection did not need to maintain its own packet-switched network. It could simply connect the end users' calls to the offices maintained by the ISP in the same manner as a conventional voice call. This is no longer true, however, after the transition to broadband. Both DSL and cable modem providers must maintain equipment, either a DSL access multiplexer ("DSLAM") or a cable modem termination system ("CMTS"), to separate the stream of data packets from other types of communications. In this environment, last-mile providers no longer serve as mere pass-throughs. Instead, they must necessarily maintain a data network to hold the packet-switched traffic once it has been segregated from the other traffic. They must also negotiate some type of interconnection agreement with another carrier so that this traffic can be routed to its final destination.¹⁶²

Given that they were already performing many of the functions traditionally performed by ISPs, the logical next step was for last-mile broadband providers to negotiate their own agreements with backbone providers. The efficiency of this arrangement is eloquently demonstrated by the AOL-Time Warner merger, which remains the only instance in which multiple ISP access has been mandated. Contrary to the original expectations of the Federal Trade Commission ("FTC"), the unaffiliated ISPs that have obtained access to Time Warner's cable modem systems have not created their own packet networks within Time Warner's cable headends. Instead, traffic bound for these unaffiliated ISPs exits the headend via Time Warner's backbone and is handed off to the unaffiliated ISP at an external location.¹⁶³ The fact that the different ISPs are providing service through the same physical infrastructure means that the other ISPs cannot provide consumers with any improvements in speed, services, or access to content.¹⁶⁴ In fact, unaffiliated ISPs have found it more economical to share Time Warner's existing ISP facilities rather than build their own, which strongly suggests that integrating ISP and last-mile operations does in fact yield real efficiencies. This demonstrates how technological change can collapse a natural interface between what were once two different levels of production.

Indeed, technological progress is beginning to put pressure on the distinction between the logical layer and the physical layer that is im-

and Other Facilities, Declaratory Ruling and Notice of Proposed Rulemaking, 17 F.C.C.R. 4798, 4839 ¶ 72, (2002).

162. See Yoo, *supra* note 36, at 33–34.

163. See *id.* at 55–56.

164. See *id.* at 57.

plicit in both the end-to-end argument and the vision of interconnection and standardization underlying the *Computer Inquiries*. As the FCC recently noted, the line between network transmission and computer processing has become increasingly blurred.¹⁶⁵ Technologists have begun to suggest that distinguishing between the physical and the logical layer violates technological neutrality and that policymaking would be better facilitated if the two were regarded as a single layer.¹⁶⁶

In summary, the complexity of the interface, the increasing heterogeneity of end users' demands, and the pace of technological change are reducing the utility of the regulatory tools upon which policymakers have traditionally relied to manage interconnection, nondiscrimination, rate regulation, and standardization. It is particularly telling that two noted scholars of network industries not noted for deregulatory views have suggested that access regimes have proven so unworkable that they should be abandoned.¹⁶⁷

b. Content and the Need for Editorial Discretion

The effectiveness of the existing regulatory tools is further limited by the fact that they were developed with respect to the person-to-person communications associated with common carriage. As a result they are not well suited to regulating networks used for conveying media content.¹⁶⁸ When content is involved, policymakers have long recognized the importance of giving the conduit editorial control over the information being conveyed.¹⁶⁹

A moment's reflection will confirm the important role that editorial discretion plays when content is involved. For example, consider what would occur if freelance writers were given a right of nondiscriminatory access to a prominent news magazine, such as *Time* or *Newsweek*. Doing so would deprive readers of any guarantee that the articles contained in any issue would avoid redundancy and cover all of the leading stories. It would also eliminate the magazine's ability to

165. See Wireline Broadband Order, *supra* note 13, at 14,890 ¶ 70.

166. See J. Scott Marcus & Douglas C. Sicker, Layers Revisited 8–11 (Sept. 13, 2005) (unpublished manuscript, presented at the 33rd Telecommunications Policy Research Conference), available at <http://web.si.umich.edu/tprc/papers/2005/492/Layers%20Revisited%20v0.4.pdf>.

167. See Paul L. Joskow & Roger G. Noll, *The Bell Doctrine: Applications in Telecommunications, Electricity, and Other Network Industries*, 51 STAN. L. REV. 1249, 1252–53 (1999).

168. See Howard A. Shelanski, *The Bending Line Between Conventional "Broadcast" and Wireless "Carriage"*, 97 COLUM. L. REV. 1048, 1050–62 (1997) (tracing the origins of the regulatory distinction between broadcasting and common carriage).

169. See, e.g., J. MacKie-Mason et al., *Service Architecture and Content Provision: The Network Provider as Editor*, 20 TELECOMM. POL'Y 203 (1996) (providing an early analysis of how application-aware networks can play editorial functions that help manage clutter and attention costs).

exercise quality control. Modern Internet users can also attest to the benefits of having filters to help sift through the avalanche of content available on the World Wide Web.

Congress recognized the key role that editorial discretion plays in the transmission of content when it enacted the seminal statutes with respect to broadcasting. During consideration of both the Radio Act of 1927 and the Communications Act of 1934, Congress considered and rejected proposals to provide a limited right of nondiscriminatory access.¹⁷⁰ Instead, Congress went in the other direction by including a provision prohibiting the regulation of broadcasters as common carriers.¹⁷¹ In so doing, “Congress specifically dealt with — and firmly rejected — the argument that the broadcast facilities should be open on a nonselective basis.”¹⁷² Exercise of such discretion inevitably privileges some communications 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.”¹⁷³ Since then, the Supreme Court has repeatedly reiterated the importance of preserving broadcasters’ editorial discretion.¹⁷⁴

The regulation of cable television followed a similar pattern. In accordance with early calls for regulating cable as a common carrier,¹⁷⁵ the FCC initially embraced turning cable into a common carrier with respect to at least some of its channels,¹⁷⁶ only to see the

170. 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); *CBS v. Democratic Nat’l Comm.*, 412 U.S. 94, 105–10 (1973) (plurality opinion) (same); Lili Levi, *The FCC, Indecency, and Anti-Abortion Political Advertising*, 3 VILL. SPORTS & ENT. L.J. 85, 140–48 (1996) (same).

171. 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).

172. See *CBS*, 412 U.S. at 105 (plurality opinion).

173. *Id.* at 124 (plurality opinion).

174. 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); *CBS*, 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).

175. See, e.g., Memorandum from the General Counsel, Chief of the Common Carrier Bureau, Chief Engineer, and Chief of the Broadcast Bureau to the FCC on the Status of So-Called Community Antenna Television Systems under the Communications Act of 1934 as Amended (Mar. 25, 1952), reprinted in *Television Inquiry, Part 6: Review of Allocation Problems, Special Problems of TV Service to Small Communities: Hearings on S. 376 Before the Senate Comm. on Interstate and Foreign Commerce*, 85th Cong. 3490 (1958); CABINET COMM. ON CABLE COMM’NS, CABLE: REPORT TO THE PRESIDENT 29–30 (1974); RESEARCH AND POLICY COMM. OF THE COMM. ON ECON. DEV., BROADCASTING AND CABLE TELEVISION: POLICIES FOR DIVERSITY AND CHANGE 70 (1975); ITHIEL DE SOLA POOL, TECHNOLOGIES OF FREEDOM 168 (1983); Bruce M. Owen, *Public Policy and Emerging Technology in the Media*, 18 PUB. POL’Y 539, 546, 551 (1970).

176. 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 (1978); Amendment of Part 74, Subpart K, of the Commission’s Rules and Regulations Relative to Community Antenna Television Sys-

Supreme Court strike down that regulation as inconsistent with the policy embodied in the Communications Act of 1934 in favor of preserving editorial control over content.¹⁷⁷ In the process, the Court emphasized “Congress’ stern disapproval . . . of negation of the editorial discretion otherwise enjoyed by broadcasters and cable operators alike.”¹⁷⁸

In later cases, the Court repeatedly reemphasized the importance of protecting cable operators’ editorial discretion.¹⁷⁹ Indeed, when Congress and the FCC attempted to bar telephone companies from entering the cable television industry, courts struck the ban down for placing an impermissible burden on the telephone companies’ First Amendment rights.¹⁸⁰ Congress would later change course and sanction limiting cable operators’ editorial control over a portion of their channel capacity when it required cable companies to provide leased access to unaffiliated programmers.¹⁸¹ Leased access effectively turned cable operators into common carriers with respect to a portion of their networks.¹⁸² A majority of the Court recognized that leased access represented a substantial intrusion into the cable operators’ editorial discretion.¹⁸³ And as noted earlier, implementation of regulations designed to guarantee access to content has proven quite cumbersome.¹⁸⁴

The fact that telecommunications networks now serve as the conduit for mass communications and not just person-to-person commu-

tems; and Inquiry into the Development of Communications Technology and Services to Formulate Regulatory Policy and Rulemaking and/or Legislative Proposals, Notice of Proposed Rulemaking and Notice of Inquiry, 15 F.C.C.2d 417, 427 ¶ 26 (1969).

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

178. *Id.* at 708.

179. See *Turner Broad. Sys., Inc. v. FCC*, 512 U.S. 622, 636 (1994); *City of Los Angeles v. Preferred Commc’ns, Inc.* 476 U.S. 488, 494 (1986); cf. *Leathers v. Medlock*, 499 U.S. 439, 444 (1991) (“Cable television provides to its subscribers news, information, and entertainment.”).

180. See *US West, Inc. v. United States*, 48 F.3d 1092 (9th Cir. 1995), *vacated and remanded on other grounds*, 516 U.S. 1155 (1996); *Chesapeake & Potomac Tel. Co. v. United States*, 42 F.3d 181 (4th Cir. 1994), *vacated on other grounds*, 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); *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)).

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

182. See *Denver Area Educ. Telecomms. Consortium, Inc. v. FCC*, 518 U.S. 727, 796 (1996) (Kennedy, J., concurring in part, concurring in the judgment in part, and dissenting in part).

183. See *id.* at 761 (opinion of Breyer, J., joined by Stevens & Souter, JJ.); *id.* at 796 (Kennedy, J., joined by Ginsburg, J., concurring in part, concurring in the judgment in part, and dissenting in part).

184. See *supra* note 154 and accompanying text.

nications 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.

B. Network Diversity and Dynamic Efficiency

Not only would network neutrality threaten to reduce static efficiency; it also poses a serious risk to dynamic efficiency. I draw on the literature exploring the impact of mandating interconnection on dynamic efficiency in the context of antitrust,¹⁸⁵ UNE access,¹⁸⁶ and multiple ISP access to cable modem systems¹⁸⁷ to show how the regime of mandatory interconnection and standardization can discourage entry into the last mile. As a result, network neutrality would appear to conflict directly with the goals of dynamic efficiency and would instead be the source of, rather than the solution to, market failure. Conversely, embracing a network diversity principle promises to promote competition in the last mile and thereby alleviate the central issue confronting broadband policy.

