THE NETWORK UTILITY

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Barring unforeseen obstacles, an on-line interactive computer service, provided commercially by an information utility, may be as commonplace by 2000 A.D. as telephone service is today.

—Martin Greenberger[1]

ABSTRACT

The rise of cloud computing, which involves remote network-based applications and storage, is shifting the balance in the data world from distributed edge systems to centralized networked platforms. This emerging paradigm bears a striking resemblance to the computer utility, a widespread vision among technologists in the 1960s. The way the Federal Communications Commission (FCC) grappled with the convergence of computing and communications in that period shaped the trajectory of both industries. Technology and market structure have changed dramatically, but the basic regulatory issues remain: networked computers need access to communications utilities, and networked computing platforms can themselves function as public utilities. The FCC must return to and update its original convergence agenda. As the technical predictions of 1960s visionaries become real, the policy considerations they raised must also be taken seriously.

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1. Martin Greenberger, *The Computers of Tomorrow*, ATLANTIC MONTHLY, May 1964, at 63, 67.

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INTRODUCTION

Midway through the twentieth century, two great technologies, the telecommunications network and the computer, embarked on a collision course. Experts in the 1960s speculated about a "computer utility" that would profoundly influence both business and society. Not long after, the FCC began to grapple with this convergence of computing and communications. The FCC's actions in the late 1960s and early 1970s shaped the future of both industries and ultimately set in motion the current debate about Internet regulation. Both the

regulator and the parties arguing before it understood in the 1960s that networked data processing raised two kinds of issues: computers as users of communications and computers as a form of communication. The FCC chose to quarantine data processing from regulated telecommunications, rather than tackle the public policy considerations of the nascent computer utility directly. The spectacular success of the information technology sector over the subsequent forty years shows the wisdom of that decision.[2]

The twenty-first century is an era of networks. There are now two billion Internet users and five billion mobile phone subscribers—a degree of connectivity unprecedented in human history.[3] Facebook has over five hundred million members, many of whom spend hours every day on the social networking site.[4] Google indexes one trillion documents and, a decade after its founding, provides a stunning array of services ranging from satellite and photographic images of much of the world to a video library that adds thirty-five hours of content every minute.[5] Children grow up texting and playing networked games, and businesses depend on email, databases, and other digital

2. *See* JONATHAN E. NUECHTERLEIN & PHILIP J. WEISER, DIGITAL CROSSROADS: AMERICAN TELECOMMUNICATIONS POLICY IN THE INTERNET AGE 149–55 (2005) ("Until very recently, all telecommunications services were joined hip to hip with the particular facilities on which they were provided. . . . The Internet, however, upsets this established order."); Barbara Esbin, *Internet over Cable: Defining the Future in Terms of the Past*, 7 COMMLAW CONSPECTUS 37, 57–58 (1999) ("The Commission initiated a series of proceedings in 1966, known as the '*Computer Inquiry*' proceedings, which, at the outset, attempted to separate the regulatory treatment of computers that were involved in the means of communication from the treatment of computers which perform data processing services."); Jason Oxman, *The FCC and the Unregulation of the Internet* 4–6 (FCC Office of Plans & Policy, Working Paper No. 31, 1999), *available at* http://www.fcc.gov/Bureaus/OPP/working_papers/oppwp31.pdf ("The Internet has created the information revolution, and it is on its way to becoming the single most important communications tool in existence.").

3. *See* Lance Whitney, *Cell Phone Subscriptions to Hit 5 Billion Globally*, CNET (Feb. 16, 2010, 8:28 PM PST), http://reviews.cnet.com/8301-13970_7-10454065-78.html (citing International Telecommunications Union estimates that global mobile subscribers will exceed five billion sometime in 2010); *The Internet Big Picture: World Internet Users and Population Stats*, INTERNET WORLD STATS, http://www.internetworldstats.com/stats.htm (last visited Apr. 12, 2011) (showing approximately two billion global Internet users).

4. *See Statistics*, FACEBOOK, http://www.facebook.com/press/info.php?statistics (last visited Apr. 12, 2011) (explaining that Facebook has more than five hundred million active users and noting that people spend over seven hundred billion minutes per month on the site).

5. *See* Jesse Alpert & Nissan Haja, *We Knew the Web Was Big . . .* , THE OFFICIAL GOOGLE BLOG (July 25, 2008, 10:12 AM), http://googleblog.blogspot.com/2008/07/we-knew-web-was-big.html (announcing one trillion links in the Google search index); Don Reisinger, *YouTube: 35 Hours of Video Uploaded Every Minute*, CNET (Nov. 11, 2010, 8:39 AM PST), http://news.cnet.com/8301-13506_3-20022481-17.html (noting that YouTube users upload approximately thirty-five hours of video to the site every minute).

tools. Burgeoning corporate data repositories and massive data centers parallel the vast stores of personal data collected by governments. And with the rise of wireless broadband connections, mobile devices, and sensors, no moment or place is untouched by the network's tentacles.[6]

The time has come to reexamine the FCC's early decisions on the convergence of computing and communications. Digitization and consolidation have erased old boundaries. The FCC's contentious decade-long effort to articulate regulatory dividing lines for broadband Internet access is moving toward closure.[7] Meanwhile, the rise of remote network-based applications and storage, or "cloud computing," is shifting the balance in the data world from distributed edge systems to centralized networked platforms.[8] Something very much like the old computer utility vision is coming back into focus. Technology and industry structure have changed dramatically, but the basic regulatory issues remain: networked computers need access to communications utilities, and networked computers can themselves function as utilities. Through many twists and turns, the FCC's early decision to tackle only the first of these concerns has morphed into a posture of skepticism toward both.[9] The FCC must return to and update its original convergence agenda. As the technical predictions of 1960s visionaries become real, the policy considerations they raised must also be taken seriously.

How government and society choose to deal with pervasive networks will go a long way toward shaping the political economy of the coming decades. Previously, the relevant public policy debate was largely focused on network neutrality rules for broadband Internet access providers.[10] "Network neutrality" is the notion that network

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6. *See* Kevin Werbach, *Sensors and Sensibilities*, 28 CARDOZO L. REV. 2321, 2321 (2007) ("The world is different today. Technology has dramatically broadened the scope and accuracy of information about individuals and their actions.").

7. *See* Jonathan Weinberg, *The Internet and "Telecommunications Services," Universal Service Mechanisms, Access Charges, and Other Flotsam of the Regulatory System*, 16 YALE. J. ON REG. 211, 212 (1999) (discussing the difficulty of classifying the Internet within the traditional communications infrastructure).

8. *See infra* Part III.A.

9. *See generally* Oxman, *supra* note 2 (describing the evolution of the FCC's policy of "unregulation" toward Internet services and network platforms).

10. *See* Rob Frieden, *A Primer on Network Neutrality*, 43 INTERECONOMICS 4, 14–15 (2008) ("[N]etwork neutrality advocates have identified actual instances where ISPs unilaterally have blocked traffic, to reduce subscribers' network demand, handicap a competitor, punish ventures for not agreeing to pay a surcharge and to stifle criticism about the ISP and its parent

operators should not be permitted to discriminate unreasonably in their treatment of unaffiliated content, devices, and services.[11] Since the FCC began in 2002 to classify broadband access as an "information service" outside of traditional telecommunications regulation, open Internet advocates have pushed for the imposition of such nondiscrimination requirements.[12] The network neutrality battle

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corporation."); Tim Wu, *Network Neutrality, Broadband Discrimination*, 2 J. ON TELECOMM. & HIGH TECH. L. 141, 142–44 (2003) (introducing the argument that the "preferable framework for ensuring network neutrality" eschews "structural remedies for a direct scrutiny of broadband discrimination"). *See generally* ANGELE A. GILROY, CONG. RESEARCH SERV., R40616, ACCESS TO BROADBAND NETWORKS: THE NET NEUTRALITY DEBATE (2010) (describing the extensive debate over the network neutrality issue).

11. Then-SBC Chief Executive Officer Edward Whitacre captured the essence of the network neutrality concern when, asked about the future of Internet startups like Google, MSN, and Vonage, he remarked:

> How do you think they're going to get to customers? Through a broadband pipe. Cable companies have them. We have them. Now what they would like to do is use my pipes free, but I ain't going to let them do that because we have spent this capital and we have to have a return on it.

At SBC, It's All About "Scale and Scope," BUS. WK., Nov. 7, 2005, http://www.businessweek.com/magazine/content/05_45/b3958092.htm. For arguments supporting network neutrality, see generally Brett M. Frischmann & Barbara van Schewick, *Network Neutrality and the Economics of an Information Superhighway: A Reply to Professor Yoo*, 47 JURIMETRICS J. 383 (2007); Wu, *supra* note 10; and Barbara van Schewick, *Network Neutrality: What a Non-Discrimination Rule Should Look Like* (Stanford Pub. Law & Legal Theory Series, Working Paper No. 1684677, 2010). For arguments opposing network neutrality, see generally Gerald Faulhaber, *Network Neutrality: The Debate Evolves*, 1 INT'L J. OF COMM. 680 (2007); Christopher S. Yoo, *Network Neutrality and Competition Policy: A Complex Relationship*, *in* NET NEUTRALITY OR NET NEUTERING: SHOULD BROADBAND INTERNET SERVICES BE REGULATED 25 (Thomas M. Lenard & Randolph J. May eds., 2006); and Christopher S. Yoo, *Network Neutrality, Consumers, and Innovation*, 2008 U. CHI. LEGAL F. 179 (2008). The FCC has chosen to use the term "open Internet" when referring to this concept. *See, e.g.*, Preserving the Open Internet, 74 Fed. Reg. 62,638, 62,638 (proposed Nov. 30, 2009) (to be codified at 47 C.F.R. pt. 8) ("In this Notice of Proposed Rulemaking (NPRM), the Commission considers adopting rules to preserve the *open Internet*." (emphasis added)).

12. *See* Inquiry Concerning High-Speed Access to the Internet over Cable and Other Facilities, 17 FCC Rcd. 4798, 4802 (2002) (declaratory ruling and notice of proposed rulemaking) ("[W]e conclude that cable modem service, as it is currently offered, is properly classified as an interstate information service, not as a cable service, and that there is no separate offering of telecommunications service."); Susan P. Crawford, *The Internet and the Project of Communications Law*, 55 UCLA L. REV. 359, 401–02 (2007) ("These network providers claim that they will have no incentive to improve the penetration of broadband services in the United States if they are not given the power to control their networks and sell separately prioritized, guaranteed services. But because the transport layer for Internet access is not competitive, deregulation of that layer is inappropriate." (footnote omitted)); 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, 927 (2001) ("How these technologies [DSL and cable modems] are developed, and the speed with which they are deployed, are critical to the future design of the internet."); Wu, *supra* note 10, at 142 ("The basic principle behind a network antidiscrimination regime is to give *users* the right to use non-harmful network

ratcheted up to a fever pitch in late 2009. It did not cool down even after the FCC adopted an order on December 21, 2010, setting forth network neutrality rules.[13]

The debate demonstrates that both regulators and deregulators suffer from a tendency to fight the last war. Network neutrality, though important, is the final hurrah of the regulatory framework created in the 1996 Telecommunications Act (1996 Act),[14] which was itself a response to the 1984 divestiture of AT&T. All of these efforts involve the shift from regulated monopoly to managed competition within defined industry segments.[15] Meanwhile, outside the regulatory theater, the marketplace has evolved. The telecommunications and mass media industries the FCC historically regulated are giving way to digital information platforms in a common environment—the Internet. The Internet, which began as a messaging and remote access service, is becoming the repository of massive pools of data processing and storage, a trend known as cloud computing.[16] At the same time, it is becoming less a means of connecting personal computers and more a common platform for vast numbers of

attachments or applications, and give innovators the corresponding freedom to supply them. Such a regime avoids some of the costs of structural regulation . . . ."); Letter from Tim Wu, Associate Professor, Univ. of Va. Sch. of Law, and Lawrence Lessig, Professor of Law, Stanford Law Sch., to Marlene H. Dortch, Sec'y, FCC 12–15 (Aug. 22, 2003), *available at* http://fjallfoss.fcc.gov/ecfs/document/view?id=6514683884 ("The [proposed network neutrality] regime adopts the basic principle that broadband operators should have full freedom to 'police what they own' (the local network) while other restrictions should be viewed with suspicion."). For a discussion of the "information service" classification, *see infra* notes 51–52 and accompanying text.

13. *See* Preserving the Open Internet, 25 FCC Rcd. 17,905, 52 Commc'ns Reg. (P & F) 1, 3 (Dec. 21, 2010) (report and order) ("Today the Commission takes an important step to preserve the Internet as an open platform for innovation, investment, job creation, economic growth, competition, and free expression."); Press Release, FCC, FCC Acts to Preserve Internet Freedom and Openness (Dec. 21, 2010), *available at* http://www.fcc.gov/Daily_Releases/Daily_Business/2010/db1221/DOC-303745A1.pdf (summarizing the FCC's actions).

14. Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56 (codified as amended in scattered sections of 47 U.S.C.). The 1996 Act modified, rather than replaced, the Communications Act of 1934, Pub. L. No. 73-416, 48 Stat. 1064 (codified as amended in scattered sections of 47 U.S.C.). This Article uses "1996 Act" to refer to the newly added sections and "Communications Act" to describe earlier provisions or the amended statute as a whole.

15. More specifically, network neutrality is an effort to prohibit unreasonable discrimination by incumbent network operators against competitive application and content providers. This approach implies that the application and content markets are the object of the FCC's actions, while the network-access markets are its subject, much as the breakup of AT&T applied regulation to the dominant phone company to facilitate a competitive long-distance market.

16. *See infra* Part III.A.

personal devices and impersonal sensors, as well as a channel for large volumes of content, especially video. The FCC faces an enormous challenge in adapting to such an environment.

Fortunately, the FCC can draw upon a substantial, yet largely forgotten, body of legal, business, and technical literature from the 1960s concerning what was then called the "computer utility."[17] Even before ARPANet, the project that evolved into the Internet, technical experts and policymakers widely recognized that computers and communications would converge into a platform that raised significant public policy questions.[18] The participants in the computer utility debates were wrong—or perhaps just forty years early—in their business forecasts. They were right in identifying the regulatory questions that the FCC, or a successor agency, should address in a converged digital world. Networked computer systems can function as utilities, even as they rely on other utilities to reach their customers. To achieve its public interest mandates, the FCC must consider the impact of cloud computing and related developments. It should examine four primary categories of issues for these new network platforms: connectivity, meaning interconnection policies and access to communications capacity; robustness, meaning capacity, security, and reliability; data integrity, namely privacy and control over user data; and transparency, specifically the disclosure of network management practices and technical standards. All of these issues were first raised in the era of the computer utility.

This Article proceeds as follows. Part I examines the failings of the current debates over network neutrality and the FCC's legal authority to regulate broadband. Part II traces the history of public utility regulation and the computer utility debates of the 1960s. Part III describes the rise of cloud computing and sets out an agenda for regulation in an era of network utilities.

I. A FUNDAMENTAL DISCONNECT

Although the FCC's engagement with the Internet has arguably been a great policy success, the history of that engagement has not been smooth.[19] One problem is that the FCC has labored for fifteen

17. *See infra* Part II.B.

18. *See infra* Part II.C.

19. *See* Kevin Werbach, *The Federal Computer Commission*, 84 N.C. L. REV. 1, 4 (2005) (arguing that the FCC's engagement with the computer and Internet industries has produced substantial benefits); John Eggerton, *Hundt: Internet Is the New Broadcasting and Cable*,

years under a statute that preserves old analog silos, such as telephone service and broadcasting, in a converged digital world.[20] Simply breaking down those boundaries, however, is no longer enough. As Internet-based digital connectivity becomes the foundation for all communications, media, and computer-based services, the core issues the FCC was created to promote—competition, innovation, investment, consumer protection, and civic discourse[21]—remain as important as ever. What has changed is the industry landscape and the associated technological and economic environment in which those issues develop. The FCC faces many important issues today, including freeing up more wireless capacity, promoting the open Internet, and implementing the National Broadband Plan.[22] An inquiry into the role of the FCC tomorrow, however, must take notice of broader concerns.