The reasons why mandating interconnection is potentially problematic from the standpoint of dynamic efficiency can best be explained in terms of the hypothetical example based on *Terminal Railroad* discussed above. Suppose that access to the bridge was not compelled and that rates were not regulated. Any supracompetitive returns earned by the owner of the existing bridge would signal that the market was in disequilibrium and would provide the incentive for anyone interested in building another bridge to do so. In addition, the railroads that were unable to obtain access to the existing bridge would be clamoring for an alternative. They would thus represent the natural strategic partners for any would-be builder of another bridge.

The situation changes dramatically if access to the bridge is compelled. Granting access lets the customers who would otherwise stand ready to invest in a new bridge off the hook, rescuing them from having to undertake the risks associated with investing in alternative capacity. At the same time, the would-be bridge entrant would also find entry less attractive. Knowing that it would be forced to share the new bridge with all comers at regulated prices weakens the incentives for it to construct another bridge. Indeed, rate regulation can deprive the

185. See 3A AREEDA & HOVENKAMP, *supra* note 32, ¶ 771b, at 174–76, ¶ 773a, at 201; Glen O. Robinson, *On Refusing to Deal with Rivals*, 87 CORNELL L. REV. 1177, 1190–94, 1209–12 (2002).

186. See Jerry A. Hausman & J. Gregory Sidak, *A Consumer-Welfare Approach to the Mandatory Unbundling of Telecommunications Networks*, 109 YALE L.J. 417, 457–61 (1999); Robert W. Crandall & Jerry A. Hausman, *Competition in U.S. Telecommunications Service: Effects of the 1996 Legislation*, in DEREGULATION OF NETWORK INDUSTRIES: WHAT'S NEXT? 73, 107–10 (Sam Peltzman & Clifford Winston eds., 2000); Thomas M. Jorde et al., *Innovation, Investment and Unbundling*, 17 YALE J. ON REG. 1 (2000).

187. See Yoo, *supra* note 51, at 246–47, 268–69; Lopatka & Page, *supra* note 28.

new entrant of the returns it needs to survive.¹⁸⁸ Granting access thus threatens to frustrate the appearance of alternative bridge capacity that remains the central goal of competition policy in this situation. In so doing, it threatens to entrench the existing bridge monopolist into place. As the Supreme Court recently noted:

Firms may acquire monopoly power by establishing an infrastructure that renders them uniquely suited to serve their customers. Compelling such firms to share the source of their advantage is in some tension with the underlying purpose of antitrust law, since it may lessen the incentive for the monopolist, the rival, or both to invest in those economically beneficial facilities.¹⁸⁹

At the same time, the obligation to share the benefits of any improvements also reduces the incumbents' incentives to undertake the investments needed to upgrade existing network technologies.¹⁹⁰ This dynamic is why courts and leading commentators have consistently condemned compelling access to communications networks whenever competition from alternative network platforms is feasible.¹⁹¹ The

188. The FCC's experience with a broadcast regulation known as the financial interest and syndication rules ("finsyn") illustrates how imposing rate regulation discourages investment in alternative networks. Finsyn attempted to curb the dominant positions held by ABC, CBS, and NBC by limiting the extent to which networks could take ownership stakes in the programming that they televised. Reducing the profitability of networking had the inevitable consequence of deterring entry by new networks. This is confirmed by the fact that the Fox network was unable to enter successfully until it obtained a waiver from finsyn. See Fox Broadcasting Co. Request for Temporary Waiver of Certain Provisions of 47 C.F.R. § 73.658, Memorandum Opinion and Order, 5 F.C.C.R. 3211 (1990); Jim Chen, *The Last Picture Show (On the Twilight of Federal Mass Communications Regulation)*, 80 MINN. L. REV. 1415, 1457 (1996). The courts eventually struck down finsyn as arbitrary and capricious. See *Schurz Commc'ns, Inc. v. FCC*, 982 F.2d 1043 (7th Cir. 1992); *Capital Cities/ABC v. FCC*, 29 F.3d 309 (7th Cir. 1994). The rules were eliminated shortly thereafter. See *Review of the Syndication and Financial Interest Rules, Sections 73.659–73.663 of the Commission's Rules, Report and Order*, 10 F.C.C.R. 12,165 (1995).

189. *Verizon Commc'ns Inc. v. Law Offices of Curtis V. Trinko, LLP*, 540 U.S. 398, 407–08 (2004).

190. See *accord AT&T v. Iowa Utils. Bd.*, 525 U.S. 366, 428–29 (1999) (Breyer, J., concurring in part and dissenting in part) ("[A] sharing requirement may diminish the original owner's incentive to keep up or to improve the property by depriving the owner of the fruits of the value-creating investment, research, or labor.").

191. See *Iowa Utils. Bd.*, 525 U.S. at 388–89 (rejecting the imposition of UNE access when the network elements are available from alternative sources); *U.S. Telecom Ass'n v. FCC*, 290 F.3d 415, 428–29 (D.C. Cir. 2002) (rejecting order requiring unbundling of DSL-compatible portion of telephone lines due to the order's failure to take into account competition from cable modem systems); 3A AREEDA & HOVENKAMP, *supra* note 32, ¶ 773b2, at 200–03 (limiting compelled access to essential facilities to situations in which the facility cannot be obtained from another source); *cf. Nat'l Cable & Telecomm. Ass'n v. Brand X Internet Servs.*, 125 S. Ct. 2688, 2711 (2005) (upholding the FCC's decision that the availability of broadband services from other sources justified refusing to impose access re-

need to stimulate reinvestment also undercuts asymmetric regulatory proposals that would impose interconnection mandates only on incumbents with market power.¹⁹² Focusing on current market shares can be misleading in industries that are undergoing rapid growth, since it is future rather than current shares that are important. Even more importantly, imposing more stringent regulation on incumbents is also problematic in a world in which encouraging reinvestment in existing networks is as important as encouraging investment in new network technologies.¹⁹³

The same dynamics can be illustrated by considering a hypothetical town in which there is a single department store. Much like a broadband network, a department store is simply a conduit for goods and services produced by others. Upon reflection, it becomes clear that imposing a rule requiring all department stores to make space available to all manufacturers on a reasonable and nondiscriminatory basis would discourage entry by a second department store. Although entrants often find it profitable to enter into competition with a monopolist earning monopoly rents, this incentive is reduced if rate regulation precludes any such rents from being earned. In addition, the frustrated manufacturers who would otherwise be eager to support construction of a second department store would also lose their enthusiasm for the project. Furthermore, compelling access to the department store shelves would also limit the ability of stores to control whether an appropriate mix of goods was represented or to assure that the goods satisfied certain quality standards. Preventing consolidation with manufacturers can preclude the achievement of real efficiencies by using tighter integration through inventory management and electronic data interchange to reduce costs. Department stores often try to promote their popularity by entering into exclusivity arrangements with key manufacturers, sometimes even establishing boutiques in

quirements on cable modem systems). *See generally* Yoo, *supra* note 33, at 246–47 (reviewing additional authorities).

192. *See* William P. Rogerson, *New Economic Perspectives on Telecommunication Regulations*, 67 U. CHI. L. REV. 1489, 1497 (2000) (book review); James B. Speta, *Deregulating Telecommunications in Internet Time*, 61 WASH. & LEE L. REV. 1063, 1036–40, 1154 (2004).

193. I would also reject asymmetric regulation proposals that would impose access requirements on DSL, but not cable modem systems. *See* Joseph Farrell, *Open Access Argument: Why Confidence is Misplaced*, in NET NEUTRALITY OR NET NEUTERING: SHOULD BROADBAND INTERNET SERVICES BE REGULATED? (Thomas M. Lenard & Randolph J. May eds., forthcoming 2005); William P. Rogerson, *The Regulation of Broadband Telecommunications, the Principle of Regulating Narrowly Defined Input Bottlenecks, and Incentives for Investment and Innovation*, 2000 U. CHI. LEGAL F. 119, 145; Simon Wilkie, *Open Networks: The Roles of Regulation and Competition*, Remarks at the Silicon Flatirons Conference on the Digital Broadband Migration: Toward a Regulatory Regime (Feb. 9, 2004). Such asymmetric regulation violates the principles of technological neutrality and threatens to place the government in a position of favoring one broadband technology over another. *See* Cable Modem Declaratory Ruling and NPRM, *supra* note 1, at 4802 ¶ 6; Wireline Broadband NPRM, *supra* note 1, at 3023 ¶ 6.

portions of their stores. Requiring department stores to provide non-discriminatory access to all manufacturers would thus prevent them from pursuing one of the best entry strategies available to new entrants.¹⁹⁴ Indeed, this type of strategic partnership between manufacturers and retailers appears to have played a critical role in promoting the growth of the cable industry.¹⁹⁵ This mechanism for promoting entry would be frustrated by regulations mandating open access to the retail platform.

This underscores the extent to which mandating access to a bottleneck facility represents surrender to the monopoly. The normal response of competition policy when it encounters monopolies is to break them up. Mandating interconnection deviates from this tradition by addressing the symptoms of monopoly power without treating its causes. Instead of breaking up the monopoly, access leaves it in place and only requires that it be shared. Furthermore, approaches that break up monopolies necessarily have built-in exit strategies embedded within them. Mandated sharing of a bottleneck facility, in contrast, implicitly envisions that the monopoly, and thus the regime of regulatory oversight, will persist indefinitely.

Such an approach might be appropriate if entry by a competitor to the bottleneck were impossible, as was arguably the case when the FCC and the courts relied on interconnection and standardization to promote competition in CPE, long distance, and enhanced services.¹⁹⁶ In that event, any reduction of incentives to invest in alternative network capacity would be beside the point, because such entry would be impossible. The situation is quite different when entry by alternative network capacity is feasible. In that case, the reduction in investment incentives may short circuit the natural process by which markets diffuse bottlenecks. In the worst case scenario, mandating interconnection can itself have the perverse effect of entrenching the existing monopolies into place. Indeed, Milton Mueller has shown that during the early years of the telephone industry, the absence of an interconnection requirement helped drive the rapid geographical buildout of the telephone network, as the Bells and the independent telephone companies competed to satisfy customers.¹⁹⁷ Subsequent empirical studies have confirmed that the provisions mandating access to local telephone facilities have dampened investment incentives in precisely this manner.¹⁹⁸ Other empirical studies indicate that unbundling of broadband facilities has had a similar adverse effect.¹⁹⁹

194. See Shapiro, *supra* note 107, at 678 (noting how exclusivity can “encourage investment in . . . networks”).

195. See OWEN & ROSSTON, *supra* note 28, at 3.

196. See *supra* notes 42–50 and accompanying text.

197. See MILTON L. MUELLER, JR., *UNIVERSAL SERVICE* 3 (1997).

198. See Jerry A. Hausman & J. Gregory Sidak, *Did Mandatory Unbundling Achieve Its Purpose? Empirical Evidence from Five Countries*, 1 J. COMPETITION L. & ECON. 173

By now, the implications for broadband policy should be manifest. The central focus in deciding whether to mandate network neutrality should be on its effect on stimulating competition in the last mile. If subject to mandatory interconnection, standardization, non-discrimination, and rate regulation, any would-be last-mile entrant would realize that even if it were successful, it would be forced to make its platform available to all content and application providers under rates that would limit it to ordinary returns. In addition, the would-be builder would not find a group of content and applications providers clamoring for additional access, since mandating interconnection to the existing platform would rescue them from having to invest in alternative distribution arrangements. In the process, network neutrality risks reducing incentives to invest in new last-mile technologies to the extent that it cements the existing last-mile oligopoly into place. Although such a policy might be justifiable if entry by alternative network capacity were impossible, it is indefensible when 3G, WiFi, powerline, and other technologies are actively searching for capital to support their deployment and when the state of the art in transmission is undergoing rapid technological change. At best, the inevitable lag in enacting new regulations will cause economic losses. At worst, by destroying incentives to build new technologies and to reinvest in existing technologies, regulation might itself be the cause, rather than the consequence, of market failure. Under these circumstances, mandating network neutrality would appear to pose a serious threat to dynamic efficiency.