The problems with the current regulatory structure can be examined at three levels. First, the existing legal framework provides insufficiently robust statutory scaffolding for the tasks the FCC faces. Second, even if the statutory imprecision could be rectified, the FCC lacks the capacity for effective regulatory boundary-drawing in the postmonopoly communications environment. Third, the FCC is set up to consider the Internet as a specific case or adjunct to its core

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BROADCASTING & CABLE, Mar. 12, 2010, http://www.broadcastingcable.com/article/450170-Hundt_Internet_Is_the_New_Broadcasting_and_Cable.php (quoting former FCC Chairman Reed Hundt's claims that FCC actions cleared the way for the broadband Internet as the nation's common medium); Oxman, *supra* note 2, at 7–15 (describing the FCC's early Internet policy decisions).

20. *See* Kevin Werbach, *A Layered Model for Internet Policy*, 1 J. ON TELECOMM. & HIGH TECH. L. 37, 39–54 (2002) ("The Internet creates particular tensions with the outdated but deeply rooted structure of the current regulatory framework.").

21. *See* 47 U.S.C. § 151 (2006) ("[T]here is created a commission to be known as the 'Federal Communications Commission', which shall be constituted as hereinafter provided, and which shall execute and enforce the provisions of this chapter."); *see also* Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56, 56 (codified as amended in scattered sections of 47 U.S.C.) ("An Act [t]o promote competition and reduce regulation in order to secure lower prices and higher quality services for American telecommunications consumers and encourage the rapid deployment of new telecommunications technologies.").

22. *See* FCC, CONNECTING AMERICA: THE NATIONAL BROADBAND PLAN, at ix (2009), *available at* http://download.broadband.gov/plan/national-broadband-plan.pdf ("This is America's plan, written by and for Americans. It's now time to act and invest in our nation's future by bringing the power and promise of broadband to us all."). Congress directed the FCC to develop a National Broadband Plan in the American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, § 6001(k)(1), 123 Stat. 115, 515 (to be codified at 47 U.S.C. § 305(k)(1)). The FCC issued the plan in March 2010 and is now conducting proceedings to implement its recommendations. FCC, *supra*, at ix.

regulatory activities, even though it has become the basic platform for all of the industries within the FCC's sphere of action.

A. The Internet Meets Telecom Regulation

1. *The Internet Challenge.* The Internet is not a particular set of services or technologies. It is not the same thing as broadband, and it is not the same thing as the Web.[23] The Internet is fundamentally an agreement to interconnect using an evolving set of technical protocols, which enable universal delivery of data across the network.[24] What makes the concept of the Internet challenging for businesspeople and policymakers alike is that it is, in a sense, an illusion. The Internet is a set of voluntary agreements to follow an evolving set of consensual practices and protocols.[25]

The Internet has changed and developed rapidly over time, and it will continue to do so. Although critical attributes of the Internet were evident in 1995—and in some cases in 1985 or 1975—much changed in the subsequent fifteen years. The Internet in the 1990s was truly a nascent business and social phenomenon. Most Americans were not online, and even smaller percentages of citizens in most other countries used the Internet.[26] Electronic commerce and online advertising were insignificant in comparison to their nondigital

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23. The World Wide Web is a particular application and set of protocols for delivering information from Internet-connected servers to end-user browsers. The Internet encompasses many such applications, including email, file sharing, and voice communications tools such as Skype. The Internet is the underlying platform for such applications.

24. In the words of the Federal Networking Council in 1995:

> "Internet" refers to the global information system that—(i) is logically linked together by a globally unique address space based on the Internet Protocol (IP) or its subsequent extensions/follow-ons; (ii) is able to support communications using the Transmission Control Protocol/Internet Protocol (TCP/IP) suite or its subsequent extensions/follow-ons, and/or other IP-compatible protocols; and (iii) provides, uses or makes accessible, either publicly or privately, high level services layered on the communications and related infrastructure described herein.

Barry M. Leiner, Vinton G. Cerf, David D. Clark, Robert E. Kahn, Leonard Kleinrock, Daniel C. Lynch, Jon Postel, Larry G. Roberts & Stephen Wolff, *A Brief History of the Internet*, INTERNET SOC'Y, http://www.isoc.org/internet/history/brief.shtml (last visited Apr. 12, 2011) (emphasis omitted) (quoting the Federal Networking Council).

25. *See* Kevin Werbach, *The Centripetal Network: How the Internet Holds Itself Together, and the Forces Tearing It Apart*, 42 U.C. DAVIS L. REV. 343, 347–51 (2008) ("Like the railroad system or the electric power grid, the Internet is a collection of independent networks that coordinate their actions, forming what appears to be a seamless collective.").

26. In 1995, there were twenty-five million Internet users in the United States and forty million worldwide. *See Internet Users*, THE WORLD BANK, http://data.worldbank.org/indicator/IT.NET.USER (last visited Apr. 12, 2011) (presenting worldwide statistics for Internet use).

forebears. The primary providers of Internet access were independent Internet service providers (ISPs), not regulated telecommunications and cable companies. Laws and regulatory structures developed in that era are no longer appropriate in this one.

When Congress passed the 1996 Act, there were approximately one hundred thousand websites in existence; there were well over one hundred million in 2011.[27] In 1998, when Congress passed the Digital Millennium Copyright Act[28] and the Internet Tax Freedom Act,[29] Google had not yet been founded. In fact, virtually none of the top one hundred sites on the Web in 2010 existed at that time.[30] Over 240 million Americans—nearly 80 percent of the population—were Internet users in 2011, according to the World Bank.[31] Millions more have access to the Internet at work. And with over 285 million U.S. mobile phone subscribers[32] and widespread deployment of Wi-Fi wireless hotspots, a majority of American adults access the Internet through wireless connections, according to the Pew Research Center.[33]

Even more significant than how the Internet has grown is how Internet usage has changed. In 1995, accessing the Internet meant initiating a dial-up connection through a modem attached to a personal computer, at speeds that required several seconds to

27. *See Web Growth Summary*, MIT, http://www.mit.edu/people/mkgray/net/web-growth-summary.html (last visited Apr. 12, 2011). For an Internet-growth report contemporaneous to its birth, see Donna L. Hoffman, Patrali Chatterjee & Thomas P. Novak, *Commercial Scenarios for the Web: Opportunities and Challenges*, J. COMPUTER-MEDIATED COMM., Dec. 1995, http://jcmc.indiana.edu/vol1/issue3/hoffman.html. For a prediction that Moore's law applies to web growth, see K.G. Coffman & A.M. Odlyzko, *Internet Growth: Is There a "Moore's Law" for Data Traffic?*, *in* AT&T HANDBOOK OF MASSIVE DATA SETS 47, 47–48 (James Abello, Panos M. Pardalos & Mauricio G.C. Resende eds., 2002).

28. Digital Millennium Copyright Act, Pub. L. No. 105-304, 112 Stat. 2860 (1998) (codified as amended in scattered sections of 5, 17, 28, and 35 U.S.C.).

29. Internet Tax Freedom Act, Pub. L. No. 105-277, div. C, tit. XI, 112 Stat. 2681, 2681-719 (1998) (codified as amended at 47 U.S.C. § 151 note (2006)).

30. *See The 1000 Most-Visited Sites on the Web*, GOOGLE, http://www.google.com/adplanner/static/top1000 (last updated Feb. 2011) (listing the one thousand most-visited sites on the Web).

31. *See Internet Users*, *supra* note 26 (detailing the number of Internet users since 1980).

32. Press Release, CTIA, CTIA—The Wireless Association Announces Semi-Annual Wireless Industry Survey Results (Mar. 23, 2010), *available at* http://www.ctia.org/media/press/body.cfm/prid/1936.

33. *See* PEW INTERNET & AM. LIFE PROJECT, MOBILE ACCESS 2010, at 7 (2010), *available at* http://www.pewinternet.org/~/media//Files/Reports/2010/PIP_Mobile_Access_2010.pdf.

download a single image file.[34] By 2010, the vast majority of Americans had broadband access, an always-on service roughly one hundred times as fast.[35] Software and hardware have evolved to offer a smoother, richer, more sophisticated Internet experience. Personal computers and even packaged software applications now offer built-in automatic updating and other communications functions, taking for granted an Internet connection as an integral part of the computing experience.

2. *The Regulatory Muddle.* The telecommunications industry is subject to extensive regulation by the FCC, an independent federal administrative agency created in 1934.[36] Under the Communications Act of 1934 (Communications Act),[37] the FCC oversees the terms under which communications companies provide service to their customers and interconnect with partners or competitors; grants licenses to use the airwaves for radio, television, mobile phone, satellite, and other wireless communications; engages in consumer-protection activities involving communications providers; regulates indecency in broadcast media; authorizes wireless devices; reviews communications mergers; promotes communications access for people with disabilities; and oversees competition in the telecommunications and media sector, among other activities.[38] Much of the Communications Act is sector-specific, including Title II for telephone service, Title III for broadcasting, and Title VI for cable television.[39] Depending on the classification of a company or service,

34. *See* RAY HORAK, TELECOMMUNICATIONS AND DATA COMMUNICATIONS HANDBOOK 635–36 (2007) (discussing dial-up access).

35. A February 2010 FCC survey found that 78 percent of American adults are Internet users and 65 percent have home broadband access. John B. Horrigan, *Broadband Adoption and Use in America* 3 (FCC Omnibus Broadband Initiative, Working Paper No. 1, 2010), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-296442A1.pdf.

36. *See generally* PETER W. HUBER, MICHAEL K. KELLOGG & JOHN THORNE, FEDERAL TELECOMMUNICATIONS LAW (2d ed. 1999) (describing the detailed system of federal telecommunications regulation in the United States). State public utility commissions also regulate intrastate communications, and some activities—such as cable television franchising and access to poles and conduits—are regulated at the municipal level. NUECHTERLEIN & WEISER, *supra* note 2, at 47–48, 162.

37. Communications Act of 1934, Pub. L. No. 73-416, 48 Stat. 1064 (codified as amended in scattered sections of 47 U.S.C.).

38. *See* HUBER ET AL., *supra* note 36, at 209–12, 220–32, 279–313 (providing an overview of the authority and jurisdiction of the FCC).

39. *See* 47 U.S.C. §§ 201–276 (2006) (Title II); *id.* §§ 301–399 (Title III); *id.* §§ 521–573 (Title VI).

different obligations may apply. In 1996, Congress passed a major overhaul that modified the statute to incorporate other distinctions, such as imposing unbundling and wholesale obligations on incumbent local-exchange carriers, but not on other providers of telecommunications service.[40]

The 1996 Act was primarily concerned with enabling and encouraging three distinct segments of the communications marketplace to cross over into each other's domains: local exchange carriers, interexchange carriers, and cable television operators.[41] Congress's vision was that the entry of new competitors into the local telephony, long-distance, and multichannel video markets would promote innovation and lower prices while simultaneously eliminating regulatory restraints.[42] Many competitors entered the market, only to fail due to changing market conditions, the resistance of the incumbents, and basic flaws in the 1996 Act's scheme for network unbundling.[43]

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40. *See, e.g.*, Telecommunications Act of 1996, Pub. L. No. 104-104, sec. 101, § 251, 110 Stat. 56, 61–66 (amending 47 U.S.C. § 251 (2006)).

41. *See* NUECHTERLEIN & WEISER, *supra* note 2, at 69–74 (discussing the objectives of the 1996 Act); CHRISTOPHER H. STERLING, PHYLLIS W. BERNT & MARTIN B.H. WEISS, SHAPING AMERICAN TELECOMMUNICATIONS: A HISTORY OF TECHNOLOGY, POLICY, AND ECONOMICS 258–66 (2006) (describing the culmination of pro-competitive forces in the 1996 Act); Nicholas Economides, *The Telecommunications Act of 1996 and Its Impact*, 11 JAPAN & WORLD ECON. 455, 456–57 (1999) (discussing the goals of the 1996 Act); Charles B. Goldfarb, *Telecommunications Act: Competition, Innovation, and Reform*, *in* TELECOMMUNICATIONS ACT: COMPETITION, INNOVATION, AND REFORM 1, 8–10 (Charles B. Goldfarb ed., 2006) (discussing the background of the 1996 Act).

Local exchange carriers provide end users with connections to the public switched telephone network. Historically, these providers were granted exclusive monopolies for their territories. Such incumbent local exchange carriers (ILECs) generally retain significant market power, even though today competitors may enter their markets, either by leasing portions of the incumbent network, or by using their own facilities, as in the case of cable telephony or mobile phone service. Interexchange carriers (IXCs) provide long-distance service between local exchange carriers. When AT&T was broken up in 1984, it was split into a competitive IXC and seven regulated ILECs. These "Baby Bells" have since merged down to three (Verizon, AT&T, and Qwest) and remain the dominant local exchange providers in most of the United States. After the 1996 Act, they also reintegrated local and interexchange services, a practice that was prohibited under the AT&T divestiture consent decree. SBC Communications, one of the Baby Bells, acquired and took on the name of AT&T, and Verizon acquired MCI. Both providers also offer mobile phone service, an area in which they compete against pure-play mobile operators such as Sprint and T-Mobile. *See generally* NUECHTERLEIN & WEISER, *supra* note 2, at 55–91 (describing the regulation of wireline carriers before and after the 1996 Act).

42. *See* NUECHTERLEIN & WEISER, *supra* note 2, at 69–70 ("The Act's foremost aspiration is greater competition in local telecommunications markets.").

43. *See* Richard A. Epstein, *Takings, Commons, and Associations: Why the Telecommunications Act of 1996 Misfired*, 22 YALE J. ON REG. 315, 315–16 (2005) ("There is

Over time, though, some intermodal competition has developed. Cable operators such as Comcast and Time Warner Cable now offer phone service to millions of customers, in competition with the reconsolidated children of the old AT&T.[44] Verizon and AT&T offer multichannel video packages in competition with cable, as do direct broadcast satellite providers.[45] And a quarter of U.S. households have chosen to use a mobile phone as their primary or sole telephone service.[46] The biggest development since 1996, however, has been convergence. All of these providers now use digital transmission, and most employ Internet protocol standards to deliver their various services.[47] In other words, the Internet has become the common platform for all communications industries.

The Internet was an afterthought in the 1996 Act.[48] The only time it is even mentioned expressly is in connection with the Communications Decency Act of 1996[49] provisions—since overturned—that imposed restrictions on indecent online speech and created a safe harbor for online service providers.[50] The 1996 Act left in place the regulatory silos of telephony (Title II), broadcasting (Title III), and cable television (Title VI), even though converged

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widespread agreement today on all sides of the telecommunications wars that something is deeply flawed with the design or implementation (or both) of the Telecommunications Act of 1996."); Thomas W. Hazlett, *Rivalrous Telecommunications Networks with and Without Mandatory Sharing*, 58 FED. COMM. L.J. 477, 478 (2005) (criticizing the mandatory unbundling provisions in the 1996 Act and commenting on the demise of competitive entrants based on unbundling); Susan Ness, *The Law of Unintended Consequences*, 58 FED. COMM. L.J. 531, 532 (2006) (explaining the shortcomings of the 1996 Act); Howard A. Shelanski, *Inter-Modal Competition and Telecommunications Policy in the United States*, 60 COMM. & STRATEGIES 15, 15 (2005) (describing how industry changes following the adoption of the 1996 Act have made it obsolete).

44. The National Cable and Telecommunications Association (NCTA) reports 23.5 million cable telephony customers as of September 2010. *Operating Metrics*, NCTA, http://www.ncta.com/StatsGroup/OperatingMetric.aspx (last visited Apr. 12, 2011).

45. *See* Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming, 24 FCC Rcd. 542, 545 (2009).

46. Maggie Fox, *Nearly a Quarter of U.S. Homes Only Use Cellphones*, REUTERS, May 12, 2010, *available at* http://www.reuters.com/article/idUSTRE64B6F620100512.

47. Michael K. Powell, Comm'r, FCC, The Great Digital Broadband Migration, Remarks Before the Progress & Freedom Foundation (Dec. 8, 2000), *available at* http://www.fcc.gov/Speeches/Powell/2000/spmkp003.html.

48. *See* Kevin Werbach, *Off the Hook*, 95 CORNELL L. REV. 535, 541 (2010) ("The Internet is a perfect example [of] when new technologies develop that Congress did not contemplate.").

49. Communications Decency Act of 1996, Pub. L. No. 104-104, tit. V, 110 Stat. 56, 133–43, *invalidated in part by* Reno v. ACLU, 521 U.S. 844 (1997).

50. *See* Werbach, *supra* note 48, at 555–61 (discussing the legislative history of the Communications Decency Act of 1996).

digital services could have elements of all three. The 1996 Act did establish a statutory category for information services, defined as "the offering of a capability for generating, acquiring, storing, transforming, processing, retrieving, utilizing, or making available information via telecommunications . . . ."[51] This definition is broad enough to encompass Internet-based services. But the 1996 Act was silent as to what, if any, obligations or FCC actions might attach to that classification. The fight over FCC jurisdiction to adopt open Internet rules for broadband access stems from this omission.[52] Approaches based on the information-services classification are referred to as "Title I" options because that definition and the general regulatory delegations to the FCC sit within that introductory title of the Communications Act, as opposed to the service-specific mandates of later titles.[53]

The category of information services paralleled the FCC's preexisting category of enhanced services, and the Commission later concluded that the two terms covered the same activities.[54] There is, however, an important difference between enhanced and information services. The enhanced services category was originally created in the FCC's *Computer II*[55] decisions to cover companies that were separate from the network operators who provided the underlying basic services of telecommunications transport.[56] An enhanced service provider (ESP), for example, was considered an end user of the

51. Telecommunications Act of 1996, Pub. L. No. 104-104, sec. 3(a)(2), § 153(41), 110 Stat. 56, 59 (codified at 47 U.S.C. § 153(20) (2006)).

52. *See generally* Werbach, *supra* note 48, at 541–45 (discussing the application of the 1996 Act to the Internet).

53. In *Off the Hook*, *supra* note 48, I proposed an ancillary jurisdiction theory rooted in the interconnection provisions of Title II of the Act, combining the two approaches. *Id.* at 571–98.

54. *See* Appropriate Framework for Broadband Access to the Internet over Wireline Facilities, 20 FCC Rcd. 14,853, 14,871 (2005) (report and order and notice of proposed rulemaking) ("[T]he Commission has previously determined that Congress intended the statutory categories [of information service and telecommunications service] to parallel the categories [of enhanced service and basic service that] the Commission established in the *Computer Inquiry* proceeding.").

55. Amendment of Section 64.702 of the Commission's Rules and Regulations (Second Computer Inquiry) (*Computer II*), 77 F.C.C.2d 384 (1980) (final decision).

56. *See id.* at 417 (establishing a "separation of common carrier transmission services from those computer services which depend on common carrier services in the transmission of information"); Robert Cannon, *The Legacy of the Federal Communications Commission's Computer Inquiries*, 55 FED. COMM. L.J. 167, 185–88 (2003) (discussing the definition of enhanced services). The basic-enhanced distinction in *Computer II* revised the division between communications and data processing in earlier FCC decisions. *See infra* note 201 and accompanying text.

network with access to local business line rates, rather than a carrier subject to usage-based interstate access charges.[57] A network operator, such as a Bell Operating Company, could provide enhanced services, subject to competitive safeguards, but in that situation, it would still be a basic service provider offering enhanced services. The 1996 Act subtly shifted the category by defining information services as those involving computer processing "via telecommunications."[58] This opened the door for the move the FCC eventually made in 2002: classifying broadband access providers that provided both telecommunications and information service functionality as integrated information service providers.[59] The exception for nascent users of the network had become the classification for the network operators themselves.

In *National Cable & Telecommunications Ass'n v. Brand X Internet Services*,[60] the Supreme Court affirmed the FCC's classification of broadband Internet access as a Title I information service.[61] The Court expressed skepticism that the FCC's choice was the proper one, and three Justices dissented on the basis that the statute compels classification of broadband transmission as a Title II telecommunications service.[62] But the Court upheld the FCC's actions on administrative law grounds, invoking *Chevron U.S.A. Inc. v. National Resources Defense Council, Inc.*[63] to give deference to an expert agency's reasonable interpretation of an ambiguous congressional delegation.[64] Because it was asked only to decide the

57. *See* MTS and WATS Market Structure, 97 F.C.C.2d 682, 711–22 (1983) (memorandum opinion and order) (clarifying the application of the FCC's rules to entities such as enhanced service providers).

58. Telecommunications Act of 1996, Pub. L. No. 104-104, sec. 3(a)(2), § 153(41), 110 Stat. 56, 59 (codified at 47 U.S.C. § 153(24) (2006)).

59. *See* Inquiry Concerning High-Speed Access to the Internet over Cable and Other Facilities, 17 FCC Rcd. 4798, 4802 (2002) (declaratory ruling and notice of proposed rulemaking) ("[W]e conclude that cable modem service, as it is currently offered, is properly classified as an interstate information service, not as a cable service, and that there is no separate offering of telecommunications service."); *Appropriate Framework for Broadband Access to the Internet over Wireline Facilities*, 20 FCC Rcd. at 14,858 ("Consistent with the Supreme Court's opinion in *NCTA v. Brand X*[, 545 U.S. 967 (2005)], we determine that facilities-based wireline broadband Internet access service is an information service.").

60. Nat'l Cable & Telecomms. Ass'n v. Brand X Internet Servs., 545 U.S. 967 (2005).

61. *Id.* at 1003.

62. *Id.* at 1005 (Scalia, J., dissenting).

63. Chevron U.S.A. Inc. v. Natural Res. Def. Council, Inc., 467 U.S. 837 (1984).

64. *See Brand X*, 545 U.S. at 980–86 (applying the *Chevron* framework to the FCC's interpretation of the term "telecommunications service").

FCC's authority to impose the information-services classification, the Court did not have to consider what, if any, rules the FCC might then impose on broadband providers.

The FCC in *Brand X* repeatedly asserted, and the Supreme Court reaffirmed in dicta, that Title I was more than a regulatory get-out-of-jail free card.[65] In 2005, the FCC adopted four Internet policy principles that described user rights vis-à-vis broadband access providers.[66] It coupled these nonbinding principles with the stern pronouncement that it would incorporate them into its ongoing regulatory activity as appropriate.[67] But the FCC did not explain how it would do so. Despite loud public and congressional debate about network neutrality, three more years passed before the FCC actually tried to impose obligations on a broadband provider for violation of those principles. When the FCC sanctioned Comcast in 2008 for its broadband network management practices, Comcast successfully sued it for acting without statutory authority.[68]

3. *The Open Internet Proceeding and Beyond.* The election of President Obama triggered a renewed emphasis on network neutrality. Obama endorsed the concept during his campaign,[69] and

65. *See id.* at 996 ("[T]he Commission remains free to impose special regulatory duties on facilities-based ISPs under its Title I ancillary jurisdiction."); Appropriate Framework for Broadband Access to the Internet over Wireline Facilities, 20 FCC Rcd. 14,853, 14,981 (2005) (report and order and notice of proposed rulemaking) (Copps, Comm'r, concurring) ("I also want to note that the Supreme Court's *Brand X* decision makes it clear that the Commission's ancillary authority can accommodate our work on homeland security, universal service, disabilities access, competition, and Internet discrimination protections—and more.").

66. *See* Appropriate Framework for Broadband Access to the Internet over Wireline Facilities, 20 FCC Rcd. 14,986, 14,987–88 (2005) (policy statement) (listing four principles "to ensure that broadband networks are widely deployed, open, affordable, and accessible to all consumers").

67. *Id.* at 14,988.

68. *See* Comcast Corp. v. FCC, 600 F.3d 642, 644 (D.C. Cir. 2010) (finding that the FCC had failed to make a showing that it had ancillary authority "to regulate an Internet service provider's network management practices").

69. *Barack Obama: Connecting and Empowering All Americans Through Technology and Innovation*, BARACKOBAMA.COM, http://www.barackobama.com/pdf/issues/technology/Fact_Sheet_Innovation_and_Technology.pdf (last visited Apr. 12, 2011) (supporting "the principle of network neutrality to preserve the benefits of open competition on the internet" and noting that "[u]sers must be free to access content, to use applications, and to attach personal devices"). Upon the enactment of the Open Internet Order, Preserving the Open Internet, 25 FCC Rcd. 17,905, 52 Commc'ns Reg. (P & F) 1 (Dec. 21, 2010) (report and order), President Obama expressed his satisfaction with the measure. *See* Press Release, White House Office of the Press Sec'y, Statement by the President on Today's FCC Vote on Net Neutrality (Dec. 21, 2010), *available at* http://www.whitehouse.gov/the-press-office/2010/12/21/statement-president-today-s-

his choice for FCC chairman, Julius Genachowski, expressed similar support.[70] The FCC began an open Internet proceeding in October 2009, proposing enforceable rules for the first time.[71] It bogged down after the Comcast decision threw the FCC's legal authority into question, and broadband providers launched a fierce lobbying assault.[72]

On December 21, 2010, the FCC adopted an order formalizing its open Internet rules (Open Internet Order).[73] The FCC articulated a new theory of its jurisdiction to regulate broadband Internet access, based on Section 706 of the 1996 Act, which directed the agency to promote the deployment of "advanced telecommunications capability."[74] The Order barred wireline broadband access providers from blocking or unreasonably discriminating against unaffiliated services, and it initially imposed lesser restrictions on wireless broadband.[75] The FCC suggested that "paid prioritization"—offering service providers enhanced delivery for a fee—would likely fail the unreasonable discrimination test, but it left that question, and most other hard decisions, to case-by-case adjudication.[76] Finally, the Open

fcc-vote-net-neutrality (congratulating the FCC and its chairman for helping "preserve the freedom and openness" of the Internet).

70. *See* Julius Genachowski, Chairman, FCC, Preserving a Free and Open Internet: A Platform for Innovation, Opportunity, and Prosperity, Address at the Brookings Institution (Sept. 21, 2009), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-293568A1.pdf (asserting that "Congress and the President have charged the FCC with developing a National Broadband Plan to ensure that every American has access to *open* and robust broadband" (emphasis added)).

71. *See* Preserving the Open Internet, 24 FCC Rcd. 13,064, 13,065 (2009) (notice of proposed rulemaking) (offering notice for "public input on draft rules to preserve an open Internet").

72. *See* Editorial, *The Price of Broadband Politics*, N.Y. TIMES, June 30, 2010, at A30 (detailing the amount of money that phone and cable companies were spending on political contributions in opposition to the FCC's plan to extend its regulatory oversight over access to broadband Internet); Bennett Roth, *FCC Push on Net Neutrality Ramps Up Lobbying*, ROLL CALL (Dec. 1, 2010, 9:40 PM), http://www.rollcall.com/news/-201079-1.html (describing "an already intense lobbying campaign by telecommunication giants, high-tech firms and open Internet advocates" that "is sure to become ever more feverish").

73. Preserving the Open Internet, 25 FCC Rcd. 17,905, 52 Commc'ns Reg. (P & F) 1 (Dec. 21, 2010) (report and order).

74. Telecommunications Act of 1996 § 706, 47 U.S.C. § 1302; *Preserving the Open Internet*, 52 Commc'ns Reg. (P & F) at 36–39 (ruling that Section 706 provides authority for open Internet rules).

75. *Preserving the Open Internet*, 52 Commc'ns Reg. (P & F) at 22–27, 29–31.

76. *See id.* at 22–30 ("[W]e will further develop the scope of reasonable network management on a case-by-case basis, as complaints about broadband providers' actual practices arise.").

Internet Order adopted a transparency mandate for broadband access providers, requiring them to disclose their network management practices to customers.[77] The Order was a carefully crafted compromise. It pleased no one, and it seems likely to face legal challenges, as well as skeptical questioning from Congress.[78]

In a previous article, I argued that the FCC could address the immediate challenge of supporting open Internet rules through an ancillary jurisdiction theory based on the interconnection provisions of the 1996 Act, as opposed to those it chose to support its jurisdiction.[79] Even if the FCC had pursued this option, however, it would have solved only part of the challenge. The problem the FCC faces is that its authority comes from a statute that delegates and specifies regulatory requirements for telephony, cable, wireless telephony, satellite, and broadcast services. The marketplace it surveys today is rapidly moving away from those categories toward an environment featuring only digital broadband connectivity and services. Since 2002, the FCC has consistently concluded that the 1996 Act places those offerings in the nether realm of information services.[80] In other words, what the statute regulates no longer exists, and what does exist is barely addressed in the statute.

The near-term drama about the FCC's classification decision will play out, but any choice the FCC makes will only be a temporary solution. Congress must revamp the Communications Act for the digital broadband era. Such a major legislative change is not to be undertaken lightly. The 1996 Act was the result of many years of active deliberation and what was considered the mother of all

77. *See id.* at 19–22 ("Effective disclosure of broadband providers' network management practices and the performance and commercial terms of their services promotes competition—as well as innovation, investment, end-user choice, and broadband adoption . . . .").

78. *See, e.g.*, Brian Stelter, *F.C.C. Faces Challenges to Net Rules*, N.Y. TIMES, Dec. 22, 2010, http://query.nytimes.com/gst/fullpage.html?res=9801E6D91739F931A15751C1A9669D8B63 ("Verizon said the F.C.C. order 'appears to assert broad authority for sweeping new regulation of broadband wireline and wireless networks and the Internet itself' without 'solid statutory underpinnings.'"); Nate Anderson, *Why Everyone Hates New Net Neutrality Rules—Even NN Supporters*, ARS TECHNICA (Dec. 21, 2010, 1:35 PM), http://arstechnica.com/tech-policy/news/2010/12/why-everyone-hates-new-net-neutrality-ruleseven-nn-supporters.ars (noting that "those who have always opposed net neutrality weren't pleased with today's FCC order instituting it"); Jennifer Valentino-DeVries, *Most of the Internet Grumbles About FCC Net Neutrality Rules*, WALL ST. J. DIGITS BLOG, (Dec. 22, 2010, 4:30 PM ET), http://blogs.wsj.com/digits/2010/12/22/most-of-the-internet-grumbles-about-fcc-net-neutrality-rules.

79. *See* Werbach, *supra* note 48, at 571–97.

80. *Id*. at 576–82.

lobbying battles.[81] The ultimate result bore little resemblance to earlier drafts after all of the horse-trading and reconciliation had concluded.[82] The FCC and Congress are rightly focused on how to make the best of the current statutory framework, or perhaps on how to work a modest tweak to remove uncertainty about the Commission's legal authority. Eventually, though, such incrementalism will not suffice. The old statute must give way.

Merely saying so, however, is not enough. The solution to an outdated legal regime is not the elimination of a legal regime; nor is it recourse to the goodwill of industry self-regulatory bodies, valuable as those may be. The task now is to model paradigms and concepts for what must replace the current framework.

B. Comcast–Level 3: Harbinger of Disputes to Come

For all of the controversy about network neutrality, the scenarios under consideration in the FCC's open Internet proceeding may turn out to be sideshows to the real battle. Network neutrality addresses the practices of broadband access providers toward their end-user customers.[83] The Open Internet Order expressly limits its mandates to such activities.[84] The access side of the network, however, is only part of the equation. Broadband access providers also connect to other networks.[85] The complex mesh of network-to-network interconnection is the defining characteristic of the Internet.[86] Users' experiences with broadband, and the experiences of edge innovators

81. *See* Ray G. Besing, *The Intersection of Sherman Act Section 2 and the Telecommunications Act of 1996: What Should Congress Do?*, 13 COMMLAW CONSPECTUS (SPECIAL ISSUE) 1, 3–4 (2005) (describing the legal and lobbying battles that culminated in the passage of the 1996 Act); Thomas W. Hazlett, *Explaining the Telecommunications Act of 1996: Comment on Thomas G. Krattenmaker*, 29 CONN. L. REV. 217, 219–21 (1996) (positing a theory of regulatory change based "on the self-interests of the various policymakers and influential pressure groups").