It is for this reason that the FCC has repeatedly stated that its decisions with respect to broadband will be guided by the principle that “broadband services should exist in a minimal regulatory environment that promotes investment and innovation in a competitive market.”²⁰⁰ The manner in which lack of interconnection can stimulate investment

(2005); Augustin J. Ros & Karl McDermott, *Are Residential Local Exchange Prices Too Low?*, in EXPANDING COMPETITION IN REGULATED INDUSTRIES 149 (Michael A. Crew ed., 2000); James Zolnierok et al., *An Empirical Examination of Entry Patterns in Local Telephone Markets*, 19 J. REG. ECON. 143 (2001); Robert W. Crandall et al., *Do Unbundling Policies Discourage CLEC Facilities-Based Investment?* (March 12, 2003) (unpublished manuscript), available at http://papers.ssrn.com/abstract_id=387421.

199. See Debra J. Aron & David E. Burnstein, *Broadband Adoption in the United States: An Empirical Analysis*, in DOWN TO THE WIRE: STUDIES IN THE DIFFUSION AND REGULATION OF TELECOMMUNICATIONS TECHNOLOGIES (Allan L. Shampine ed., 2003); Martha Garcia-Murillo, *International Broadband Deployment: The Impact of Unbundling*, 57 COMM. & STRATEGIES 83 (2005); Bronwyn Howell, *Infrastructure Regulation and the Demand for Broadband Services: Evidence from OECD Countries*, 47 COMM. & STRATEGIES 33 (2002); Yoo, *supra* note 144, at 195–96; Jung Hyun Kim et al., *Broadband Uptake in OECD Countries: Policy Lessons from Comparative Statistics Analysis* (unpublished manuscript presented at the 31st Research Conference on Communication, Information and Internet Policy, Sept. 20, 2003), available at <http://tprc.org/papers/2003/203/Kim-Bauer-Wildman.pdf>.

200. Wireline Broadband NPRM, *supra* note 1, at 3022 ¶ 5; *accord* Cable Modem Declaratory Ruling and NPRM, *supra* note 1, at 4802 ¶ 5.

in new networks is eloquently demonstrated by the fact that major complementary services and equipment providers, such as Google, EarthLink, IBM, Intel, and Disney, have each undertaken major investment in alternative broadband technologies in the wake of the Supreme Court's *Brand X* decision.²⁰¹ Embracing network diversity as a policy, in contrast, would thus appear to provide substantial incentives to support the build-out of new last-mile facilities.

C. Noneconomic Justifications for Network Neutrality

In addition to the economic rationales discussed above, some commentators have invoked noneconomic rationales to justify network neutrality.²⁰² Drawing inspiration from the Supreme Court's admonition that "it has long been a basic tenet of national communications policy that the widest possible dissemination of information from diverse and antagonistic sources is essential to the welfare of the public,"²⁰³ some of these scholars argue that the central rationale is to promote political discourse, even if it might be more economical to limit access.²⁰⁴ Indeed, there is a long legacy of regulating network industries in order to protect access by small producers that dates back to the initial regulation of the railroads in the late 19th Century.²⁰⁵ Following the landmark Supreme Court decision in *Munn v. Illinois*,²⁰⁶ other scholars justify the imposition of interconnection, stan-

201. See Michael Bazeley, *Google Offers Free WiFi Net for S.F.*, SAN JOSE MERCURY NEWS, Oct. 1, 2005, at 1; Jesse Drucker & Merissa Marr, *Disney to Enter Cellphone Market, with Kids in Mind*, WALL ST. J., July 6, 2005, at D5; Ed Gubbins, *Intel Gets Behind BPL*, TELEPHONY, Sept. 5, 2005, at 16; Bob Keefe, *Battered EarthLink Shifts Gears: Phone Services Play Role in Makeover*, ATLANTA J.-CONST., July 24, 2005, at C1; Ken Kerschbaumer, *Plug-and-Play Internet: Wall-Outlet Broadband Attracts Heavy Hitters*, BROADCASTING & CABLE, July 18, 2005, at 20.

202. See, e.g., Lance Liebman, *Foreword: The New Estates*, 97 COLUM. L. REV. 819, 833 (1997) ("Should the populist ancestry of the Sherman Act be revisited to contend with telecommunications giants?").

203. *Turner Broad. Sys., Inc. v. FCC*, 512 U.S. 622, 663–64 (1994) (quoting *United States v. Midwest Video Corp.*, 406 U.S. 649, 668 n. 27 (1972) (plurality opinion)) (internal quotation marks omitted); accord *Turner Broad. Sys., Inc. v. FCC (Turner II)*, 520 U.S. 180, 192 (1997).

204. See Yochai Benkler, *From Consumers to Users: Shifting the Deeper Structures of Regulation Toward Sustainable Commons and User Access*, 52 FED. COMM. L.J., 561, 565–68, 578 (2000); Cooper, *supra* note 6, at 191–99; cf. *Turner II*, 520 U.S. at 227 (Breyer, J., concurring) (noting that the purpose of the policy of promoting "the widest possible dissemination of information from diverse and antagonistic sources" is "to facilitate the public discussion and informed deliberation, which, as Justice Brandeis pointed out many years ago, democratic government presupposes").

205. See Herbert Hovenkamp, *Regulatory Conflict in the Gilded Age: Federalism and the Railroad Problem*, 97 YALE L.J. 1017, 1044–54 (1988); Robert L. Rabin, *Federal Regulation in Historical Perspective*, 38 STAN. L. REV. 1189, 1197–208, 1219–20 (1986).

206. 94 U.S. 113, 126 (1876); accord *Budd v. New York*, 143 U.S. 517, 532 (1892) ("[T]he right of the legislature to regulate the charges for services in connection with the use of property did not depend in every case upon the question whether there was a legal monopoly."); Roger D. Colton, *Heightening the Burden of Proof in Utility Shutoff Cases In-*

standardization, nondiscrimination, and rate regulation requirements because telecommunications networks are “affected with a public interest.”²⁰⁷

There is nothing incoherent about imposing regulation to promote values other than economic welfare. The problems with this approach are more practical than conceptual.²⁰⁸ Unless protecting the widest possible diversity of sources is a virtue in and of itself that trumps all other values, such a theory must provide a basis for quantifying the noneconomic benefits and for determining when those benefits justify the economic costs. Our nation’s experience with antitrust law has revealed that telecommunications networks are often subject to economies of scale,²⁰⁹ which in turn implies that forcing communications enterprises to remain small can exact a price. At some point, the marginal benefit associated with protecting another small voice will fall short of the marginal costs of preventing network firms from realizing the available economies of scale.

The problem is that arguments in favor of protecting small customers and speakers have historically failed to reflect any sense of optimality and have instead regarded additional diversity as an absolute good.²¹⁰ But the presence of scale economies underscores the basic fact that promoting diversity exacts a cost that must be traded off against the benefits of additional producers. As the D.C. Circuit has noted in a related context, “Everything else being equal, each additional ‘voice’ may be said to enhance diversity. . . . But at some point, surely, the marginal value of such an increment in ‘diversity’ would not qualify as an ‘important’ governmental interest. Is moving from 100 possible combinations to 101 ‘important?’”²¹¹ More recent pronouncements have begun to acknowledge that not “each and every incremental increase in the number of outlet owners can be justified as necessary in the public interest” and that “there certainly are points of

volving Allegations of Fraud, 33 HOW. L.J. 137, 140 n.22 (1990) (noting that in *Brass v. North Dakota ex rel. Stoesser*, 153 U.S. 391 (1894), “the Supreme Court held: ‘in the face of an able argument by counsel and a strong dissenting opinion based squarely on the theory that virtual monopoly is necessary to warrant government regulation under the doctrine of the *Munn* case, that it is the public nature and not the monopolistic character which justifies control of a business as a public utility’”).

207. See Speta, *supra* note 6, at 261 & n.185, 270–71.

208. For a more general critique of attempts to build theories of media regulation on democratic principles, see Christopher S. Yoo, *The Rise and Demise of the Technology-Specific Approach to the First Amendment*, 91 GEO. L.J. 245, 306–46 (2003).

209. See *supra* Part III.A.2.

210. See, e.g., Multiple Ownership of Standard, FM and TV Broadcast Stations, First Report and Order, 22 F.C.C.2d 306, 311 ¶21 (1970) (“A proper objective is the maximum diversity of ownership that technology permits in each area. We are of the view that 60 different licensees are more desirable than 50, and even that 51 are more desirable than 50.”); Cooper, *supra* note 6, at 197 (“There is no such thing as ‘enough’ democratic discourse.”).

211. *Time Warner Entm’t Co. v. FCC*, 240 F.3d 1126, 1135 (D.C. Cir. 2001).

diminishing returns in incremental increases in diversity.”²¹² That said, the approach has remained decidedly ad hoc. As a result, those who take seriously the admonition that it takes a model to beat a model will be decidedly reluctant to embrace such an indeterminate approach. The open-endedness of the approach and the lack of a clear notion of optimality leave it vulnerable to being redirected towards political purposes.

In this regard, the fate of the “Populist” School of antitrust provides a useful object lesson.²¹³ This School embraced a noneconomic vision of competition policy that protected small players in order to promote democratic values associated with Brandeisian pluralism even when doing so was economically costly.²¹⁴ Over time, courts and commentators began to recognize that because many industries are subject to economies of scale, preserving small producers has a price. The problem was that Populism failed to provide a basis for determining when the costs outweighed the benefits. By the end of the 1980s, even those sympathetic to the Populist School were forced to concede that the economic approach to antitrust had prevailed.²¹⁵ In the process, antitrust shifted from hostility toward vertical integration in order to protect small players for largely noneconomic reasons to a more nuanced, explicitly economic approach that recognized that vertical

212. See 2002 Biennial Regulatory Review — Review of the Commission’s Broadcast Ownership Rules and Other Rules Adopted Pursuant to Section 202 of the Telecommunications Act of 1996, Report, Order and Notice of Proposed Rulemaking, 18 F.C.C.R. 13620, 13631 ¶ 31 (2003).

213. For overviews of the conflict between the Chicago and the Populist Schools that manifest distinctly different sympathies, see 1 AREEDA & HOVENKAMP, *supra* note 32, ¶ 100b, at 4–6, ¶ 111, at 97–115; Michael S. Jacobs, *An Essay on the Normative Foundations of Antitrust Economics*, 74 N.C. L. REV. 219, 227–40 (1995); Alan J. Meese, *Farewell to the Quick Look: Redefining the Scope and Content of the Rule of Reason*, 68 ANTITRUST L.J. 461, 466–67 (2000).

214. For a classic statement of this position, see *United States v. Brown Shoe Co.*, 370 U.S. 294, 344 (1962) (stating that Congress intended to “promote competition through the protection of viable, small, locally owned business” even when “occasional higher costs and prices might result from the maintenance of fragmented industries and markets”). For other similar statements, see, e.g., *United States v. Topco Assocs., Inc.*, 405 U.S. 596, 610–11 (1972); *Albrecht v. Herald Co.*, 390 U.S. 145, 152–54 (1968), *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); *Fashion Originators’ Guild of Am., Inc. v. FTC*, 312 U.S. 457, 467 (1941) (holding group boycotts illegal and evidence of procompetitive benefits inadmissible).

215. See, e.g., Robert H. Lande, *Implications of Professor Scherer’s Research for the Future of Antitrust*, 29 WASHBURN L.J. 256, 258 (1990) (recognizing that “the dominant paradigm today is that the only goal of the existing antitrust laws is to increase economic efficiency”); Eleanor M. Fox, *The Modernization of Antitrust: A New Equilibrium*, 66 CORNELL L. REV. 1140, 1140 (1981) (conceding that “[r]egard for efficiency is in the ascendancy”); Henry S. Gerla, *A Micro-Microeconomic Approach to Antitrust Law: Games Managers Play*, 86 MICH. L. REV. 892, 892 (1988) (observing that “[c]lassical microeconomic theory . . . has become the dominant tool for contemporary antitrust analysis”); *accord* Jacobs, *supra* note 213, at 239 (“The victory of a purely economic analysis over . . . the Modern Populist School could hardly seem more complete.”).

integration can yield substantial economic benefits.²¹⁶ Broadband policy could be well served to follow the same path and recognized the dangers of an excessive focus on preserving the freedom of consumers and content/applications providers and that permitting a degree of vertical integration can represent the better way to promote economic welfare.

Arguments justifying the regulation of telecommunications networks because they are “affected with the public interest” are similarly unlikely to prove a satisfactory basis for regulation. This doctrine was developed during the *Lochner* era as a means for reconciling the intrusive regulation imposed on public utilities with the Court’s willingness to strike down economic regulation as impermissible interference with the freedom of contract.

The category was notoriously slippery. Specifically Courts rejected the notion that exercise of the power of eminent domain²¹⁷ or operation under a state franchise²¹⁸ was by itself sufficient to render an industry “affected with the public interest.” Instead, the inquiry was governed by a multifactor balancing test, with no one factor being dispositive.²¹⁹ Criticism mounted that the category was analytically empty. Eventually, the Supreme Court rejected the entire framework as unworkable in its landmark decision in *Nebbia v. New York*,²²⁰ and the concept was thereafter regarded as “discarded.”²²¹

This is not to say that Brandeisian principles could not support a coherent theory of regulation. It is only to say that no one has yet articulated such a theory with sufficient clarity to be coherent. That said, the populist vision rests in uneasy tension with the modern economy. Brandeisian populism aspires to the type of small scale economic activity typically associated with Jeffersonian democracy.²²² It also

216. See Yoo, *supra* note 33, at 186–202.

217. See *id.* at 96–97. In addition, courts have repeatedly rejected the notion that private property that was initially obtained via eminent domain and is currently used to serve the public is somehow entitled to less dignity under the law. See *W. Union Tel. Co. v. Pa. R.R.*, 195 U.S. 540, 569–70, 573 (1904) (noting that a right of way obtained through condemnation remains private property even when devoted to a public use); *United Rys. & Elec. Co. v. West*, 280 U.S. 234, 249 (1930) (holding that “the property of a public utility, although devoted to the public service and impressed with a public interest, is still private property”), *overruled in part on other grounds by Fed. Power Comm’n v. Hope Natural Gas Co.*, 320 U.S. 591 (1944); *Gulf Power Co. v. United States*, 187 F.3d 1324, 1329–30 (11th Cir. 1999) (“A property owner is entitled to expect that the property it acquired via eminent domain . . . came with the right all property has.”).

218. See *Nebbia v. New York*, 291 U.S. 502, 534 (1934).

219. See FORD P. HALL, *THE CONCEPT OF A BUSINESS AFFECTED WITH A PUBLIC INTEREST* 17–55, 90–145 (1940).

220. *Nebbia*, 291 U.S. at 536; *accord Tyson & Brother v. Banton*, 273 U.S. 418, 446 (1927) (Holmes, J., dissenting); *id.* at 451 (Stone, J., dissenting).

221. *Olsen v. Nebraska ex rel. W. Reference & Bond Ass’n*, 313 U.S. 236, 245 (1941); *accord* RONALD A. ANDERSON, *GOVERNMENT AND BUSINESS* 225 (4th ed. 1981) (arguing that *Nebbia* “destroyed that concept”).

222. See Rabin, *supra* note 205, at 1219–20. In the words of Brandeis himself:

tends to value economic stability for its own sake, since instability tends to break down the citizenry.²²³ As such, it does not seem well suited to industries like broadband, in which large scale, rapid, and often disruptive change are prominent features.

IV. THE AMBIGUOUS POLICY IMPLICATIONS OF NETWORK DIVERSITY

It thus appears to be quite possible to make out a plausible case in favor of network diversity. Indeed, the economic considerations discussed above suggest that adopting network neutrality would be a mistake and that encouraging network diversity may well cause economic welfare to increase. I must acknowledge, however, that the case for network diversity is subject to a number of caveats that make the determination of whether network diversity would constitute good policy quite complex.

This Part takes a closer look at the complexities of the welfare calculus. I begin by debunking the common misperception that endorsing network diversity would be tantamount to embracing the Schumpeterian vision of competition. On closer inspection, it becomes clear that the two approaches are quite distinct. I then examine the welfare implications of network diversity, concluding that whether or not network diversity would promote economic welfare is an empirical question that cannot be determined a priori. I then review the institutional considerations regarding the likely benefits of administrative intervention. In so doing, I also explore the relative merits of

[S]ize alone gives to giant corporations a social significance not attached ordinarily to smaller units of private enterprise. Through size, corporations, once merely an efficient tool employed by individuals in the conduct of private business, have become an institution — an institution which has brought such concentration of economic power that so-called private corporations are sometimes able to dominate the state. The typical business corporation of the last century, owned by a small group of individuals, managed by their owners, and limited in size by their personal wealth, is being supplanted by huge concerns in which the lives of tens or hundreds of thousands of employees and the property of tens or hundreds of thousands of investors are subjected, through the corporate mechanism, to the control of a few men. . . . The changes thereby wrought in the lives of the workers, of the owners and of the general public, are so fundamental and far-reaching as to lead these scholars to compare the evolving “corporate system” with the feudal system; and to lead other men of insight and experience to assert that this “master institution of civilized life is committing it to the rule of a plutocracy.”

Louis K. Liggett Co. v. Lee, 288 U.S. 517, 565 (1933) (Brandeis, J., dissenting); *see also* United States v. Falstaff Brewing Corp., 410 U.S. 526, 543 (1973) (Douglas, J., concurring) (stating that “the concentration of power leads predictably to socialism that is antagonistic to our system”).

223. *See* Spulber & Yoo, *supra* note 69, at 909 n.66.

leaving redress of such matters to antitrust law. I close by offering a tentative case in favor of the network diversity approach.

The key insight is that network diversity is not the mirror image of network neutrality, as would be the case if network diversity envisioned mandating the use of proprietary or incompatible protocols. Instead, network diversity is best implemented through nonregulation. As such, it appears to be the most appropriate course of action when faced with an economically ambiguous situation and a technologically uncertain future.

A. The Misunderstood Relationship Between Network Diversity and Schumpeterian Competition

The emphasis on permitting network owners to earn short-run economic profits is sometimes mistakenly compared to the type of competition proposed by Joseph Schumpeter.²²⁴ Schumpeter suggested that the classic model of perfect competition, which envisions multiple competitors vying for the same consumers, was passé. In the modern era, it had been replaced by a model in which firms do not compete on the margin, but rather through discovery of the next breakthrough innovation that “commands a decisive cost or quality advantage and which strikes not at the margins of the profits and the outputs of the existing firms but at their foundations and their very lives.”²²⁵ Supracompetitive returns play a key role in this model. It is the prospect of sustainable supracompetitive returns that constitutes “the baits that lure capital on to untried trails.”²²⁶

Although Schumpeterian competition and network diversity do bear a superficial resemblance to one another, close analysis reveals that the theories are quite different. The most distinctive feature of Schumpeterian competition is that the classic model of *horizontal* competition *within* the market, in which multiple firms compete directly with one another by selling similar products, is replaced by a winner-take-all, *vertical* competition *for* the market, in which the market is dominated by a succession of monopolists. The type of competition envisioned by the network diversity approach is more reminiscent of the type of horizontal competition associated with conventional economic analyses. Producers do derive some limited market power from their ability to differentiate their products, but the magnitude of this effect falls far short of the type of dominant advantage envisioned by Schumpeter. Indeed, it is the ability to differentiate

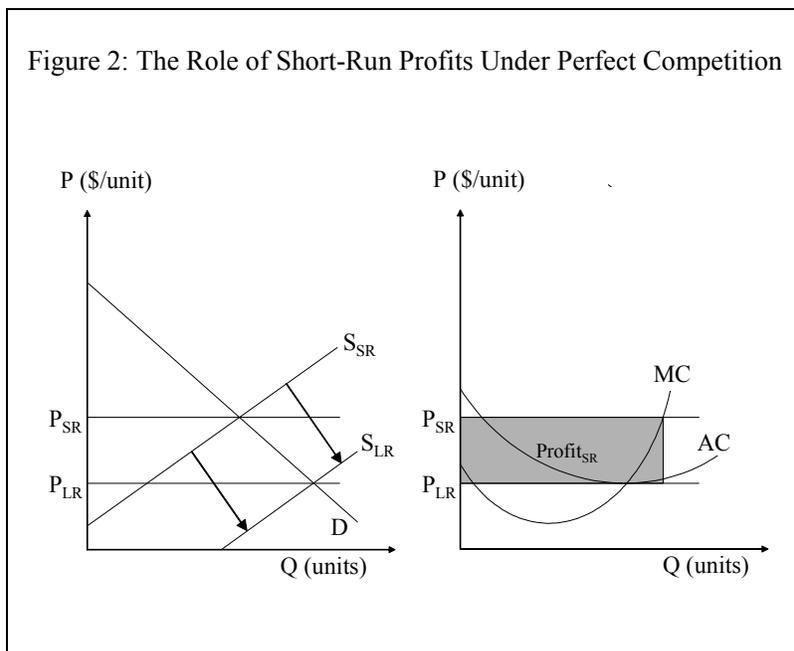
224. See Yochai Benkler, *Some Economics of Wireless Communications*, 16 HARV. J.L. & TECH. 25, 72–73 (2002); Cooper, *supra* note 6, at 202–05; Lemley & Lessig, *supra* note 6, at 960–62; Wu, *supra* note 6, at 80–82.