82. Senator John McCain called the legislation the "Leave No Lobbyist Behind Act of 1996." 149 CONG. REC. 21,874 (2003) (statement of Sen. McCain).

83. Kevin Werbach, *Only Connect*, 22 BERKELEY TECH. L.J. 1233, 1268 (2008).

84. *See* Preserving the Open Internet, 25 FCC Rcd. 17,905, 52 Commc'ns Reg. (P & F) 1, 17–19 (Dec. 21, 2010) (report and order) (delineating the scope of the open Internet rules).

85. The networks that carry traffic between local Internet access providers are referred to as backbones. There is no one Internet backbone, but these high-capacity core networks are sometimes referred to collectively as "the backbone."

86. *See* Werbach, *supra* note 83, at 1250–57 ("At a deep level, the internet *is* interconnection. Hence the name, 'in-ter-net.'"); Werbach, *supra* note 25, at 367–69 ("[T]he primary function of the Internet protocol is to enable independent data networks to federate into a single meta-network.").

seeking to deliver new services to those users, depend at least as much on traffic flows between broadband access providers and other networks as on traffic flows between those providers and their own end users or directly connected content providers. The FCC's Open Internet Order does not touch these practices.

A dispute between Comcast and Level 3 illustrates the failings of the existing approach. The controversy involves two major Internet network operators, Comcast and Level 3 Communications, but its genesis lies with a company that owns no network facilities: Netflix. Netflix offers a streaming video service that provides subscribers with immediate access to movies over the Internet.[87] Netflix has been exceptionally successful with this service offering.[88] Estimates are that Netflix streaming traffic now represents one-fifth of all peak U.S. Internet traffic.[89] However, Netflix does not own a network.[90] To deliver its content to subscribers, it must purchase capacity from network providers. Several competitors offer transmission services across the Internet backbone. Until late 2010, Netflix contracted with content delivery networks (CDNs), primarily Akamai and LimeLight.[91] CDNs distribute content across local caching services hosted within ISPs' networks, so that content is delivered to the end user locally rather than across the backbone.[92]

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87. Thanks to a variety of business arrangements, this Internet-based service can be delivered to television sets through set-top boxes such as TiVo or through game consoles such as the Xbox 360. Press Release, Netflix & Roku, Netflix Teams with Streaming Media Innovator Roku on Player that Instantly Streams Movies from Netflix Directly to the TV (May 20, 2008), *available at* http://netflix.mediaroom.com/index.php?s=43&item=272; *Instantly Watch Movies & TV Episodes from Netflix on Your TiVo Box*, TIVO, http://www.tivo.com/mytivo/product-features/on-demand/watch-netflix/index.html (last visited Apr. 12, 2011); Greg Peters, *Wii and PS3 to Be Disc-Free*, THE NETFLIX BLOG (Oct. 18, 2010, 8:23 AM), http://blog.netflix.com/2010/10/wii-and-ps3-to-be-disc-free.html.

88. *See* Michael Liedtke, *Netflix Expects Video Streaming to Drown Out DVDs*, BOS. GLOBE, Nov. 22, 2010, http://www.boston.com/business/technology/articles/2010/11/22/netflix_expects_video_streaming_to_drown_out_dvds ("[Netflix's] 17 million subscribers watch more hours of Internet-streamed video each month than they do on the DVDs they get through the mail.").

89. *See* Peter Burrows, *Will Video Kill the Internet, Too?*, BLOOMBERG BUSINESSWEEK, Dec. 6, 2010, at 43, 43 ("[Netflix] now accounts for 20 percent of all Internet traffic during the typical American evening . . . .").

90. *See* Todd Spangler, *The Netflix Niche*, MULTICHANNEL NEWS, Jan. 31, 2011, at 10 (describing how Netflix operates).

91. *See Market Talk: Oppenheimer Cuts Limelight, Akamai on Netflix Concerns*, DOW JONES NEWS SERVICE, Nov. 15, 2010, *available at* Factiva, Doc. DJ00000020101115e6bf0003h.

92. *See* Werbach, *supra* note 83, at 1254 ("CDNs such as Akamai operate distributed networks of caching servers, hosted on large numbers of networks, which automatically serve content to end users from nearby caches.").

In early November 2010, Netflix agreed to switch to Level 3, a large wholesale network operator, for its streaming distribution.[93] Level 3 has not traditionally been a major player in the CDN market. Instead, it offers transit service across its national backbone for large enterprises and other networks.[94] It also peers with other top-tier backbones, which means that it engages in settlement-free exchange of traffic, on the assumption that traffic flows between large networks are relatively equal.[95] The FCC does not regulate commercial practices in the backbone market, so network operators are generally free to hash out privately whether a relationship will be considered peering (no money exchanged) or transit.[96]

Among the companies to which Level 3 provides transit service is Comcast, the largest U.S. residential broadband access provider, as well as the largest cable television provider.[97] Comcast pays Level 3 to carry traffic from its local networks to other endpoints on the Internet.[98] When Level 3 began carrying Netflix traffic, however, the traffic flows between it and Comcast suddenly changed. Level 3 was now delivering roughly five times as much traffic to Comcast as Comcast was delivering to it.[99] Comcast, arguing that it would now be

93. *See* Cecilia Kang, *Level 3 Accuses Comcast of Unfairly Using Its Clout as the Dominant U.S. Cable Provider*, POST TECH (Nov. 29, 2010, 8:20 PM ET), http://voices.washingtonpost.com/posttech/2010/11/comcast_hit_with_two_net_neutr.html ("Level 3 is the exclusive backbone Internet service provider for Netflix . . . .").

94. *See id.* ("Level 3's backbone networks deliver content such as videos, retailing Web sites and games to networks operated by cable and phone companies, which then transmit the data over the 'last mile' of Internet pipes into American homes.").

95. *See* Michael Kende, *The Digital Handshake: Connecting Internet Backbones*, 11 COMMLAW CONSPECTUS 45, 47–52 (2003) (describing how and why Internet backbones "cooperate with one another by interconnecting their networks").

96. *See id.* at 48 ("[I]nterconnection between Internet backbone providers is not currently regulated by the Federal Communications Commission . . . or any other government agency. Instead, the backbones are self-regulated . . . .").

97. *See High-Speed Internet*, COMCAST INVESTOR RELATIONS, http://www.cmcsk.com/high-speed-internet.cfm (last visited Apr. 12, 2011) ("With nearly 15 million customers, Comcast is the nation's largest provider of residential high-speed Internet services."); *Video*, COMCAST INVESTOR RELATIONS, http://www.cmcsk.com/video.cfm (last visited Apr. 12, 2011) ("With 24.2 million video subscribers, Comcast is the nation's leading provider of cable television.").

98. Press Release, Comcast Corp., Comcast Extends National Fiber Infrastructure (Dec. 7, 2004), *available at* http://www.comcast.com/About/PressRelease/PressReleaseDetail.ashx?PRID=183.

99. *See* Nate Anderson, *Peering Problems: Digging into the Comcast/Level 3 Grudgematch*, ARS TECHNICA (Dec. 9, 2010, 11:20 AM), http://arstechnica.com/tech-policy/news/2010/12/comcastlevel3.ars ("Comcast says that, with Level 3's addition of Netflix in the new year, the traffic ratios will be as high as 5:1."); Kang, *supra* note 93 (recording a Comcast executive stating

forced to bear the costs of these higher traffic flows, imposed on Level 3 the recurrent fee it charges to CDNs that deliver traffic destined for its customers.[100] In response, Level 3 put out a press release attacking Comcast for erecting a "toll booth" on the Internet and claiming that Comcast's actions represented a violation of the FCC's open Internet principles.[101] The FCC has launched an investigation.[102] It has not, however, given any indication that it will take action, and there is no precedent for intervention in disputes of this kind.

The FCC has never chosen to address the Internet backbone market, in part because it has always deemed competitive forces

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that Level 3's traffic was "highly imbalanced"); *Peer Pressure*, ECONOMIST BABBAGE BLOG (Dec. 23, 2010, 8:25 AM), http://www.economist.com/blogs/babbage/2010/12/connecting_internets (reporting Comcast's statement that Level 3 "had massively increased the data flow over the two firms' connection"); Brian Stelter, *Netflix Partner Says Comcast 'Toll' Threatens Online Video Delivery*, N.Y. TIMES MEDIA DECODER BLOG (Nov. 29, 2010, 6:13 PM), http://mediadecoder.blogs.nytimes.com/2010/11/29/netflix-partner-says-comcast-toll-threatens-online-video-delivery (reporting a Comcast executive's observation that Level 3 was "sharply increasing its traffic"). This ratio exceeds the criteria for peering under Comcast's peering policy. *See Comcast Settlement-Free Interconnection (SFI) Policy*, COMCAST, http://www.comcast.com/peering (last visited Apr. 12, 2011) ("Applicant must maintain a traffic scale between its network and Comcast that enables a general balance of inbound versus outbound traffic."). It appears that it also exceeds the terms of Comcast's transit agreement with Level 3, given that the agreement was based on the assumption that Level 3 would be providing service to Comcast. Because all of these agreements are private, however, the terms cannot be publicly verified.

100. Press Release, Level 3 Commc'ns, Inc., Level 3 Communications Issues Statement Concerning Comcast's Actions (Nov. 29, 2010), *available at* http://www.level3.com/en/About-Us/Newsroom/Press-Release-Archive/2010/2010-11-29-level3-statement-comcast.aspx; Stelter, *supra* note 99. A group of peering experts sent a letter to the FCC disputing Comcast's claims that traffic imbalances were still the proper mechanism for determining peering and transit policies. *See* Letter from Bradley D. Bopp, Dir. of Eng'g, NationalNet, et al. to Julius Genachowski, Chairman, FCC, et al. 1–2 (Dec. 20, 2010), *available at* http://shell.voxel.net/~arothsch/ratio-petition-v3.pdf ("[T]raffic ratios are an outdated and misleading metric for determining equality and financial burden . . . .").

101. *See* Press Release, Level 3 Commc'ns, Inc., *supra* note 100 ("Level 3 believes Comcast's current position violates the spirit and letter of the FCC's proposed Internet Policy principles . . . ." (quoting Thomas Stortz, Chief Legal Officer, Level 3 Communications, Inc.) (internal quotation marks omitted)).

102. *See* Brian Stelter, *F.C.C. Investigates Complaint Against Comcast*, N.Y. TIMES MEDIA DECODER BLOG (Nov. 30, 2010, 3:53 PM), http://mediadecoder.blogs.nytimes.com/2010/11/30/f-c-c-investigates-complaint-against-comcast ("The chairman of the Federal Communications Commission said Tuesday that the agency was looking into claims by Level 3 Communications that Comcast had unfairly erected a toll booth that 'threatens the open Internet.'"). There has been to date no formal complaint filed with the FCC, so the Commission is under no obligation to take any action.

sufficient.[103] The FCC never explicitly concluded that backbones were outside of its authority. It simply never adopted rules applicable to that marketplace, which began as an unregulated service provided by small, independent information-services providers.[104] There is a good legal argument that the backbone should be treated as telecommunications under the 1996 Act because it involves the pure transport of information.[105] And indeed, interconnection in the backbone bears a strong resemblance to certain interconnection issues the FCC regulates in the telephone world, often involving the same companies.[106] The FCC has simply never taken up these arguments.

The economics involved are complicated. In principle, there is no reason why one provider or the other should pay the fee. The distribution chain between Netflix, Level 3, and Comcast is a classic two-sided market, in which revenues come from both the provider—in this case, Netflix—and end users.[107] Higher fees from Comcast to Level 3 could increase Netflix's costs, which Netflix might then have to recoup by charging more to its customers. On the other hand, if Comcast is correct that Netflix's video traffic imposes substantial costs on its network, Comcast might have to charge slightly higher rates to all of its users because of the Netflix video influx. As a policy matter, the FCC might therefore have to weigh its desire for greater broadband deployment against its desire to promote innovative new

103. *See* Kende, *supra* note 95, at 54–55 (describing the economic relationships among networks comprising the Internet).

104. *See id.* at 54–56 ("For more than thirty years, the Commission has sought to avoid imposing unnecessary common carrier regulation on providers of computer services that rely on the nation's telecommunications infrastructure for transmission of those services but do not themselves provide telecommunications services to the public.").

105. *See id.* at 55 & n.105 (noting that services that involve pure transport of information are "basic" services, and that "[t]he Commission has concluded that ['telecommunications service'] correspond[s] to the categor[y] of basic").

106. *See* James B. Speta, *A Common Carrier Approach to Internet Interconnection*, 54 FED. COMM. L.J. 225, 268–79 (2002) ("[O]ne could imagine the FCC imposing a tariffing requirement [in the Internet interconnection market], which has been the traditional means of enforcing a common carrier's interconnection obligation and is still employed in markets in which the telecommunications carrier has market power." (footnote omitted)).

107. *See* J. Scott Marcus, *IP-Based NGNs and Interconnection: The Debate in Europe*, 72 COMM. & STRATEGIES 17, 17–19 (2008) (arguing that economic models holding that only the initiator, and not the caller, received value from a call were even less applicable in the age of Internet networks); Jean Tirole & Jean-Charles Rochet, *Two-Sided Markets: A Progress Report*, 37 RAND J. ECON. 645, 645 (2006) (defining a two-sided market as one "in which one or several platforms enable interactions between end-users and try to get the two (or multiple) sides 'on board' by appropriately charging each side").

broadband applications, which might in turn stimulate broadband adoption. Many technical complexities are involved in assessing network costs for Internet traffic, however, including whether interconnection between networks occurs close to or far from end users.[108]

The Comcast–Level 3 dispute thus highlights the sorts of questions the FCC would have to ask to develop appropriate policies for a converged broadband environment. The problem is not that these questions are challenging, but that they are not even on the table. Eight years or more of intensive debate about network neutrality at the FCC have not even touched the proper treatment of network-to-network relationships in the Internet backbone. Perhaps the FCC investigation of the dispute will spur a new effort to expand the scope of the open Internet proceeding, but that seems unlikely. The FCC has treated regulation of data networking as the exception, rather than the rule, for so long that it has become almost impossible for the agency to shift gears.

C. The Fundamental Issue: Computing Meets Communications

Boundary-drawing is a difficult challenge for any regulator.[109] If a category is declared subject to regulation, actors have an incentive to show that they do not fit that category. This problem grows larger as the regulatory obligations incident upon the classification grow. Thus, if a "telecommunications service provider" is subject to a litany of restrictions, none of which applies to an "information service provider," companies have strong incentives to fit themselves into the

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108. *See* Letter from Bradley D. Bopp et al. to Julius Genachowski et al., *supra* note 100, at 1 ("Traffic ratios were commonly considered by networks seeking interconnection in the late 1990s, where much of the traffic exchanged was subsequently hauled large distances, with disparities in route-miles traveled and associated costs. In contrast, today, large access and content networks interconnect at a number of carrier-neutral collocation facilities around the country, where technical practices are employed to ensure that data is transmitted to an access network at the location closest to its requesting 'eyeballs.'").