225. SCHUMPETER, *supra* note 31, at 84.

226. *Id.* at 90.

networks that prevents the market from devolving into the type of winner-take-all regime associated with Schumpeter and natural monopoly. In this sense, network diversity is quite anti-Schumpeterian.²²⁷

The only similarity between these two approaches is that fact that both rely on supracompetitive returns to push competition forward. In the case of Schumpeterian competition, these supracompetitive returns are long-lived and sustainable. The network diversity model, in contrast, envisions these economic profits to be transient and quickly dissipated.²²⁸ In this sense, the proper analog for the supracompetitive returns in the network diversity approach is the role that short-run profits play in stimulating entry under the model of perfect competition (depicted in Figure 2). The primary difference is that entry is modeled in the case of perfect competition by an outward shift of the supply curve and modeled in the case of monopolistic competition by an inward shift of the demand curve.



227. Network diversity also eliminates the rent dissipation problems that occur when many parties undertake up-front, fixed-cost investments but only one can prevail. See Jennifer F. Reinganum, *The Timing of Innovation: Research, Development, and Diffusion*, in 1 HANDBOOK OF INDUSTRIAL ORGANIZATION 849, 853 (Richard Schmalensee & Robert D. Willig eds., 1989) (reviewing literature on patent races); Aditya Bamzai, Comment, *The Wasteful Duplication Thesis in Natural Monopoly Regulation*, 71 U. CHI. L. REV. 1525 (2004) (applying rent dissipation to natural monopoly).

228. See *supra* note 101 and accompanying text.

Indeed, this shows the inherent flaw in approaches that attempt to regulate away supracompetitive returns when entry is possible. In so doing, regulators would eliminate the primary impetus for competitive entry, which means that the supply curve would never shift.²²⁹ Network neutrality thus represents a surrender to the monopoly that is unjustified unless entry is truly infeasible. It also depends on having confidence that regulatory authorities would do a better job of dissipating rents than would private ordering and that the authorities would be able to revise the regime to eliminate mandatory interconnection as soon as technological progress makes entry by alternative networks feasible.²³⁰

B. The Complexity of the Welfare Analysis

Acknowledging that products compete on more dimensions than simply price greatly complicates the welfare analysis. When products compete solely on price, welfare analysis is simply a matter of determining total surplus. The multidimensionality of competition under network diversity depends on certain factual assumptions and inevitably requires a complex tradeoff among a number of different considerations.

1. The Robustness of Competition

In order for network diversity to provide the types of benefits described in this Article, the level of competition in equilibrium must be sufficiently robust to discipline other providers. The Merger Guidelines promulgated by the FTC and the Justice Department suggest that competition among six similarly sized firms represents the minimum necessary to prevent firms from using vertical integration to harm competition,²³¹ the criteria applied by the FCC when reviewing recent wireless mergers would find no anticompetitive effects so long as roughly four, equally sized competitors remained.²³² Indeed, recent

229. See *supra* Part III.B.

230. See *infra* Part IV.C (discussing the institutional considerations surrounding network diversity).

231. See U.S. Dep't of Justice & FTC, *Non-Horizontal Merger Guidelines*, in 1992 Horizontal Merger Guidelines §§ 4.131, 4.213, 57 Fed. Reg. 41,552 (1992) (indicating that antitrust authorities are unlikely to challenge vertical mergers unless the Hirschman-Herfindahl index (HHI) in the primary market exceeds 1800), available at <http://www.usdoj.gov/atr/public/guidelines/2614.htm>.

232. See Applications of AT&T Wireless Services, Inc. and Cingular Wireless Corporation for Consent to Transfer Control of Licenses and Authorizations, Memorandum Opinion and Order, 19 F.C.C.R. 21522, 21568 ¶¶ 106–107 (2004) (applying an HHI threshold of 2800); Applications of Nextel Communications, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations, Memorandum Opinion and Order, 20 F.C.C.R. 13,967, 13,995–96 ¶ 63 (2005); Applications of Western Wireless Corporation and

merger decisions suggest that the survival of three firms may be sufficient to preserve the benefits of competition.²³³ Formal models calibrated on engineering data suggest that the level of demand may be able to support up to three wireline broadband providers to seventy percent of U.S. households.²³⁴ Measured against any of these standards, the overall broadband market is sufficiently competitive to protect against anticompetitive harms.²³⁵ Entry by wireless providers (which involve lower up-front entry costs) and other broadband technologies, such as broadband over powerlines (“BPL”), should intensify competition still further.

This suggests that for most of the country, competition should remain sufficiently robust to ameliorate concerns of anticompetitive effects. At the same time, the survival of differentiated firms depends on the overall demand for network services.²³⁶ It is quite possible that for at least some portions of the country, the overall demand will remain too thin to support multiple broadband providers. Furthermore, the need to acquire spectrum rights, municipal licenses and state-issued certificates of public necessity and convenience, and access to rights of way may constitute entry barriers that slow or prevent the deployment of alternative transmission platforms.

Attel Corporation for Consent to Transfer Control of Licenses and Authorizations, Memorandum Opinion and Order, 20 F.C.C.R. 13,053, 13,073 ¶¶ 46–47 (2005).

233. See William J. Baer et al., *Taking Stock: Recent Trends in U.S. Merger Enforcement*, ANTITRUST, Spring 2004, at 15, 17 (suggesting that the FTC is unlikely to challenge a merger which leave at least four remaining competitors); Simon Baxter & Frances Dethmers, *Unilateral Effects under the European Merger Regulation: How Big Is the Gap?*, E.C.L.R. 2005, 26(7), 380–89, 386 (concluding that both the United States and the European Commission will challenge three-to-two mergers and will take a more permissive attitude towards four-to-three mergers); Timothy J. Muris, Opening Remarks Before FTC Bureau of Economics Roundtable on Understanding Mergers: Strategy and Planning, Implementation, and Outcomes (Dec. 9, 2002) (suggesting that the FTC is unlikely to challenge a four-to-three merger that yielded substantial efficiencies), available at <http://www.ftc.gov/speeches/muris/mergers021209.htm>. Mergers that reduced the number of competitors from three to two have generally been opposed. See *FTC v. H.J. Heinz Co.*, 246 F.3d 708 (D.C. Cir. 2001); *FTC v. Staples*, 970 F. Supp. 1066 (D.D.C. 1997); Amendment of the Commission’s Space Station Licensing Rules and Policies, First Report and Order and Further Notice of Proposed Rulemaking in IB Docket No. 02-34, and First Report and Order in IB Docket No. 02-54, 18 F.C.C.R. 10,760, 10,788 ¶ 64 (2003) (discussing benefits of a three-firm market and presumption against three-to-two mergers). But see *United States v. Oracle Corp.*, 331 F. Supp. 2d 1098 (N.D. Cal. 2004) (approving 3-2 merger); *FTC v. Arch Coal, Inc.*, 329 F. Supp. 2d 109 (D.D.C. 2004) (same), *appeal dismissed*, No. 04-5291, 2004 WL 2066879 (D.C. Cir. Sept. 15, 2004).

234. See Gerald R. Faulhaber & Christian Hogendorn, *The Market Structure of Broadband Telecommunications*, 48 J. INDUS. ECON. 305, 321 (2000).

235. See Yoo, *supra* note 36, at 52–53 (reporting that as of the end of 2003, the HHI for the broadband industry was 1079, or roughly the equivalent of competition among ten firms of equal size).

236. As Adam Smith observed, “[T]he division of labor is limited by the extent of the market.” ADAM SMITH, AN INQUIRY INTO THE NATURE AND CAUSES OF THE WEALTH OF NATIONS 17 (Modern Library 1937) (1776).

In addition, the differentiation of services inherent in the network diversity approach can insulate some subscribers from the benefits of competition. While many consumers may find the services provided by alternative providers to be equally acceptable, some consumers may find themselves tied to the services or characteristics provided by a particular provider. These consumers' preferences will prevent them from fully benefiting from entry by alternative works providing different services.²³⁷ Whether network diversity will provide sufficient competition to mitigate the dangers of vertical integration is thus an empirical question that cannot be answered a priori.

2. The Heterogeneity of Demand

Whether network diversity would enhance or impair economic welfare depends on the structure of demand. The network diversity model is based on the assumption that customer preferences are heterogeneous. Small players survive by targeting different market segments. The success of this approach presumes that there are different product segments to target. To the extent that consumer preferences are homogeneous, multiproduct equilibria will not be sustainable and will simply waste resources without yielding any welfare benefits. The success of the network diversity model thus depends on assumptions about the distribution of preferences.²³⁸

Monopolistic competition further assumes that consumer preferences are symmetric with respect to each of the competing group. The primary effect of this assumption is to place each work in equal competition with all other products in the group rather than in localized competition with a smaller subset of near neighbors. It is quite possible that this assumption is false. If so, a new entrant will not steal business uniformly from all incumbents. Instead, the entrant will disproportionately take sales from some incumbents and not others. In addition, it is quite possible that consumer preferences may not be uniformly distributed across all product possibilities. Both of these factors may have the effect of creating localized monopolies similar to the one enjoyed by a lone gas station along a desert highway even in the absence of entry barriers when the overall volume of traffic is not sufficient to support a second station.²³⁹

The Chamberlinian result thus depends on a number of empirical assumptions about the structure of demand. It cannot be determined a priori whether the market will reach equilibrium with multiple players

237. See Steven C. Salop, *Monopolistic Competition with Outside Goods*, 10 BELL J. ECON. 141, 145–48 (1979).

238. See Yoo, *supra* note 51, at 243–46 & n.100.

239. See *id.* at 237, 242, 245–46, 278–79.

or, if so, whether that equilibrium will be superior to the network neutrality equilibrium in terms of economic welfare.