109. *See* JAMES C. BONBRIGHT, ALBERT L. DANIELSEN & DAVID R. KAMERSCHEN, PRINCIPLES OF PUBLIC UTILITY RATES 26–66 (1988) (discussing the boundaries between competition and regulation); ROBERT B. HORWITZ, THE IRONY OF REGULATORY REFORM 22–45 (1989) (discussing the boundaries of several regulatory theories for public utilities such as telecommunications); ALFRED E. KAHN, THE ECONOMICS OF REGULATION: PRINCIPLES AND INSTITUTIONS 3–8, 11–12 (1988) (explaining the legal and economic reasons behind regulation); James W. McKie, *Regulation and the Free Market: The Problem of Boundaries*, 1 BELL J. ECON. 6, 7 (1970) ("[T]he boundary problem [for public utilities] is there. It is becoming more difficult, and presenting new aspects for solution, as organization and technology develop and competitive activities press more closely upon the regulated ones.").

latter bucket.[110] These boundary problems generate both type I and type II errors.[111] Regulators are reluctant to let regulated companies out of the box, even if some of the restrictions are excessive, and they are reluctant to put new services inside of the box, even when they bear the indicia of regulated services.

The 1996 Act gave the FCC this sort of choice between two poor options. It could either classify all Internet-related services—with the possible exception of voice over Internet protocol (VoIP)—as information services, even if offered by carriers, or force a sharp division between the regulated and unregulated components of Internet access. The latter option was particularly unsatisfying because cable operators, which had become the largest providers of broadband access, had never been subject to common carrier regulation.[112] The FCC would have had either to treat broadband access by telephone and cable companies differently, creating a competitive imbalance, or to impose Title II open-access mandates on cable companies traditionally subject to a different set of rules. The FCC's decision was controversial, but it was an imperfect response to an imperfect statutory framework.

Any system in which obligations depend heavily on service classification will be problematic when applied to digital systems that transgress those boundaries. Even when a classification decision initially produces salutary effects, it will only be a matter of time before it begins to unravel. The FCC tied its conclusion that broadband access was an information service to its longstanding policy of "unregulation" toward the Internet.[113] The FCC has repeatedly expressed the concern that if it puts some Internet-based

110. *See* Rob Frieden, *The FCC's Name Game: How Shifting Regulatory Classifications Affect Competition*, 19 BERKELEY TECH. L.J. 1275, 1303 (2004) (noting that traditional telecommunications service providers are being threatened by the proliferation of less-regulated information service providers).

111. A type I error is a false positive, and a type II error is a false negative.

112. *See* Inquiry Concerning High-Speed Access to the Internet over Cable and Other Facilities, 17 FCC Rcd. 4798, 4843–49 (2002) (declaratory ruling and notice of proposed rulemaking); *see also* John T. Nakahata, *Broadband Regulation at the Demise of the 1934 Act: The Challenge of Muddling Through*, 12 COMMLAW CONSPECTUS 169, 171 (2004) (noting that cable operators "historically had not been treated as common carriers").

113. *See* Oxman, *supra* note 2, at 18–20 (describing the FCC's "unregulation" of broadband).

services within the purview of traditional telecommunications regulation, it will begin down a slippery slope.[114]

For example, this concern explains the FCC's actions regarding VoIP. Even in the 1990s, some VoIP services were, to users, virtually identical to traditional telephony.[115] On the one hand, the obligations of Title II could not hinge on the technical protocol employed for outwardly identical services. On the other hand, imposition of interstate access charges and regulatory obligations for the nascent VoIP industry would have been disastrous, and imposition of those obligations on pure computer software providers such as Vocaltec made no sense.[116] The FCC in the 1990s saw no reason to move forward quickly in tackling this thorny issue: VoIP was a new service with few customers and was evolving quickly. Unfortunately, some members of Congress disagreed. They saw unregulated VoIP threatening subsidies for universal telephone service, because only telecommunications carriers were required to contribute to the subsidy pool.[117] In 1998, the Senate Appropriations Committee directed the FCC to explain how it could avoid treating VoIP as a regulated Title II service.[118]

The FCC issued what became known as the Stevens Report, named for the chairman of the Appropriations Committee who

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114. *See, e.g.*, William E. Kennard, Chairman, FCC, The Road Not Taken: Building a Broadband Future for America, Remarks Before the National Cable Television Association (June 15, 1999), *available at* http://www.fcc.gov/Speeches/Kennard/spwek921.html (explaining his opposition to open access obligations on cable broadband Internet access providers because they might chill investment).

115. *See* Federal-State Joint Board on Universal Service, 13 FCC Rcd. 11,501, 11,550 (1998) (report to Congress) ("Indeed, from the end-user perspective, these types of phone-to-phone IP telephony service providers seem virtually identical to traditional circuit-switched carriers.").

116. *See id.* at 11,543 ("As a general matter, Title II requirements apply only to the 'provi[sion]' or 'offering' of telecommunications. Without regard to whether 'telecommunications' is taking place in the transmission of computer-to-computer IP telephony, the Internet service provider does not appear to be 'provid[ing]' telecommunications to its subscribers." (alterations in original) (footnotes omitted) (quoting 47 U.S.C. §§ 153(46), 254(d) (Supp. II 2007))).

117. *See* 150 CONG. REC. S9069 (daily ed. Sept. 10, 2004) (statement of Sen. Alexander) ("[T]raditional long-distance services are suffering, in part from the increase in telephone calls made over the Internet with VOIP service.").

118. *See* Departments of Commerce, Justice, and State, the Judiciary, and Related Agencies Appropriations Act, 1998, Pub. L. No. 105-119, § 623, 111 Stat. 2440, 2521–22 (directing the FCC to review its interpretation of the 1996 Act and to explain its compatibility with the Act's plain language).

requested it.[119] The report suggested that "phone to phone" VoIP services could fit well within the Title II definition.[120] But the FCC stopped just short of the regulatory line, appropriately concerned about chilling effects on innovation and investment. Once drawn, however, the tentative distinction gradually became a solid barrier. The FCC waited years to take on the question of whether some VoIP services might be classified as regulated telephony, and it has not issued a definitive judgment as of early 2011.[121]

Lines are easier to draw in static industries, in which different categories of companies are easily distinguished. The effort grows far more difficult in a fast-changing environment such as the current telecommunications and data networking sector.

The difficulties the FCC faces can be traced to the distinction between communications and computing. The FCC's actions suggest that the agency sees itself as a regulator of communications and seeks to avoid the possibility that it will regulate computing.[122] It sees the distinctions in its prior decisions and the 1996 Act as institutionalizing that division. And it reads the history of the personal computer and the Internet as evidence that computing-based industries create wealth and innovation when quarantined from the obligations of communications regulation. None of these conclusions is incorrect. The Internet would not have developed if it had been left to the incumbent communications providers to build it, nor would it have survived if those operators had been given free rein to stifle its growth. Framing the issue this way, however, obscures a great deal.

In reality, communications and computing are connected and becoming more so. The strategy of keeping one in the regulatory box and the other outside no longer makes sense. Computer-based services are no longer strangers in the strange land of communications networks. The important regulatory issues are at the edges and inside of these networked platforms.

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119. *See Federal-State Joint Board on Universal Service*, 13 FCC Rcd. at 11,519–25 (describing Senator Ted Stevens's involvement in the report).

120. *See id*. at 11,543–44 (suggesting that "phone-to-phone" VoIP services "bear the characteristics of 'telecommunications services'").

121. *See* Werbach, *supra* note 19, at 44–47 (describing the history of the FCC's regulation of VoIP services).

122. *See* Oxman, *supra* note 2, at 6 ("The story of the Commission and its role in the development of the Internet highlights the benefits of the FCC's early deregulatory efforts to facilitate the growth of computer applications offered over the public telecommunications network." (footnote omitted)).

II. THE HISTORICAL CONTEXT

The FCC's current trajectory began long before the classification of broadband access in 2002, the legislative reforms of 1996, or even the *Computer II* and *Computer III*[123] decisions that distinguished regulated "basic" from unregulated "enhanced" services in the 1980s. In fact, the FCC's policy approach toward networked-data platforms began before the Internet existed; it even predated the Internet's predecessor, the ARPANet. The current tussle over FCC Internet regulation is a direct descendant of a set of decisions the FCC made in its *Computer I*[124] proceeding, which was launched in 1968 in response to the technological vision of the computer utility. And the basic questions the FCC confronted then are considerably older still. They involve the regulatory treatment of companies in a special position to provide essential services or exercise competitive bottlenecks—public utilities.

A. "Affected with a Public Interest"

"Utility" is a term, much like "innovation," that is widely used but curiously immune to precise definition.[125] Most descriptions of the concept are circular: a utility is a company, such as a telephone network, water, or electricity provider, which has special obligations because it functions as a public utility.[126] Yet there is a long history of

123. Amendment of Sections 64.702 of the Commission's Rules and Regulations (Third Computer Inquiry) (*Computer III*), 104 F.C.C.2d 958 (1986) (report and order).

124. Regulatory and Policy Problems Presented by the Interdependence of Computer and Communication Services and Facilities (*Computer I Final Decision*), 28 F.C.C.2d 267 (1971) (final decision and order).

125. I refer here to "utility" in the sense of a regulated provider of certain services. *See* Pablo T. Spiller & Mariano Tommasi, *The Institutions of Regulation: An Application to Public Utilities*, *in* HANDBOOK OF NEW INSTITUTIONAL ECONOMICS 515, 519 (Claude Menard & Mary M. Shirley eds., 2005) (defining a utility as a service with large sunk costs, economies of scale, and massive consumption). In economics, "utility" has a precise meaning: the total satisfaction derived from consumption of a good or service. GREGORY MANKIW, PRINCIPLES OF MICROECONOMICS 442–43 (5th ed. 2008); JOHN VON NEUMANN & OSKAR MORGENSTERN, THEORY OF GAMES AND ECONOMIC BEHAVIOR 15–16 (1946).

126. *See* COLUMBIA ENCYCLOPEDIA 2592 (6th ed. 1993) ("[I]ndustry required by law to render adequate service in its field at reasonable prices to all who apply for it. Public utilities frequently operate as monopolies in their market. In the United States, public utilities are most commonly involved in the business of supplying consumers with water, electricity, telephone, natural gas, and other necessary services."); WEST'S ENCYCLOPEDIA OF AMERICAN LAW 173 (2d ed. 1998) ("A public utility is a business that furnishes an everyday necessity to the public at large. Public utilities provide water, electricity, natural gas, telephone service, and other essentials."); *see also* Rick Geddes, *Public Utilities*, *in* 3 ENCYCLOPEDIA OF LAW AND

legal doctrine and case law on the regulatory treatment of public utilities, mostly from the late nineteenth and early twentieth centuries.[127] To allow the federal government to impose social and worker protections, U.S. courts developed a doctrine permitting regulation of private business activities that were "affected with a public interest."[128] At the time, the Supreme Court was skeptical of the regulation of private businesses without an express constitutional mandate.[129] Modern courts have little difficulty finding government actions supported under either the general police power or the power to regulate interstate commerce. During the Progressive Era, however, expansive government desires to regulate the terms and conditions of powerful corporate interests ran up against limited doctrinal theories of government power.[130]

Certain businesses, such as ferries and ports, had been subject to limitations on their business practices for centuries; these limitations typically required them to provide service to all comers on a nondiscriminatory basis.[131] Progressives built on this foundation to justify reforms that restricted businesses' dealings with their customers, employees, and competitors. The first legal challenge was to fit this "common carriage" concept into a doctrinal rubric. The

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ECONOMICS 1162 (Boudewijn Bouckaert & Gerrit De Geest eds., 2000) ("[Public utility] industries share a common 'network' structure, in that they have an extensive distribution system of lines, pipes, or routes requiring the use of public rights of way, often with strong physical linkages between component parts.").

127. The concept was well-entrenched in American jurisprudence in the early twentieth century. *See* Gustavus H. Robinson, *The Public Utility Concept in American Law*, 41 HARV. L. REV. 277, 277 (1928) ("Since not long after the Civil War we have accustomed ourselves to 'private business' as one large category, and 'public business' as another.").

128. Walton H. Hamilton, *Affectation with Public Interest*, 39 YALE L.J. 1089, 1100–01 (1930). *See generally* BRUCE WYMAN, THE SPECIAL LAW GOVERNING PUBLIC SERVICE CORPORATIONS AND ALL OTHERS ENGAGED IN PUBLIC EMPLOYMENT (1911) (discussing the "affected with a public interest" doctrine); Charles Fairman, *The So-Called Granger Cases, Lord Hale, and Justice Bradley*, 5 STAN. L. REV. 587 (1953) (same); Breck P. McAllister, *Lord Hale and Business Affected with a Public Interest*, 43 HARV. L. REV. 759 (1930) (same).

129. *See* Stephen A. Siegel, Lochner *Era Jurisprudence and the American Constitutional Tradition*, 70 N.C. L. REV. 1, 3, 24 (1991) (explaining that, during the *Lochner* era, the Court generally believed that the "concepts used to resolve constitutional disputes must be contained in the Constitution, or must so clearly effectuate goals contained in the Constitution that for all intents and purposes they may be conceived of as being contained in the Constitution").

130. *See* Cass R. Sunstein, Lochner*'s Legacy*, 87 COLUM. L. REV. 873, 880 (1987) ("In the *Lochner* era itself, of course, the police power could not be used to help those unable to protect themselves in the marketplace.").

131. *See* Hamilton, *supra* note 128, at 1093–94 (discussing Lord Hale's argument that wharves necessary to the public could not charge excessive rates for use).

second was to expand common carriage to cover the newly emerging business powers of an industrializing nation.

The leading case, *Munn v. Illinois*,[132] was decided in 1876.[133] The Supreme Court held that the state of Illinois could set rates and other terms for grain elevators on the shores of Lake Michigan.[134] The Court concluded that the grain elevators, although not traditional common carriers, were nonetheless "affected with a public interest."[135] As such, they were subject to greater regulatory oversight than private businesses. The Court in *Munn* traced this doctrine to an eighteenth-century treatise by English jurist Matthew Hale.[136]

In the years following *Munn*, the courts struggled to define the boundaries of "affectation with the public interest."[137] The doctrine was criticized for being nothing more than a catch-all category for things that the courts wanted to regulate.[138] Even those who defended it acknowledged that the term was essentially a marker for allowing legislatures to act in appropriate ways to enforce public policy objectives.[139]

Finally in 1934, in *Nebbia v. New York*,[140] the Supreme Court gave up the game: "The phrase 'affected with a public interest' can, in the nature of things, mean no more than that an industry, for adequate reason, is subject to control for the public good."[141] The Court, under its more expansive New Deal vision of the Constitution, was willing to permit public regulation of private businesses without the legal fiction of some distinct industrial category. Although the constitutional basis for development of the "affectation with the public interest" test disappeared in the first half of the twentieth century, the concept endures. At a general level, the endurance of the

132. Munn v. Illinois, 94 U.S. 113 (1876).

133. *Id.* at 113.

134. *Id.* at 130–31.

135. *Id.* at 127.

136. Sir Matthew Hale, *De Portibus Maris*, *in* A COLLECTION OF TRACTS RELATIVE TO THE LAW OF ENGLAND 72, 79 (Francis Hargrave ed., 1787).

137. *See* Hamilton, *supra* note 128, at 1096–1106 (describing post-*Munn* cases in which courts came to varying conclusions about what "affectation with the public interest" meant).

138. *See* Robinson, *supra* note 127, at 280–81 (arguing that extensions of the doctrine to grain elevators, stockyards, and a cold storage business were accomplished "by the method of real or fictional analogy").

139. *See* Hamilton, *supra* note 128, at 1106–07 ("The question is to be approached as an aspect of the public policy for the control of an industry.").