3. The Multidimensionality of Welfare Under Network Diversity

Monopolistically competitive markets reach equilibrium where the demand curve and the average cost curve are tangent to one another. Because the demand curve is downward sloping, this will necessarily be a point where the average cost curve is downward sloping as well. This also implies that equilibrium will occur at a point where the average cost curve lies above the marginal cost curve.²⁴⁰ This dictates that any sustainable price will necessarily exceed marginal cost and thus that some degree of deadweight loss is endemic under monopolistic competition. The fact that monopolistically competitive markets reach equilibrium at volumes that do not minimize average cost led Chamberlin to the conclusion about the pervasiveness of market failure.²⁴¹

Later theorists pointed out that such conclusions failed to reflect the full dimensions of the welfare calculus under monopolistic competition. When products are differentiated, they can contribute to welfare not only by offering better prices, but also by incorporating attributes that better satisfy particular customers' ideal preferences. The multidimensionality of competition implies that social welfare cannot be completely determined through simple price-cost comparisons. It is possible, but not definite, that the reduction in welfare associated with the deadweight losses might be offset by the increase in welfare made possible by greater product diversity.²⁴²

4. The Possibility of Excess Entry

Since the earliest days of natural monopoly theory, commentators have suggested that entry by more than one network provider might be excessive.²⁴³ The argument is that even if two companies made the fixed cost investment needed to enter, only one would survive. The result would force society to bear the fixed costs of building two networks even though it was clear from the outset that only one set of

240. See 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, 668 n.14 (2003) (reproducing a well-known and simple mathematical proof of this proposition).

241. See CHAMBERLIN, *supra* note 100, at 104–09.

242. See Yoo, *supra* note 51, at 252–53.

243. See 1 JOHN STUART MILL, PRINCIPLES OF POLITICAL ECONOMY 132–54 (London, John W. Parker 1848) (observing that allowing monopolists to produce and distribute water and gas in London would reduce the costs of production by obviating the need for duplicative machinery, works, and pipes). For a more modern statement of the wasteful duplication thesis, see 2 KAHN, *supra* note 137, at 121–23.

wires would ever be used. The network diversity approach reveals why duplication of fixed costs might yield social benefits. It raises the possibility that the higher costs incurred by each producer might be offset by the welfare benefits resulting from enabling consumers to consume network services that better satisfy their preferences.

That said, it is not necessarily given that the multiple entry associated with network diversity is always welfare enhancing. In some cases, the sales generated by a new entrant may consist of incremental customers who were not previously being served by one of the incumbents (an effect sometimes called “demand creation”). When a new network’s customers are entirely the result of demand creation, its entry is certain to be welfare enhancing. In other cases, its sales may consist in whole or in part of customers who were previously being served by one of the incumbents (an effect sometimes called “demand diversion”), in which case the welfare calculus is more complex. Even though the new entrant must incur fixed costs in order to enter, those costs are potentially offset by the welfare benefits associated with stimulating incremental sales and allowing customers who were previously served by the incumbent network to access consumer services that better fit their preferences. Few such benefits would exist if the products are too similar, and it is far more likely that such duplicative entry would be socially wasteful.²⁴⁴

The net impact of entry under network diversity is thus quite complex, depending not only on the extent to which the entrant’s revenue represents demand creation or demand diversion, but also on the magnitude of the welfare gains that result from providing network services that better satisfy the customers cannibalized from the incumbent network. Again, this is not a question that can be answered a priori.

5. The Transaction Costs of Network Diversity

Adoption of network diversity necessarily requires the incurrence of some degree of transaction costs. Some would be temporary, such as the costs incurred when network owners voluntarily retool their networks to accommodate different standards. Other transaction costs would be more enduring. For example, if multiple standards were to exist, end users and providers of applications and content would have to expend significant resources to verify compatibility with respect to different networks. It is theoretically possible that the resulting friction might be so severe that it more than offsets the benefits of shifting to another standard. When that is the case, society would be better off if network diversity were not permitted.

244. See Yoo, *supra* note 51, at 260–64.

At the same time, mandating network neutrality would involve transaction costs as well. The costs of adopting, disseminating, maintaining, and updating a standardized interface are considerable.²⁴⁵ Furthermore, imposing and updating any such interface gives rise to an inevitable regulatory delay that can be debilitating when the underlying technology is changing rapidly.²⁴⁶ Indeed, the FCC has recognized that network neutrality can actually harm consumers by forcing network owners either to delay deployment of new technologies while reengineering their networks to comply with interconnection and interoperability requirements or, in the event that they are able to do so economically, by forcing them to forego deploying the full increase in capability made possible by a particular innovation.²⁴⁷ Resolution of the network neutrality debate thus depends on a complete analysis of the transaction costs on both sides of the equation.

6. Long-Run Dynamic Efficiency Gains Versus Short-Run Static Efficiency Losses

Entry by providers of differentiated networks will not be instantaneous. Thus, even if monopolistic competition is likely to yield dynamic efficiency benefits over the long-run, the inevitable delays in entry may force the market to incur short-run static efficiency losses. Some scholars have categorically asserted that because the dynamic efficiency gains will be compounded over time, they will invariably exceed the short-run static efficiency losses.²⁴⁸ This approach seems too simplistic. Whether the dynamic efficiency gains will dominate the static efficiency losses depends on a myriad of factors, including the magnitude of the gains and losses, the speed of entry, and the appropriate discount rate. Determining the welfare implications of network diversity requires a multifaceted inquiry that is not susceptible to a simple policy inference.

C. Institutional Considerations

In addition to the theoretical economic considerations identified above, institutional considerations should also inform the choice between network diversity and network neutrality. These considerations raise doubts as to the advisability of having the FCC impose network neutrality.

246. See Wireline Broadband Order, *supra* note 13, at 14,890–91 ¶ 71.

247. See *id.* at 14,887–90 ¶¶ 65–70.

248. See WALTER G. BOLTER ET AL., TELECOMMUNICATIONS POLICY FOR THE 1980'S, at 360 (1984); Janusz Ordovery & William Baumol, *Antitrust Policy and High-Technology Industries*, OXFORD REV. ECON. POL'Y, Winter 1988, at 13, 32.

1. Fact Specificity

As noted above, the welfare calculus depends on a wide variety of contextual factors. The complexity of the welfare calculus renders it difficult to determine a priori whether universal adoption of the network diversity principle would promote or harm economic welfare. The problem is that regulation tends to take the form of ex ante rules,²⁴⁹ and such rules tend to be ill-suited to factually nuanced determinations. Regulation is an inherently blunt instrument that acts in a categorical, non-fact-specific manner. It is less well suited to resolving issues that demand detailed inquiry into the circumstances of individual cases.

Some commentators attempt to avoid the clumsiness of ex ante regulation by urging the adoption of a general regulatory standard of nondiscriminatory access that leaves the details of the regulatory regime to be developed after the fact through case-by-case adjudication on an ex post basis.²⁵⁰ Although better able than ex ante regulation to take into account the context-specific considerations I have described above, such an approach threatens to stifle network diversity nonetheless. Even proponents of network diversity concede that deviations from interconnectivity and standardization are sometimes justified and that it can be difficult, if not impossible, to determine whether a particular deviation is justified.²⁵¹ When that is the case, the usual policy response is to allow experimentation with different business practices and to place on those who would oppose such practices the burden to demonstrate some adverse effect on competition.

Erecting a presumption against discriminatory access and forcing owners to justify any deviations would have the effect of foreclosing practices that are ambiguous or for which evidence of actual market performance is lacking. This would have the unfortunate effect of preventing the development of network diversity even if entry by diversified network providers would be welfare enhancing. Given the difficulties in forecasting the impact of technological change and in predicting which business models will ultimately prove successful, the humility inherent in a more restrained approach provides critical breathing room for the experimentation upon which the innovative process depends. Although the difference between the network diversity approach and the more modest, ex post versions of network neutrality at first glance may appear to be nothing more than a difference in emphasis or a shift in the burden of proof, allowing practices to go forward until they are proven harmful has the important consequence

249. See *supra* note 6 and accompanying text.

250. See *supra* note 7 and accompanying text.

251. See *supra* notes 27, 30 and accompanying text.

of permitting experimentation with ambiguous practices that would be foreclosed under a presumption of nondiscrimination.

Even if competition were not sufficiently robust to prevent network owners from undertaking anticompetitive conduct, it is extremely unlikely that the type of blanket approach to nondiscrimination favored by network neutrality proponents would represent the proper policy response. Should a local telephone company attempt to protect its core business by blocking its DSL customers from using VoIP or a cable modem provider attempt to protect its core cable television business by prohibiting its cable modem customers from accessing streaming video, such problems would justify a targeted response limited to a particular application, as the FCC mandated in *Madison River*.²⁵² Under no circumstances would such concerns support the kind of blanket restrictions envisioned under the strongest versions of network neutrality.

2. Technological Dynamism

Regulation poses particularly grave risks in industries that are undergoing rapid technological change. When that is the case, even the most conscientious regulator will find it hard to keep up with the pace of change. Worse yet, whether imposed as an ex ante rule or as a presumption against discriminatory access with the specific contours of the regulatory requirement developed ex post, network neutrality would have the effect of foreclosing practices that are ambiguous or about which there is too little information. This is why scholars from across the political spectrum have warned of the dangers of regulatory lag in industries that are technologically dynamic.²⁵³ The task confronting policymakers is especially difficult because they would have to intervene at a fairly early stage in the technology's development to make any difference, since governmental intervention after the market has settled on the optimal technology would serve little purpose.²⁵⁴

3. Bureaucratic Considerations

Agencies have long been criticized as imperfect assimilators of the public interest. Regulatory decisions are all too often shaped by political goals and public interest pressure in ways that are not always

252. See *Madison River Commc'ns, LLC*, Order, 20 F.C.C.R. 4295 (2005).

253. See, e.g., STEPHEN BREYER, REGULATION AND ITS REFORM 286–87 (1982); 2 KAHN, *supra* note 137, at 127; John C. Panzar & Robert D. Willig, *Free Entry and the Sustainability of Natural Monopoly*, 8 BELL J. ECON. 1, 21 (1977); Richard A. Posner, *Natural Monopoly and Its Regulation*, 21 STAN. L. REV. 548, 636 (1969).

254. See *supra* note 55 and accompanying text.

consistent with good policy.²⁵⁵ Policymakers may also find it tempting to undervalue the future benefits associated with the entry of alternative network capacity, which will no doubt seem uncertain and contingent, and to overvalue the immediate and concrete benefits of providing consumers with more choices in the here and now. Indeed, the FCC has allowed short-term considerations to override longer-term benefits in the past.²⁵⁶ Public choice theory strongly suggests that the bias in favor of the former over the latter is no accident.

Administrative agencies are also often thought to exhibit a tendency to enlarge their jurisdiction even when the proper response would be to contract it.²⁵⁷ Consider, for example, the emergence of a technological alternative to a network that had previously been a natural monopoly. The proper policy response would be deregulation of the previously regulated industry, since the emergence of competition would vitiate the justification for regulation in the first place. An agency, however, has the incentive to do precisely the opposite. Rather than deregulate the old industry, all too often agencies respond by asserting jurisdiction over the new industry and extending the same restrictive legacy regulations applied to the old industry to the new industry. This is exactly what happened in the Interstate Commerce Commission (“ICC”) when the emergence of the trucking industry eliminated whatever natural monopoly power was enjoyed by the railroad. Rather than deregulating railroads, the ICC extended the regulatory regime governing railroads to the new competitor. A similar pattern emerged when cable television circumvented the supposed scarcity of the electromagnetic spectrum that justified intrusive regulation of broadcasting.²⁵⁸

The reaction is understandable. Agency personnel have every reason to be reluctant to eliminate the justification for their continued employment. In addition, they no doubt grow to identify with the regulatory regimes that they administer and are likely to resent and to try to control anything that disrupts them. But the emergence of competition in a previously uncompetitive industry is precisely the type of disruption that should be embraced. Giving regulatory authorities gatekeeper authority over network architecture necessarily puts network policy in the crosshairs of this tension.