140. Nebbia v. New York, 291 U.S. 502 (1934).

141. *Id.* at 536.

concept, despite its analytical flaws, demonstrates that even in the limited governmental area, some regulation of private market actors is necessary to avoid market failures.[142]

More specifically, the public-interest concept made the jump from common law doctrine to legislative command for the administrative agency overseeing the telecommunications sector. The Radio Act of 1927,[143] the precursor to the 1934 Communications Act, which established the modern FCC, introduced the requirement that wireless licensees serve the "public interest, convenience, or necessity."[144] This phrase was incorporated into both the Communications Act and the 1996 Act as a central policy mandate. Regulated common carriers such as AT&T were given extraordinary protection by the government against competition, and, in return, they bore special obligations as public utilities. Only a regulated carrier, for example, could provide "message switching," or services analogous to telephone service, but it had to do so at rates and terms approved by both the FCC and state regulatory commissions.[145]

Since the 1970s, there has been a dramatic shift away from intrusive public utility regulation and toward the facilitation of competition.[146] Some remnants of public utility regulation—like exclusive franchises, rate regulation, tariffing, and other mechanisms—remain in energy and transportation, but they have

142. *See* Paul Kens, Property, Liberty, and the Rights of the Community: Lessons from *Munn v. Illinois* 7 (May 21, 2010) (unpublished manuscript), *available at* http://ssrn.com/abstract=1612824 ("The pervasiveness of regulations of business practices [in the nineteenth century] undoubtedly reflects an understanding among the era's people, policy makers, and judges that, while the right to own private property was inviolable, the uses to which it might be put was subject to regulation.").

143. Radio Act of 1927, ch. 169, 44 Stat. 1162.

144. Erwin G. Krasnow & Jack N. Goodman, *The "Public Interest" Standard: The Search for the Holy Grail*, 50 FED. COMM. L.J. 605, 606 (1998) (discussing the legislative history of the "public interest" standard in the 1927 Radio Act); *see also* Kevin Werbach, *Supercommons: Toward a Unified Theory of Wireless Communication*, 82 TEX. L. REV. 863, 870–71 (2004) (discussing the history of the Radio Act of 1927).

145. These limitations were relaxed over the years and were substantially transformed by the 1996 Act. *See* NUECHTERLEIN & WEISER, *supra* note 2, at 69–74 (describing the goals of the 1996 Act with regard to wireline carriers).

146. *See generally* Joseph D. Kearney & Thomas W. Merrill, *The Great Transformation of Regulated Industries Law*, 98 COLUM. L. REV. 1323 (1998) (describing the dramatic changes in the United States' approach to regulating communications in the last quarter of the twentieth century).

largely disappeared from telecommunications.[147] The 1996 Act represented a decisive break from the model of regulated monopoly.[148] The FCC's role is now to promote competition through access regulation and other means, not to substitute for it.

The concept of the public utility remains relevant, even as the regulatory approaches historically associated with it have disappeared from the communications sector. As many commentators have recognized, and as courts eventually acknowledged, the doctrine was never really about a well-defined class of monopoly service providers.[149] Public utility regulation was always a means to serve public policy ends for network platforms and other businesses with bottleneck control. Even in the current deregulatory era, the possibility of market failure supports both antitrust and sectoral regulation. Take away the historical association between public utility regulation in telecommunications and exclusive monopoly franchises, and what endures is the recognition that some private firms can raise public concerns. As Professors Oren Bracha and Frank Pasquale have pointed out, regulatory mechanisms to promote fairness and accessibility have been applied to many private entities that wield significant exclusionary power.[150] The first question to ask, therefore, is whether particular services and service providers raise the same concerns that have motivated public utility regulation. In the 1960s, many experts in the new field of computer science were convinced such concerns were on the horizon. Unsurprisingly, they described the emerging systems with the term "computer utility."

147. For a discussion on some of the traditional regulatory approaches that were eschewed by the 1996 Act, see Howard A. Shelanski, *Adjusting Regulation to Competition: Toward a New Model for U.S. Telecommunications Policy*, 24 YALE J. ON REG. 55, 63–69 (2007).

148. *See* Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56, 56 (codified as amended in scattered sections of 47 U.S.C.) ("An Act to promote competition and reduce regulation . . . .").

149. *See supra* note 138 and accompanying text.

150. *See* Oren Bracha & Frank Pasquale, *Federal Search Commission? Access, Fairness, and Accountability in the Law of Search*, 93 CORNELL L. REV. 1149, 1175–76 (2008) ("When a private party occupies an extraordinary position of power that makes it indispensable to others for obtaining certain important resources, goods, or services, and when alternatives are very limited, traditionally there has been more receptiveness to the application of fairness and accountability norms."); *see also* Frank Pasquale, *Beyond Innovation and Competition: The Need for Qualified Transparency in Internet Intermediaries*, 104 NW. U. L. REV. 105, 112 (2010) (developing further the arguments for Internet intermediaries more generally).

B. The Computer Utility Vision

The convergence of communications and computing is not a new phenomenon. In fact, it was an anomaly that most computers during the period roughly between 1980 and 2000 were individual PCs that did not interconnect with one another remotely. Systems that used circuits from telecommunications operators to deliver computing services at a distance were developed not long after the first digital computers were created.[151] By the 1960s, it was estimated that more than half of all computers would be tied into communications networks within a decade.[152] The interdependence of computers and communications was a hot topic of debate in the late 1960s, before the Internet even existed.[153] And major network operators at that time were cognizant that computers would increasingly become the technical foundation for the telecommunications system itself. The debate at the FCC about how to keep computers *out* of the regulatory quagmire actually began as a discussion about how to bring them *in.* The term for the original vision of computing fused with communications was the computer utility.

The phrase "the computer utility," though it has faded from use, was widely employed among computer scientists and related thinkers in the 1960s.[154] These researchers had a strong belief that centralized

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151. *See infra* notes 161–62 and accompanying text.

152. Bernard Strassburg, *The Computer Utility—Some Regulatory Implications*, 9 JURIMETRICS J. 19, 20 (1968) ("It is predicted . . . that by 1970 some 60 percent of all computers will be tied into the nation's communications network . . . .").

153. *See, e.g.*, Manley R. Irwin, *The Computer Utility: Competition or Regulation?*, 76 YALE L.J. 1299, 1299 (1967) ("Within the decade, electronic data centers will provide computational power to the general public in a way somewhat analogous to today's distribution of electricity. Computer systems will blanket the United States, establishing an informational grid to permit the mass storage, processing, and consumption of a variety of data services . . . ."); Delbert Smith, *The Interdependence of Computer and Communications Services and Facilities: A Question of Federal Regulation*, 117 U. PA. L. REV. 829, 829 (1968) ("Numerous and sophisticated interconnections between computer and communication services and facilities have raised problems of regulatory policy that are aggravated by the anomaly of partial regulation: communications carriers are regulated under the Communications Act of 1934, but computer services remain thus far unregulated." (footnote omitted)).

154. *See, e.g.*, C.C. BARNETT, JR., B.R. ANDERSON, W.N. BANCROFT, R.T. BRADY, D.L. HANSEN, H. SIMMONS, D.C. SNYDER, D. WECHSLER & J.L. WILCOX, THE FUTURE OF THE COMPUTER UTILITY (1967); D.F. PARKHILL, THE CHALLENGE OF THE COMPUTER UTILITY (1966); Greenberger, *supra* note 1; Elizabeth Fowler, *Computer Utility Set*, N.Y. TIMES, Apr. 15, 1965, at 45; J.C.R. Licklider & Robert W. Taylor, *The Computer as a Communication Device*, SCI. & TECH., Apr. 1968, *reprinted in* SYS. RESEARCH CTR., RESEARCH REPORT 61, IN MEMORIAM: J.C.R. LICKLIDER 1915–1990, at 21 (1990), *available at* http://www.hpl.hp.com/techreports/Compaq-DEC/SRC-RR-61.pdf; Paul Baran, *Communication Policy Issues for the*

networked computing systems represented a major new class of public utility alongside electricity and telephone systems.[155] And those who articulated this vision understood that it meant the convergence of computing and regulated communications. For example, the introduction to the proceedings from a major series of academic symposia on the topic, published in 1968, concluded confidently that "the data processing industry and the communications common carriers have been led inexorably toward the concept of the computer utility."[156]

The technical foundations of the computer utility were time-sharing systems that allowed many users to access the same mainframe computer through remote communications links.[157] Modern electronic computers were first developed around the time of World War II, originally for military and scientific applications. In the post-war years, vendors such as IBM, Honeywell, NCR, and Burroughs began to sell mainframe computers to large businesses.[158] These devices were so large and expensive that only the biggest corporations, academic institutions, and government agencies could

Coming Computer Utility (RAND Paper Series, Paper No. P-3685, 1968); Chris McDonald, The Computer Democracy: The Politics of the Computer-Communications Infrastructure from the Computer Utility to the Internet (Oct. 1, 2009) (unpublished manuscript) (on file with the *Duke Law Journal*).

155. *See, e.g.*, Baran, *supra* note 154, at 2 ("There is a growing belief that we may be moving into an era where information processing is bought just like electricity—a computer utility.").

156. Fred Gruenberger, *Preface* to COMPUTERS AND COMMUNICATIONS—TOWARD A COMPUTER UTILITY, at vii, vii (Fred Gruenberger ed., 1967).

157. Time sharing grew out of advances pioneered by the Air Force's SAGE anti-aircraft targeting computer, which was designed at MIT. *See* PARKHILL, *supra* note 154, at 55–58 ("Of greatest importance . . . is the fact that the SAGE computing system is an on-line real-time time-shared system that is simultaneously employed by many different users."); McDonald, *supra* note 154, at 1 ("In the first half of the 1960's, researchers at MIT and elsewhere extended the work done on SAGE to create a new technique known as time-sharing.").

158. *See* NICHOLAS CARR, THE BIG SWITCH: REWIRING THE WORLD, FROM EDISON TO GOOGLE 49 (2008) ("Soon after the first UNIVAC appeared, IBM introduced its own line of mainframe computers, the 701 series, and by 1960 Honeywell, General Electric, RCA, NCR, Burrough, and AT&T's Western Electric division were all in competition to sell computer gear."); Greenberger, *supra* note 1, at 63 ("[I]n 1954, a UNIVAC was delivered to the General Electric Company in Louisville for business use. . . . [In 1964] there [were] probably more than twenty thousand computers in use within the United States, and correspondingly large numbers [were] installed in many other countries around the world.").

afford them.[159] Access was limited to a small cadre of scientists and staff associated with those institutions.[160]

Time-sharing technology parceled out the mainframe's processing capacity into extremely short time slices. Several users could therefore program and receive output from the same machine at the same time. Each user had the impression of continuous access to the machine.[161] In an era before personal computers, time sharing was a revolutionary technique. It allowed anyone with the requisite skills access to computational capacity, instead of just those within major corporations and government or academic research centers.[162] The development of remote terminals expanded the power of time sharing still further. With these terminals, a programmer could interact with a computer from a remote location by using a telephone network link. Decades before it was feasible to build a small computer affordable enough for an individual user, remote time sharing created the experience of individual, local interaction with computer processing.

A major locus of computer utility development was Project MAC, an early time-sharing system developed at MIT.[163] Professor Robert Fano, the head of Project MAC, drew an analogy between remote networked computing and traditional utilities such as electricity, in that both offered on-demand access to greater capacity

159. *See* CARR, *supra* note 158, at 52 ("Because it was so expensive to buy or lease mainframes—the rent on a typical IBM computer was about $30,000 a month in the mid-1960's—a company had to keep the machine in constant use if it was to justify the expense.").

160. For further discussion of the early history of computers, see Harry D. Huskey, *Computers—Academy to Industry*, *in* COMPUTERS AND COMMUNICATIONS, *supra* note 156, at 53, 53–58.

161. *See* PARKHILL, *supra* note 154, at 51 (noting that the computer utility includes features such as "[e]ssentially simultaneous use of the system by many remotely located users" and "[a]vailability of at least the same range of facilities and capabilities at the remote stations as the user would expect if he were the sole operator").

162. *See* McDonald, *supra* note 154, at 3 ("A decade before computer hobbyists on the West Coast created the personal computer, the computer utility vision of how computing could be brought to the masses captured the imagination of researchers, computer businesses, and the popular press.").

163. *See* R.M. Fano, *The MAC System: The Computer Utility Approach*, IEEE SPECTRUM, Jan. 1965, at 56, 56 (describing the MAC project and pointing out that MAC stood for, among other things, "multiple-access computer"); McDonald, *supra* note 154, at 1 ("In the first half of the 1960's, researchers at MIT and elsewhere extended the work done on SAGE to create a new technique known as time-sharing.").

than any individual user could maintain.[164] As Fano astutely noted, the computer utility offered three additional benefits, compared to a relatively nondifferentiated input such as electricity: "a great variety of services," the ability for a user to "store and retrieve his own private files of data and programs," and a "convenient means for collaboration."[165] The research conducted through Project MAC in the early 1960s, along with other academic time-sharing projects, created broad awareness in the academic community about the potential of such systems.[166]

Time sharing also created new business opportunities. Companies such as Computer Sciences Corporation, University Computing Corporation, and General Electric established computing service bureaus, which offered customers access to time-shared computing capacity.[167] These service bureaus became a hot growth market in the late 1960s.[168] Western Union, still a major regulated common carrier even though its telegraph service had been eclipsed by the telephone, announced plans for a major push into the computer utility business.[169] The commercial time-sharing market was

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164. *See* Fano, *supra* note 163, at 56 (discussing "the notion of a community utility capable of supplying computer power to each 'customer'" that was "analogous to an electrical distribution system").

165. *Id.* at 56–57. These elements—on-demand capacity, service delivery, partitioned access to private data or applications, and collaboration capabilities—are at the heart of today's cloud computing platforms. *See infra* Part III.B.1.

166. *See* McDonald, *supra* note 154, at 5 ("Despite their very limited capabilities . . . early time-sharing systems made conceivable to Fano, Kennedy, and others, especially within the academic community, something like a public utility for computer power.").

167. *See* HOMER R. OLDFIELD, KING OF THE SEVEN DWARFS: GENERAL ELECTRIC'S AMBIGUOUS CHALLENGE TO THE COMPUTER INDUSTRY, at v–vi (1996) (describing the creation of the GE Computer Department and noting that "the Computer Department pioneered in the development of time-sharing and multi-processing techniques"); McDonald, *supra* note 154, at 5 ("Numerous computer businesses latched onto the idea that time-sharing and the information utility were the wave of the future."). Interestingly, IBM, the dominant company in the computer industry, was barred from serving as a service bureau under the terms of a 1956 consent decree. United States v. IBM Corp., 1956 Trade Cas. (CCH) ¶ 68,245, at 71,125 (S.D.N.Y.). IBM nonetheless developed an offering under which a user would bring data to an IBM data center, process it, and pay IBM for the computer time, rather than the processing service per se. Smith, *supra* note 153, at 834. This model bears striking similarities to the public cloud computing model now embraced by Amazon.com and others. *See infra* Part III.B.1.

168. *See* McDonald, *supra* note 154, at 5 (noting that businesses invested in time-sharing machines in part to "take advantage of red-hot capital markets for high-tech companies").

169. *See id.* ("Most ambitious of all was Western Union. Driven to reinvent itself as something more than a telegraph company . . . it announced plans in 1965 to become a national information utility." (citation omitted)).

estimated at $70 million in 1968, but analysts at the time estimated that it would grow to over $1 billion in 1973.[170]

The computer utility systems of the 1960s supported only a few dozen or hundred users simultaneously and offered text-only functionality that a modern PC user would find archaic. Despite these limitations, advocates envisioned them as the starting point for something far grander: national-scale public computer utilities that would transform business, shopping, entertainment, public services, and more.[171] Descriptions of the computer utility from the mid-twentieth century are eerily prescient. For example, the definition in a leading book on the concept, published in 1966 by Mitre Corporation researcher Douglas Parkhill, sounds exactly like the modern Internet: "As generally envisaged, a computer public utility would be a general-purpose public system, simultaneously making available to a multitude of diverse geographically distributed users a wide range of different information-processing services and capabilities on an on-line basis."[172]

Parkhill described the computer utility as offering simultaneous access to many remote users; concurrent operation of multiple applications; availability of the same features remotely as a local computer would offer; a fee structure for access; flexibility to add capabilities while the system was still operating; and "a capacity for indefinite growth, so that as the customer load increases, the system can be expanded without limit by various means."[173] Parkhill and others also recognized that some computer utilities would be publicly available and some privately operated for internal corporate or government use.[174]

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170. Manley R. Irwin, *Computers and Communications: The Economics of Interdependence*, 34 LAW & CONTEMP. PROBS. 360, 361 (1969); *see also Whole New Market*, FORBES, July 1, 1969, at 43, 43 (predicting that, "[b]y some estimates, AT&T revenues will reach $35.5 billion in 1980, with at least half generated by data communications"). These rosy predictions proved unfounded. In hindsight, the computer utility bubble could be compared to the Internet bubble that inflated and then popped thirty years later.

171. *See* JOHN G. KEMENY, MAN AND THE COMPUTER 21 (1972) (arguing that "[i]t is only through [time-sharing] that a true symbiotic relationship between man and computer is possible"); PARKHILL, *supra* note 154, at 154–66 (arguing that a computer utility would lead to a new monetary system, computerized shopping, shared information services, interactive processing, automatic publishing, and improved economic planning and control).

172. PARKHILL, *supra* note 154, at 3. The epigraph for this Article, published in 1964, is another example. *See supra* note 1 and accompanying text.

173. PARKHILL, *supra* note 154, at 51–52.

174. *See id.* at 52 ("In addition to the general-purpose public form, there are countless other possible shapes that a computer utility might take. These include private general-purpose

The computer utility vision also drew on a then-influential concept from computer science called Grosch's law.[175] Grosch's law held that the performance of a computer system increases at the rate of the square of its cost.[176] In other words, computer deployments have significant economies of scale, because the price-performance ratio of a computer increases as the computer grows. A larger computing installation would have an inherent performance or pricing advantage over a smaller one. All things being equal, therefore, the market would tend toward large centralized computing systems.[177]

This vision mirrored the natural-monopoly rationale for communications regulation that also held sway at the time.[178] According to this theory, telecommunications networks had strong economies of scale due to their high fixed costs and the scale efficiencies of large providers such as AT&T.[179] AT&T could provide phone calls at a lower marginal cost than smaller independent

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systems, private special-purpose systems such as those used for airline-reservation purposes, public special-purpose systems, public and private multiple-purpose systems, and a whole hierarchy of increasingly complex general-purpose public systems . . . .").

175. *See* HUBER ET AL., *supra* note 36, at 1089 ("In computing at that time, bigger was better."); George Gilder, *The Information Factories*, WIRED, Oct. 2006, at 178, 202 ("Google's magical ability to distribute a search query among untold numbers of processors and integrate the results for delivery to a specific user demands the utmost central control. This triumph of centralization is a strange, belated vindication of Grosch's law, the claim in 1953 that computer power rises by the square of the price.").

176. JULIA LOBUR & LINDA NULL, THE ESSENTIALS OF COMPUTER ORGANIZATION AND ARCHITECTURE 589 (2006). By the end of the twentieth century, computer scientists considered Grosch's law to be disproven. PAUL A. STRASSMANN, THE SQUANDERED COMPUTER 31–32 (1997).

177. *See* STRASSMAN, *supra* note 176, at 31 ("[T]he profitability of computerization would show up when firms bought large-scale equipment and centralized the workload in data centers for more efficient processing.").

178. *See* NUECHTERLEIN & WEISER, *supra* note 2, at 12 (describing a natural monopoly as a market in which, because prices to the consumer are lowest when one firm is providing the service, "scale economies keep increasing until a provider is serving all customers in the market"); W. KIP VISCUSI, JOSEPH E. HARRINGTON, JR. & JOHN M. VERNON, ECONOMICS OF REGULATION AND ANTITRUST 337–60 (3d ed. 2000) (explaining the economics behind natural monopolies and proposed solutions).

179. A more modern argument with a similar thrust focuses on network effects. S*ee* NUECHTERLEIN & WEISER, *supra* note 2, at 4–10 (arguing that certain industries, such as telecommunications, tend toward monopoly because "the value of the network to *each* user increases or decreases, respectively, with every addition or subtraction of *other* users to the network"); CARL SHAPIRO & HAL VARIAN, INFORMATION RULES: A STRATEGIC GUIDE TO THE NETWORK ECONOMY 173–75 (1998) ("Whether real or virtual, networks have a fundamental economic characteristic: the value of connecting to a network depends on the number of *other* people already connected to it.").

operators, so it would eventually win out. Competition was seen as an impediment to efficient functioning of the market. One large integrated provider such as AT&T was superior to many smaller competitors, so it made sense for the regulatory system to enshrine the monopoly control of that dominant provider. These assumptions animated the regulatory debates that followed.

C. Convergence Regulation: The Prequel

During the heyday of the computer utility, researchers and policymakers engaged in significant discussion about the legal and regulatory implications of this new phenomenon.[180] Because remote time sharing required interconnection with communications circuits, it impinged on the domain of the FCC. The communications regulatory world of the 1960s, however, was very different than that of the early twenty-first century. An emphasis on opening up competitive opportunities and facilitating market-based solutions has largely replaced the direct price regulation of monopoly service providers.[181] Instead of a few vertically integrated but horizontally siloed providers such as AT&T and ABC, the FCC now oversees a fragmented and overlapping communications marketplace. These differences, along with the computer utility as the model for networked data services, explain the FCC's subsequent path of quarantining data services from regulated communications. Ironically, the most prominent dispute of the 1960s never produced an FCC decision, although it laid the groundwork for what came later.

1. *Bunker Ramo.* The Bunker Ramo Corporation was an early computer services firm. Among other things, it developed some of the first electronic reservation systems for major airlines.[182] It also offered electronic quotations services for the brokerage industry. These services allowed stock brokers to obtain up-to-date stock prices through remote data terminals in their offices. In 1964, Bunker Ramo developed a new service, Telequote IV, that added two-way

180. *See, e.g.*, PARKHILL, *supra* note 154, at 145–52 (discussing some of the legal issues unique to computer public utilities).

181. *See supra* text accompanying notes 146–48.

182. *See* William Shelton Mackenzie, The Legal and Competitive Aspects of the "Computer Utility" 51 (1968) (unpublished MBA project, the Wharton School, University of Pennsylvania) (on file at Lippincott Library, University of Pennsylvania) ("[Bunker Ramo] is a pioneer in airline reservation systems, designing installations for Braniff, United, Trans-World, and American Airlines.").

communications capabilities to its brokerage product.[183] Now brokers could not only receive quotes, but could also place trades or communicate with other brokers directly through the system. The one problem with Bunker Ramo's service was that to reach its customers' remote terminals, the service needed communications circuits to connect its data center to the telephone network.

AT&T and Western Union both refused to provide the requested lines.[184] They argued that Bunker Ramo was improperly engaging in a regulated common carrier service because Telequote IV allowed brokers to communicate with each other.[185] Resale of communications services was, at the time, prohibited; carriers had a protected monopoly enforced by the FCC. Bunker Ramo argued that its offering was primarily a data processing service and that the capacity for direct communication between brokers was merely incidental.[186] The carriers rejected this claim and refused to provide the necessary lines.[187] Western Union then introduced a service offering of its own, called SICOM, that was "virtually indistinguishable from Telequote IV."[188]

Bunker Ramo took its case to the FCC. It argued that AT&T and Western Union were improperly refusing to provide service because it was primarily an unregulated data processing provider, not a provider of regulated communications service.[189] It also argued that Western Union was engaged in discrimination by providing the circuits to its own SICOM service and not to Bunker Ramo's competitive offering.[190] After a series of counteraccusations, AT&T

183. *See id.* ("In 1964–1965, the company initiated what it called Telequote IV, a stock quotation system for brokers, which included the capability for communication not only between a remote terminal and a centralized computer, but also between various customers subscribing to the Telequote IV service.").

184. *Id.* at 51–52.

185. *Id.* at 53.

186. *See id.* at 52 ("Bunker-Ramo claimed that communications was 'incidental' to the overall Telequote IV service, and that broker-to-broker communications accounted for approximately 2% of the communication utilization.").

187. *Id.* at 51–52.

188. *Id.* at 54.

189. *See* GERALD W. BROCK, THE SECOND INFORMATION REVOLUTION 172–73 (2003) (explaining that Bunker Ramo "was treated as an unregulated data processing service" and that the company sought to add a service that allowed buying and selling of stock prices, as opposed to simple stock quotations, but was denied by AT&T because AT&T believed Bunker Ramo to be a service communications company).

190. Mackenzie, *supra* note 182, at 56–58 (explaining that, although Western Union argued that "the lines it leases to customers and the lines that it uses for the SICOM offering are not

and Bunker Ramo negotiated a resolution of their dispute, and Bunker Ramo ultimately withdrew Telequote IV before the FCC had an opportunity to rule on it.[191]

The Bunker Ramo controversy highlighted the concern that networked data processing services depended on access to communications infrastructure. The computer utility was a hybrid of communications and computing, but communications in the 1960s was a regulated monopoly. If the network operator failed to provide communications capacity, or did so at excessive prices or with poor service quality, the associated computing service could not succeed.

These issues have only become more salient in the intervening years. Concerns that network operators will block or degrade potentially competing services lie at the heart of network neutrality. The Comcast–Level 3 dispute reflects the same dynamics.[192] Level 3 argued that Comcast was imposing charges for carriage of Netflix traffic at least in part because Netflix represented a threat to Comcast's video business.[193] Level 3 saw itself as a user of Comcast's connections to provide information services to its customer, Netflix. Comcast, in essence, saw Level 3 as a carrier seeking to avoid proper carrier treatment.

The Bunker Ramo incident, now forgotten, anticipated the network neutrality fight by forty years. It was also a significant impetus for the FCC's examination of the regulatory issues that the new computer utilities posed.[194] Partly in response to the controversy, the Commission began its long effort to define the boundaries between communications and computing.

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the same," Bunker Ramo argued that "users of SICOM are being allowed to effectively share private lines provided by the carrier at greatly reduced rates").

191. Hanan Samet, *Computers and Communications: The FCC Dilemma in Determining What to Regulate*, 28 DEPAUL L. REV. 71, 75 n.19 (1978).

192. *See supra* Part I.B.

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

194. *See* Samet, *supra* note 191, at 75 ("The first computer inquiry was prompted, in part, by a dispute between the Bunker-Ramo Corporation and Western Union."); Note, *The FCC Computer Inquiry: Interfaces of Competitive and Regulated Markets*, 71 MICH. L. REV. 172, 192 (1972) (describing the "ruinously slow" legal process in the Bunker Ramo case); Barry Taub, Comment, *Federal Communications Commission Regulation of Domestic Computer Communications: A Competitive Reformation*, 22 BUFF. L. REV. 947, 961 (1973) (explaining the dispute and the FCC's response).

2. Computer I. In 1966, the FCC launched what became known as *Computer I*,[195] the first of three major cycles over three decades referred to collectively as the *Computer Inquiries*.[196] The *Computer I* Notice of Inquiry did not explicitly reference the Bunker Ramo controversy or the computer utility discussions among computer scientists, but it reflected the prevailing wisdom that the futures of communications and computing were intertwined. The FCC highlighted computerized stock quotation offerings as an example at the outset of the Notice of Inquiry, most likely an allusion to the Bunker Ramo incident.[197]

For the time, *Computer I* was an intensely contested proceeding. Over sixty organizations filed comments, totaling over three thousand pages.[198] The FCC found the submissions so substantial that it hired the Stanford Research Institute (SRI) to review them and formulate recommendations.[199] FCC Common Carrier Bureau Chief Bernard Strassburg commented a few months after the proceeding was launched that "[t]he Inquiry has been characterized by many as the most important one the Commission has ever embarked upon."[200] It took the FCC five years from the Notice of Inquiry that began the proceeding to publish the Final Decision that adopted binding rules.

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195. Regulatory and Policy Problems Presented by the Interdependence of Computer and Communication Services and Facilities (*Computer I NOI*), 7 F.C.C.2d 11 (1966) (notice of inquiry); Regulatory and Policy Problems Presented by the Interdependence of Computer and Communication Services and Facilities (*Computer I Tentative Decision*), 28 F.C.C.2d 291 (1970) (tentative decision); *Computer I Final Decision*, 28 F.C.C.2d 267 (1971).

196. *See generally Computer III* Further Remand Proceedings: Bell Operating Company Provision of Enhanced Services, 10 FCC Rcd. 8360 (1995) (notice of proposed rulemaking) (recounting the history of the *Computer Inquiries*).

197. *See Computer I NOI*, 7 F.C.C.2d at 13 ("The communications common carriers are rapidly becoming equipped to enter into the data processing field.").

198. Donald A. Dunn, *Policy Issues Presented by the Interdependence of Computer and Communications Services*, 34 LAW & CONTEMP. PROBS. 369, 369 (1969).

199. *See* D.A. DUNN, STANFORD RESEARCH INST., REPORT NO. 7379B-1, POLICY ISSUES PRESENTED BY THE INTERDEPENDENCE OF COMPUTER AND COMMUNICATIONS SERVICES (1969) (summarizing and analyzing the responses to the FCC *Computer Inquiry*). The SRI report synthesized the comments and organized the issues in the proceeding, but it offered only limited guidance to the Commission in resolving the thorny issues. *Id.* at 54 ("[The data] is not complete enough to be of guidance in making specific and far reaching policy decisions.").

200. Strassburg, *supra* note 152, at 19. Two decades later, the FCC reaffirmed this assessment. *See Computer III*, 104 F.C.C.2d 958, 966–67 (1986) (report and order) ("The regulatory issues spawned by the technical confluence of regulated communications services and unregulated [computer networks] have been among the most important matters this Commission has dealt with over the past 20 years.").

The *Computer I* Final Decision distinguished "communications" from "data processing" functions.[201] The dominant regulatory question regarding the computer utility was its regulatory status.[202] *Computer I* answered the question of whether networked data processing systems were subject to the same rules as communications carriers. Under the regime of common carriage, communications network operators at the time were subject to extensive oversight, including tariffing and rate regulation.[203] Because the line between ordinary competitive companies and regulated carriers was so stark, the classification of a service as being on one side or the other was momentous. Companies might not even be allowed to operate if their service was declared to involve regulated common carriage, or they might be subject to extensive regulatory obligations.

Moreover, in a 1956 antitrust consent decree, AT&T agreed to limit itself to offering regulated communications services.[204] The

201. *See Computer I Final Decision*, 28 F.C.C.2d 267, 270 (1971) (declining to regulate computers but maintaining regulations over communications under the Communications Act). This was later refined by the FCC into a division between "basic" and "enhanced" services. *See Computer II*, 77 F.C.C.2d 384, 386 (1980) (final decision) (distinguishing "three categories of service—voice, 'basic non-voice' (BNV) and 'enhanced non-voice' (ENV)"); Cannon, *supra* note 56, at 183 ("Out of the analytical turmoil over classification of these services was born the basic versus enhanced services dichotomy."). In 1996, Congress ratified the FCC framework, creating analogous statutory categories of "telecommunications" and "information services." Telecommunications Act of 1996, Pub. L. No. 104-104, sec. 3(a)(2), § 153(41), (48), 110 Stat. 56, 59, 60 (codified at 47 U.S.C. § 153(20), (43) (2006)).

202. *See* PARKHILL, *supra* note 154, at 148–52 ("[T]he time has now arrived when it becomes possible to consider computer power to be a likely candidate for admission to the public-utility club."); Irwin, *supra* note 153, at 1308 ("If the FCC is to prevent the carriers from using its regulations to foreclose market entry, the Commission must either make it clear that communications services ancillary to data processing are outside its jurisdiction or else assume authority over computer utilities and begin regulating entrants from the data processing field."); Manley R. Irwin, *The Computer Utility: Market Entry in Search of Public Policy*, 17 J. INDUS. ECON. 239, 252 (1969) ("Two options are clearly open to time-shared computer services: competition or regulation."); Manley R. Irwin, *The Regulatory Status of the Computer Utility*, 43 LAND ECON. 223, 224 (1967) ("If nothing else, the FCC's investigation poses the fundamental question; is the computer utility destined to become a regulated utility?").