255. See BRUCE M. OWEN & RON BRAEUTIGAM, *THE REGULATION GAME* (1978); 2 KAHN, *supra* note 137, at 325–26.

256. See Yoo, *supra* note 208, at 272–75.

257. See WILLIAM A. NISKANEN, JR., *BUREAUCRACY AND REPRESENTATIVE GOVERNMENT* (1971).

258. For my critique of the broadcast model of regulation, see Yoo, *supra* note 208.

4. Antitrust as a Possible Alternative

Antitrust-style principles might have implications for the locus of enforcement: might courts enforcing antitrust law represent the proper forum for addressing these problems?²⁵⁹ Antitrust is well designed for the fact-specific, case-by-case determinations that my analysis suggests is appropriate. Because federal judges have life tenure and because the courts have general rather than industry-specific jurisdiction, courts are also less susceptible to capture and bureaucratic empire building than agencies. The Supreme Court also recently made clear that interconnection disputes are not immune from antitrust scrutiny.²⁶⁰

Despite the confidence that some have voiced in antitrust courts' ability to address issues surrounding the new economy, scholars have long been critical of antitrust courts' ability to administer access to bottleneck facilities.²⁶¹ Others have warned that courts lack the institutional capability and expertise to make the kind of determinations needed to implement the regime of interconnection, nondiscrimination, rate regulation, and standardization implicit in network neutrality.²⁶²

The Supreme Court recently agreed, explicitly acknowledging that, given the technical nature and complexity of interconnection disputes, "[a]n antitrust court is unlikely to be an effective day-to-day enforcer of these detailed sharing obligations."²⁶³ The Court thus held

259. See HUBER ET AL., *supra* note 22, at 401–04; Richard A. Posner, *Antitrust in the New Economy*, 68 ANTITRUST L.J. 925, 925 (2001); Howard A. Shelanski, *From Sector-Specific Regulation to Antitrust Law for U.S. Telecommunications: The Prospects for Transition*, 26 TELECOMM. POL'Y 335 (2002).

260. See *Verizon Commc'ns, Inc. v. Law Office of Curtis V. Trinko, L.L.P.*, 540 U.S. 398, 415 (2004).

261. See 3A AREEDA & HOVENKAMP, *supra* note 32, ¶ 774e, at 223–27; RICHARD POSNER & FRANK EASTERBROOK, ANTITRUST 761–63 (2d ed. 1981); Phillip E. Areeda, *Essential Facilities: An Epithet in Need of Limiting Principles*, 58 ANTITRUST L.J. 841, 853 (1989); Fred S. McChesney, *Be True to Your School: Chicago's Contradictory Views of Antitrust and Regulation*, in THE CAUSES AND CONSEQUENCES OF ANTITRUST: THE PUBLIC-CHOICE PERSPECTIVE 323, 329 (Fred S. McChesney & William F. Shughart II eds., 1995); Richard A. Posner, *A Statistical Study of Antitrust Enforcement*, 13 J.L. & Econ. 365 (1970).

262. See Glen O. Robison, *On Refusing to Deal with Rivals*, 87 CORNELL L. REV. 1177, 1215–16 (2002); Jerry A. Hausman & J. Gregory Sidak, *A Consumer-Welfare Approach to the Mandatory Unbundling of Telecommunications Networks*, 109 YALE L.J. 417, 470 (1999); Abbott B. Lipsky, Jr. & J. Gregory Sidak, *Essential Facilities*, 51 STAN. L. REV. 1187, 1195 (1999); Jonathan E. Nuechterlein & Philip J. Weiser, *First Principles for an Effective Rewrite of the Telecommunications Act of 1996*, at 23–39 (AEI-Brookings Joint Center, Working Paper No. 05-03, Mar. 2005), available at <http://ssrn.com/abstract=707124>.

263. *Trinko*, 540 U.S. at 414–15; *accord* Nat'l Cable & Telecomm. Ass'n v. Brand X Internet Servs., 125 S. Ct. 2688, 2712 (2005) (concluding that because access regimes involve "subject matter [that] is technical, complex, and dynamic," the FCC is in a better position to address the proper scope of access regimes than are the courts (quoting Nat'l Cable & Telecomm. Ass'n v. Gulf Power Co., 534 U.S. 327 339 (2002) (alternation in

that the presence of a regulatory access regime supervised by an agency essentially eliminates the justification for a judicial imposition of an access mandate.²⁶⁴ The inclusion of similar language in *Brand X*²⁶⁵ suggests that the same principles apply to broadband as well.²⁶⁶

V. PUTTING IT ALL TOGETHER

Given the complexity of the welfare analysis and the institutional considerations, how should the debate between network diversity and network neutrality be resolved? Interestingly, Lessig acknowledges some of the arguments that I raise²⁶⁷ and even concedes that the final resolution is indeterminate.²⁶⁸ Nonetheless he comes down squarely on the side of network neutrality. I review the justifications Lessig offers for preferring network neutrality before offering my own conclusions.

First, Lessig suggests that although network management is a real problem, congestion problems can be solved by increasing bandwidth rather than by giving network owners more control over network flows. Although Lessig recognizes that this vision of a world with “infinite” bandwidth contradicts the basic economic notion that all commodities are inherently scarce, 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.”²⁶⁹

As noted earlier,²⁷⁰ there is no compelling reason to believe that bandwidth will necessarily increase faster than demand, especially in light of the number of bandwidth-intensive applications waiting in the wings and the fact that the number of potential connections goes up

original) (internal quotations omitted); *AT&T v. City of Portland*, 216 F.3d 871, 876 (9th Cir. 1999) (noting that courts are ill suited to imposing and supervising access requirements on the Internet).

264. See *Trinko*, 540 U.S. at 412.

265. See *Brand X*, 125 S. Ct. at 2712.

266. This conclusion is not above question. The Supreme Court has held that for allegedly anticompetitive conduct to fall outside the scope of antitrust enforcement, regulators must be exercising active supervision. See *FTC v. Tico Title Ins. Co.*, 504 U.S. 621, 633–34 (1992); *Cal. Retail Liquor Dealers Ass’n v. Midcal Aluminum Inc.*, 445 U.S. 97, 105–06 (1980). The mere possibility that the FCC might exercise its Title I ancillary jurisdiction to regulate broadband is arguably not sufficiently active supervision to shield last-mile providers from antitrust liability. That said, such a conclusion would seem largely inconsistent with the reasoning of *Brand X*.

267. See LESSIG, *supra* note 4, at 46–48, 167–75.

268. See *id.* at 47 (recognizing that “[w]e don’t know enough yet to know” whether or not implementing “a pricing system for allocating bandwidth” would do more harm than good); *id.* at 174 (conceding that his argument “cannot begin to resolve” whether proprietary control of cable modem systems is necessary to stimulate investment in network infrastructure); *id.* at 175 (admitting that in determining whether to give network owners power over the network, “we have no good way to make sure that the gains outweigh the losses”).

269. *Id.* at 47.

270. See *supra* notes 67–70 and accompanying text.

exponentially with the number of computers added to the system. Relying on capacity expansion to solve the problems related to congestion is made all the more problematic by the fact that forecasting demand is inherently uncertain and capacity cannot be expanded instantaneously. Even when capacity expansion is feasible in the long run, any underestimation of projected demand will necessarily create short-run scarcity that cannot be addressed through increased bandwidth. The inherent uncertainty about future changes in demand renders it essentially impossible for network owners to rely on the expansion of capacity as the sole solution to the problems of network management. In addition, adding bandwidth and using network management techniques that reduce the transparency of the network represent alternative ways to solve the problems of congestion. Unless one assumes that the cost of capacity will necessarily decline faster than the growth in the demand for capacity, the relative attractiveness of each alternative cannot be determined a priori. Lastly, the nonstandardization and exclusivity inherent in network diversity are often designed to improve security or increase functionality wholly apart from the desire to reduce congestion. When that is the case, the possibility of adding bandwidth is not responsive to the problem. It would thus seem to be a mistake to precommit to one approach over the other.

Second, Lessig also suggests that network neutrality might be justified by the growing level of concentration in network ownership.²⁷¹ Indeed, Lessig is quite skeptical about the prospects that intermodal competition from alternative platforms like DSL can provide sufficient discipline for cable modem providers.²⁷² This conclusion rests in uneasy tension with Lessig's faith in unlimited bandwidth as a solution to the problems of network management.²⁷³ Even more importantly, it is far from clear that concentration represents the threat that Lessig suggests once the precise markets that network neutrality is designed to protect have been identified.²⁷⁴ The concentration is most acute in the market in which last-mile broadband providers bargain with end users. As noted earlier, preventing owners of last-mile tech-

271. See *id.* at 173–74. Lessig is quite candid about his bias against incumbent network owners:

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.

Id. at 176.

272. See *id.* at 161–62.

273. See *supra* note 269 and accompanying text.

274. The following discussion is based on Yoo, *supra* note 51, at 253–54; and Yoo, *supra* note 36, at 51–52.

nologies from entering into exclusivity arrangements and forcing them to employ nonproprietary protocols that permit complete interoperability would not affect this market one iota. The economic relationship between last-mile providers and end users is largely determined by the fact that most end users currently only have two options in terms of last-mile providers: the cable company and the telephone company. Mandated network neutrality would not change the makeup of this market.²⁷⁵

Imposing network neutrality would have a significant impact on the upstream market in which last-mile providers bargain with providers of applications and content. Major web-based providers, such as Amazon.com or eBay, are focused more on the total number of customers they are able to reach nationwide than they are on their ability to reach customers located in any specific metropolitan area. The fact that they may be unable to reach certain customers is of no greater concern, however, than the fact that manufacturers of particular brands of cars, shoes, or other conventional goods are not always able to gain distribution in all parts of the country. Manufacturers who are cut off from consumers served by a particular cable or telephone company should not face significant problems so long as they are able to obtain access to a sufficient number of customers located elsewhere.²⁷⁶ The FCC has similarly rejected the notion that the local market power enjoyed early cellular telephone providers posed any threat to the cellular telephone equipment market, since any one cellular provider represented a tiny fraction of the national equipment market.²⁷⁷ The proper question is thus not whether the broadband transport provider wields market power vis-à-vis broadband users in any particular city, but rather whether that provider has market power in the national market for obtaining broadband content. In short, it is national reach, not local reach, that matters.

When the relevant market is properly defined, it becomes clear that this market is too unconcentrated for vertical integration to pose a threat to competition. As noted earlier, the concentration levels in the broadband industry fall far below the thresholds thought to justify anticompetitive concern.²⁷⁸ Indeed, Lessig's concerns about concentration seem better suited to the network of the past than the network

275. See *supra* Part II.B.

276. See *Time Warner Entm't Co. v. FCC*, 240 F.3d 1126, 1131–32 (D.C. Cir. 2001) (relying on the FCC's conclusion that a cable television programmer need only reach 18.56% of the country to be economically viable) (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. 19,098, 19,114–18 ¶¶ 40–50, (1999)).

277. See *Bundling of Cellular Customer Premises Equipment and Cellular Service*, Report and Order, 7 F.C.C.R. 4028, 4029–30 ¶ 13 (1992).

278. See *supra* notes 231–233 and accompanying text.

of today.²⁷⁹ In the context of broadband, they amount to the claim that a decision by the largest broadband provider to limit access to its network poses a real threat to competition in applications and content. Although such dangers might have been credible in the days in which AT&T dominated the last mile, they are considerably less compelling during an era in which the largest player controls only twenty-one percent of the national market.²⁸⁰ Absent collusion with other providers, the interconnection decisions of even the largest player are not in a position to stifle the competitiveness of the applications and content layers.

Indeed, the ambiguity inherent in the issues surrounding concentration is underscored by comparing Lessig's concern, which is that portions of the network will be too eager to deviate from the established standard,²⁸¹ with the concern associated more frequently with network economic effects, which is that users will be too reluctant to deviate from the established standard, thereby allowing an obsolete technology to become locked in.²⁸² When the latter is the primary concern, the presence of large players is a potential boon, rather than a bane. Because larger players are able to internalize a greater share of the benefits created by their own technology choices, they are logical candidates to mitigate the lock-in effects caused by network externalities by becoming the sponsor of a new technology.²⁸³ In other words, to the extent that network economic effects create excess inertia rather than excess momentum, attempts to deviate from the existing standard should be embraced, rather than rebuffed.

In the end, Lessig's primary concern is that network diversity would hurt the environment for innovation, which he believes stems from the existence of an "innovation commons" in which applications and content providers can have access to the entire universe of potential customers without having to obtain permission from any gatekeeper. Network owners, Lessig argues, are too eager to fracture the interoperability of the Internet because they fail to internalize the benefits from innovation associated with network neutrality.²⁸⁴ As noted earlier, a close reading of the economic literature reveals that the impact of network economic effects on innovation is ambiguous and that such concerns appear to be misplaced in the context of a

279. See LESSIG, *supra* note 4, at 26–34; Lemley & Lessig, *supra* note 6, at 933–35, 937–38.

280. Yoo, *supra* note 36, at 52–53 & fig. 4.

281. See LESSIG, *supra* note 4, at 48, 168, 171, 176.

282. See Farrell & Saloner, *supra* note 117, at 941–43; Katz & Shapiro, *supra* note 53, at 108; *see also supra* note 118.

283. See Yoo, *supra* note 33, at 281–82; Spulber & Yoo, *supra* note 69, at 929.

284. See LESSIG, *supra* note 6, at 168, 171, 173, 175. This is a point that is more important to him than even the end-to-end argument. Indeed, Lessig acknowledges that even if discrimination is imposed by end users in a manner consistent with end-to-end, he would still be concerned. *See id.* at 171, 173.

physical network that can be owned and in an industry undergoing exponential growth.²⁸⁵ Indeed, the use of the term “commons” creates some degree of irony, since the accepted solution to the tragedy of the commons is the creation of well-defined property rights,²⁸⁶ which would be more consistent with network diversity than network neutrality. More recent scholarship on the anticommons has underscored the fact that property rights can be too small as well as too large.²⁸⁷ The presence of innovation externalities more properly suggests the existence of an optimal size of a property right rather than a blanket presumption in favor of an innovation commons.

As such, little insight is gained by trying to elevate the preservation of the innovation commons into a rhetorical trump. The most plausible justification resembles a version of the “precautionary principle,” which argues that certain harms are so potentially catastrophic that regulators should guard against them even when it is uncertain whether they will ever come into fruition. Such an argument would claim that the potential harm to innovation associated with deviating from the transparency that now characterizes the Internet is so great as to justify imposing network neutrality prophylactically.²⁸⁸ The problem with this argument is that the precautionary principle is incoherent as an a priori commitment. Because there are risks in adhering to as well as deviating from the status quo, taken to its logical conclusion, it forbids all courses of action, since regulation can impose costs and foreclose beneficial outcomes just as surely as nonregulation.²⁸⁹

As a result, theorists have attempted to render the precautionary principle coherent by limiting application to circumstances in which the adverse consequences are truly *catastrophic* and in which deviations from the status quo are *irreversible*.²⁹⁰ Neither precondition would appear to be satisfied in the case of network neutrality. As the experience in reconfiguring local telephone switches for independent long distance providers demonstrates, allowing networks to become noninteroperable is unlikely to prove irreversible.²⁹¹ Furthermore, 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.

285. See *supra* Part III.A.2.b.

286. See Garrett Hardin, *The Tragedy of the Commons*, 162 SCIENCE 1243 (1968).

287. See, e.g., Michael A. Heller, *The Tragedy of the Anticommons: Property in the Transition from Marx to Markets*, 111 HARV. L. REV. 621 (1998).

288. See *supra* note 57 and accompanying text.

289. See CASS R. SUNSTEIN, LAWS OF FEAR: BEYOND THE PRECAUTIONARY PRINCIPLE 26–34 (2005).

290. See *id.* at 109–17.

291. See *supra* note 147 and accompanying text.

Ultimately, Lessig fails to provide a determinative resolution to the question. Likewise, I acknowledge that in the absence of a clearer picture of the contextual details, my own resolution is necessarily no more definitive. Short of swapping *ipse dixit* claims about better policy, how should decisionmakers resolve disputes in the face of uncertainty?

Fortunately, competition policy offers a potential way out of this analytical limbo. It suggests that when policymakers cannot determine whether a new institutional form would help or hinder competition, the proper response is nonregulation until a practice is shown to effect a concrete harm to competition. Forbearance from either forbidding or mandating any particular solution leaves room for the experimentation upon which markets depend.²⁹²

Nonintervention is particularly appropriate where, as here, regulators will struggle to distinguish anticompetitive from procompetitive behavior. As network neutrality advocates candidly acknowledge, deviations from network neutrality are often the result of benign attempts to meet the increasingly varied demands that end users are placing on the network.²⁹³

Many of the other considerations I have raised militate in favor of network diversity. As a result, placing the burden of proof on those who would regulate represents the proper way for regulators to show technological humility and accords with our notions of liberty and the classic vision of the proper relationship between the individual and the state.²⁹⁴ It also allows decisionmaking about technology adoption to be decentralized. Finally, it avoids the risks of locking the existing technological boundaries between firms into place in industries undergoing dynamic technological change. In the most extreme case, regulation can itself become the source of natural monopoly, in which case intervention would have the perverse effect of reinforcing the market failure that regulation was designed to redress.

My intuitions are also informed by the practical problems associated with mandating interconnection, nondiscrimination, rate regulation, and standardization. Experience with cable leased access and UNE access has shown how difficult such regimes are to administer when interfaces are complex and the underlying technology is changing rapidly.²⁹⁵ Viewing the history of FCC regulation through the cautionary lens of public choice theory provides an additional reason to disfavor regulatory intervention. As noted earlier, it is quite possible that regulators will give preference to the concerns of static efficiency,

292. See *supra* notes 25–26 and accompanying text.

293. See LESSIG, *supra* note 6, at 46–48, 167–75; Cooper, *supra* note 27, at 1050–52; Lemley & Lessig, *supra* note 6, at 939.

294. See Yoo, *supra* note 208, at 317–18, 331–34.

295. See *supra* Part III.A.3.a.

which have concrete impact in the here and now, over the concerns of dynamic efficiency, which involve contingent benefits to parties who often have yet to be identified.²⁹⁶ The FCC's history in this regard is not promising. Even James Landis, the leading proponent of expertise-driven public interest regulation and one of the key architects of the New Deal, acknowledged that the FCC has been a disaster.²⁹⁷

This bias has unfortunate implications for the permanence of regulatory intervention. Compelled sharing of the existing network by mandating interconnection, nondiscrimination, rate regulation, and standardization implicitly presumes that regulatory supervision will continue indefinitely. In short, it represents a surrender to the monopoly that is only justifiable if entry by alternative network capacity is impossible. In contrast, solutions that focus on dynamic efficiency have embedded within them built-in exit strategies. Once a sufficient number of broadband network platforms exist, regulatory intervention will no longer be necessary. Fostering entry and then deregulating once it has occurred seems to me a better ambition for regulatory policy than committing to the ongoing supervision of both the price and nonprice terms of business relationships that network neutrality implies.

Ultimately, network diversity does not depend upon a definitive resolution of the best substantive outcome. It adopts a humbler stance towards policymakers' ability to determine the competitive impact of particular practices and to anticipate technological change. Network diversity is not simply the mirror image of network neutrality in that it does not call for the imposition of proprietary protocols. Instead, it adopts a more modest position that permits the experimentation upon which economic progress depends to proceed until the practice's actual impact can be determined.

VI. CONCLUSION

There can be no question that network neutrality holds considerable allure. The vision of a world in which every end user can obtain access to every available application and piece of information is quite compelling. It is thus quite understandable that so many commentators have endorsed network neutrality as a concept. The economic advantages of interoperability are considerable, and I would expect interoperability to play a central role in the business plans of the vast majority of Internet-based businesses.

The question that must be asked is not whether network neutrality yields benefits, but rather whether the threat posed by a single net-

296. See *supra* note 257 and accompanying text.

297. JAMES M. LANDIS, REPORT ON REGULATORY AGENCIES TO THE PRESIDENT-ELECT 53-54 (1960).

work owner deviating from network neutrality is so great that regulators should prohibit it from exploring whether network diversity might make more sense. My exploration of the arguments underlying network neutrality provides substantial reason for caution. Standardization can reduce welfare both by reducing diversity and by biasing the market against certain types of applications. It can have the perverse effect of reinforcing the sources of market failure used to justify regulatory intervention in the first place. It can further entrench monopoly power by dampening incentives to invest in alternative network neutrality.

Instead, my analysis suggests that public policy might be better served if policymakers were instead to embrace network diversity. Doing so would permit end users to enjoy the benefits of product variety. Network diversity also has the potential to mitigate the supply-side and demand-side scale economies that concentrate telecommunications markets and to make it easier for multiple networks to coexist. The more restrained approach inherent in network diversity is also more consistent with the current understanding of the institutional capabilities of courts and agencies. It also accommodates technological dynamism and humility by providing maximum room for experimentation and development. This is not to say that policymakers should reject network neutrality once and for all. What is called for is a sense of balance and optimality that can adjust with the circumstances. But in the face of technological uncertainty, the more appropriate and humble approach would appear to favor forbearance from mandating any particular architecture.