203. *See* WYMAN, *supra* note 128, at 115–16 (describing the legal demands placed on telephone systems because they have virtual monopolies on providing communications services); *see also* Werbach, *supra* note 83, at 1246–50 ("[C]ommon carriage concepts were incorporated wholesale into the Communications Act of 1934 (1934 Act), which created the Federal Communications Commission.").

204. United States v. W. Elec. Co., 1956 Trade Cas. (CCH) ¶ 68,246, ¶ 71,138 (D.N.J.) ("A T & T is enjoined and restrained from engaging . . . in any business other than the furnishing of common carrier communications services . . . ."); *see also* Susan P. Crawford, *Transporting Communications*, 89 B.U. L. REV. 871, 888–91 (2009) (discussing the implications of the 1956 consent decree).

dominant provider of common carrier communications services was thus barred from entering into unregulated lines of business, a restriction that would endure until the 1990s. If data processing was not a common carrier service, AT&T could not participate in the market. If, on the other hand, it was construed as falling within the regulatory scope of Title II of the Communications Act, remote data processing could *only* be offered by regulated common carriers. The computer utility marketplace was therefore either an unregulated space open only to new entrants or a market limited to the major incumbent. Competition and regulation were two mutually exclusive alternatives.

The announced goal of *Computer I* was to consider regulation of data processing services.[205] In other words, the original question was when and how such services might be brought within the ambit of the Communications Act. In the end, the FCC chose to define data processing as an unregulated offering.[206] It found that "the offering of data processing services is essentially competitive and . . . there is no public interest requirement for regulation by government of such activities."[207] Because competition and regulation were seen as alternatives at the time, finding data processing to be competitive implied that it was not appropriate for communications regulation.[208] The FCC thus found that providers of networked data processing services would not be treated as carriers. It concluded that "the market for these services [would] continue to burgeon and flourish best in the existing competitive environment."[209] The computer utility would develop outside of Title II of the Communications Act.

For companies already within Title II of the Communications Act, the decision had significant consequences as well. One important

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205. *See Computer I NOI*, 7 F.C.C.2d 11, 15–16 (1966) (stating a goal of identifying "under what circumstances data processing, computer information, and message switching services, or any particular combination thereof—whether engaged in by established common carriers or other entities—are or should be subject to the provisions of the Communications Act").

206. *See Computer I Final Decision*, 28 F.C.C.2d at 268 ("[W]e are not attempting to assert jurisdiction over common carriers as purveyors of computer services . . . .").

207. *Computer I Tentative Decision*, 28 F.C.C.2d 291, 297 (1970). The FCC cited estimates that there were more than eight hundred data processing service bureaus in operation, that more than five thousand data processing companies sold excess computer time and capacity on their systems, and that over one thousand banks offered data processing capacity to their customers. *Id.* at 297–98. It also found that the required capital to enter the market was low and that the market was growing quickly. *Id.*

208. *See supra* notes 201–03 and accompanying text.

209. *Computer I Tentative Decision*, 28 F.C.C.2d at 298.

effect was to bar AT&T from entering the computer utility market, because of the 1956 consent decree.[210] Other common carriers such as GTE and Western Union had no such prohibition, but the FCC created special obligations for their provision of data processing. The common carriers could do so only under terms of "maximum separation"—by establishing structurally separate entities that would deal at arms-length with the regulated carrier.[211] The carriers considered these restrictions so onerous that they challenged them in court, pointing out that the FCC was attempting to regulate carriers' provision of the very thing it had disclaimed any desire to regulate.[212] The Second Circuit eventually threw out some of the more extreme limitations, but it upheld the FCC's basic decisions.[213]

3. *Lessons of a Marriage Counselor. Computer I* had important consequences. It drew a regulatory line for the first time between the regulated world of communications and the unregulated world of computer processing. It prevented AT&T and the other major telephone companies from dominating the computer utility marketplace by virtue of their size and advantages of incumbency. The result of what Professor Steve Bickerstaff calls the "shackling" of AT&T was to allow the data networking market to develop along a different path: more distributed, independent, and small-scale.[214] Data networking delivered in this manner was a perfect fit for the PC when it arrived because it had never been tied to the model of large mainframes and dumb terminals that network operators envisioned in

210. *See id.* at 298–99 n.2 (discussing the effect of the consent decree on AT&T).

211. *Id.* at 302–04.

212. *See* GTE Serv. Corp. v. FCC, 474 F.2d 724, 730–32 (2d Cir. 1973) (discussing GTE's various challenges to the regulations).

213. *See id.* at 733–37. Although *GTE Service Corp. v. FCC*, 474 F.2d 724 (2d Cir. 1973), limited the FCC's authority to impose specific restrictions on unregulated data processing activities, it confirmed the FCC's jurisdiction to address data processing services that threatened to undermine its regulatory scheme for common carriers. *See* Werbach, *supra* note 48, at 555–57 (addressing regulatory concerns relating to the Internet).

214. *See* Steve Bickerstaff, *Shackles on the Giant*, 78 TEX. L. REV. 1, 61 (1999) ("It is reasonable to believe that, had it been positioned to do so, the Bell System would have been vigorous in its effort to curtail, delay, or defeat the challenge posed by personal computers and, to some extent, its effort would have included the development and implementation of network software and products designed to match or surpass what was available on personal computers.").

the 1960s.[215] The modern PC and Internet markets developed as a direct result of the FCC's actions in *Computer I*.[216]

The competitive dynamics in the communications and computing industries since the 1960s, however, should not obscure the realization that animated the FCC's inquiry: the two fields are inextricably interconnected. Bernard Strassburg, who at the time of *Computer I* served as chief of the FCC Common Carrier Bureau, described the FCC's role in the proceeding as similar to that of a "marriage counselor."[217] Much as a married couple's relationship evolves over time, dividing lines for computing and communication need to be reevaluated as market conditions change. The FCC revised the distinction between regulated and unregulated services in *Computer II*.[218] But it has not returned squarely to the fundamental question of when "data processing . . . should be subject to the provisions of the Communications Act."[219]

Moreover, the question of data processing regulation was, and is, not limited to whether such services are best treated as regulated common carrier offerings. In *Computer I*, the FCC also considered two other dimensions: service requirements for the communications inputs to unaffiliated data processing providers and data privacy.[220] The FCC found it unnecessary to resolve these questions in *Computer*

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215. A dumb terminal refers to an end-user computer that draws on a more powerful computer elsewhere on the network for its information, rather than performing significant processing itself.

216. *See* Bickerstaff, *supra* note 214, at 60–61 (discussing "the impact of *Computer I* on the commercial success of personal computers and the advent of services that has accompanied that success").

217. Bernard Strassburg, *Competition and Monopoly in the Computer and Data Transmission Industries*, 13 ANTITRUST BULL. 991, 991 (1968).

218. *See* Robert Cannon, *Where Internet Service Providers and Telephone Companies Compete: A Guide to the Computer Inquiries, Enhanced Service Providers and Information Service Providers*, 9 COMMLAW CONSPECTUS 49, 56 (2001) ("Basic telecommunication falls under Title II of the Communications Act and is subject to common carrier regulation and obligations. Enhanced services, in contrast, . . . are 'unregulated' by the Commission.").

219. *Computer I NOI*, 7 F.C.C.2d 11, 15–16 (1966). The debate over the FCC's jurisdiction over broadband Internet access addresses essentially the same issue, but it is framed very differently. *See* Werbach, *supra* note 48, at 541–45 (describing the expansion of the Internet and corresponding regulations). Having defined a particular instantiation of data processing that involves telecommunications as an integrated information service, the FCC is now seeking ways to pull it back into the statutory framework. Broadband, however, is only a limited subset of the Internet. *See supra* Part I.A.

220. *See* Calvin Davison, Stephen L. Babcock & John D. Leshy, *Computers and Federal Regulation*, 21 ADMIN. L. REV. 287, 290–91 (1969) (describing the inquiry into each of these subjects).

I.[221] The proceeding begun in 1968 continued for more than three decades and through three major waves of decisions, but communications inputs and privacy essentially dropped out of consideration. Facts on the ground have caught up with the issues the FCC raised in the 1968 Notice of Inquiry.[222]

In subsequent stages of the *Computer Inquiries*, the FCC allowed regulated carriers to offer what it called "enhanced services," subject first to structural separation, and then to nonstructural safeguards.[223] The *Computer Inquiry* regime survived the 1996 Act, but the FCC eventually decided that the restrictions were unnecessary in the new competitive deregulated marketplace.[224]

D. The Internet Instead

The *Computer Inquiry* outlasted the circumstances of its birth; the computer utility did not. The computer utility as a business concept died with the disruption of the commercial time-sharing industry in the recession of 1970–71.[225] At the same time, researchers moved on from the well-understood techniques of remote time sharing to the novel challenge of internetworking. From a technical standpoint, the work on Project MAC and other time-sharing systems in the 1960s laid the groundwork for the ARPANet in the 1970s, the NSFNet in the 1980s, and the commercial Internet in the 1990s and beyond.

There was, however, an important shift from computer utility systems to the direct precursors of the Internet. The time-sharing systems were fundamentally centralized. The computer utility in its original form was a way to give many users access to one machine through a distributed collection of dumb terminals. The Internet is a

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221. *See* Note, *supra* note 194, at 172–73 ("In 1966, the Federal Communications Commission launched the *Computer Inquiry* to explore the broad range of regulatory and policy problems generated by this technological development.").

222. *See infra* Part III.B.

223. *See* Cannon, *supra* note 218, at 56–57 (describing the steps to becoming an enhanced services provider under *Computer I* and *Computer II*).

224. *See* Appropriate Framework for Broadband Access to the Internet over Wireline Facilities, 20 FCC Rcd. 14,853, 14,875 (2005) (report and order and notice of proposed rulemaking) ("We decline to continue to impose any *Computer Inquiry* requirements on facilities-based carriers in their provision of wireline broadband Internet access service.").

225. *See* Martin Campbell-Kelly & Daniel D. Garcia-Swartz, *Economic Perspectives on the History of the Computer Time-Sharing Industry, 1965–1985*, 30 IEEE ANNALS HIST. COMPUTING 16, 16 (2008) ("The [computer utility] rhetoric was remarkably like that of the Internet's early years, except that the predictions never came to pass.").

far more distributed system, built not around the mainframe but around the minicomputer and the PC.[226] The Internet as it actually evolved is a mechanism for linking together these computers and their networks into a seamless virtual system.[227] The endpoints of the Internet are computers capable of engaging in their own processing and storage, and the "center" of the Internet does not exist because the Internet protocols link many fully autonomous networks in a flat topology.[228]

The standard history of the Internet emphasizes the role of idealistic, iconoclastic engineers in developing the network outside of the regulated communications industry.[229] The computer utility community in the 1960s, in contrast, was in the mainstream of academic research and corporate R&D.[230] Ironically, the vision of communications and computing in the countercultural 1960s was a centralized model controlled by the incumbents, whereas the Internet that actually developed in the 1970s was a decentralized, distributed system. The computer utility community failed to appreciate that a system of the scale and scope they imagined could develop from the bottom up through open standards and entrepreneurial creativity. On the other hand, the engineers who built the Internet failed to appreciate that their creation could not indefinitely operate outside of the regulated communications infrastructure but would incorporate it.

The success of the Internet demonstrates the value of open platforms.[231] As the visionaries of the computer utility recognized,

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226. *See* HUBER ET AL., *supra* note 36, at 1089 (joking that the founders of Apple Computer apparently failed to read the FCC's pronouncement about centralized computer utilities).

227. *See* Werbach, *supra* note 83, at 1250–57 ("Though widely described as one network, the internet is actually a collection of several thousand independent networks, whose common characteristic is an agreement to interconnect to deliver internet protocol (IP) datagrams.").

228. *See* Werbach, *supra* note 25, at 348 (noting that the Internet is composed of heterogeneous parts of layered and differing functionality).

229. *See generally* JANET ABBATE, INVENTING THE INTERNET (1999) (noting that, to some, "the system seemed at times to verge on anarchy," without centralized direction); KATIE HAFNER, WHERE WIZARDS STAY UP LATE: THE ORIGINS OF THE INTERNET (1996) (describing the Internet as a product of the efforts of both the Department of Defense and a number of individuals unaffiliated with the government); McDonald, *supra* note 154, at 4 (describing a libertarian conception of the Internet in which, "[r]ather than being driven by the initiative of governments and large corporations, new services would emerged [*sic*] from the individual initiative of widely distributed users").

230. *See* McDonald, *supra* note 154, at 2–3 (noting that the computer utility industry was established and relatively mainstream in the 1960s).

231. *See* Jonathan L. Zittrain, *The Generative Internet*, 119 HARV. L. REV. 1974, 1975–76 (2006) (noting that the Internet allows any computer or other information processor to become a part of the network easily, providing millions with access to information).

however, there are other important public policy issues to address. The Internet protocol architecture deliberately excluded specialized features for security and end-to-end reliability.[232] The engineers who designed the Internet decided that the costs of fossilizing those mechanisms into the core protocols would exceed the benefits, especially as the network evolved.[233] Indeed, this end-to-end approach has been a major factor in the Internet's success.[234] But this fact does not mean that concerns such as privacy and robustness are unimportant, especially because the Internet has reached a mass market level of adoption. The computer utility community posited these topics as important from the outset.

The story of the Internet as a purely private creation has always left a great deal out. The predecessor network that demonstrated workable packet switching and internetworking, ARPANet, was primarily funded by an arm of the Department of Defense.[235] The civilian network that later superseded it, NSFNet, was also federally funded and overseen. When the National Science Foundation (NSF) transitioned away from public funding and management of core Internet infrastructure in the early 1990s, it imposed transitional requirements, such as universal backbone interconnection through network access points (NAPs).[236] Even as these early interventions faded, their effects in shaping both the technical and business practices of the Internet community have endured.

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232. *See* BARBARA VAN SCHEWICK, INTERNET ARCHITECTURE AND INNOVATION 90–103 (2010) (describing decisions made by the engineers designing the Internet not to implement the most reliable features after weighing them against other considerations).

233. *See id*. at 93 (noting that the "costs of providing error control in the application outweigh the benefits of doing so" for most applications).

234. *See id*. at 101 ("Providing a connectionless, unreliable datagram service at the Internet layer, while placing connection-oriented functionality in transport-layer protocols operating end-to-end between end hosts, makes the Internet more robust.").

235. *See* ABBATE, *supra* note 229, at 43 (noting that ARPANet's source of funding was the Department of Defense's computing wing, ARPA).

236. *See* Brett M. Frischmann, *Privatization and Commercialization of the Internet Infrastructure: Rethinking Market Intervention into Government and Government Intervention into the Market*, 2 COLUM. SCI. & TECH. L. REV. 1, 19–20 (2001) (noting that the NSF and the NSFNet "community" created a new architecture for managing interconnection services); Jay P. Kesan & Rajiv C. Shah, *Fool Us Once Shame on You—Fool Us Twice Shame on Us: What We Can Learn from the Privatizations of the Internet Backbone Network and the Domain Name System*, 79 WASH. U. L.Q. 89, 115–17 (2001) (noting that the privatization of NSFNet meant that regional networks would have to choose a commercial backbone, rather than rely on a central backbone, as they had before the NSF's changes).

A renewed look at *Computer I* provides a deeper understanding of how regulatory decisions shaped the Internet. *Computer I* adopted a quarantine strategy for data processing services. These services were walled off from regulation, whereas the regulated carriers were either disallowed from providing them entirely, as AT&T was, or were subject to extensive structural restrictions, like the independent carriers were. The limitations of this approach became apparent quickly.[237] The FCC thought it could establish a dividing line between communications and data processing services by considering hybrid offerings on a case-by-case basis.[238] It was wrong. The exception swallowed the rule because the distinction between computing and communications became increasingly arbitrary as the communications network became increasingly digital.[239] Nonetheless, *Computer I* remained on the books for close to a decade, until the FCC refined the dividing line in its 1980 *Computer II* proceeding.[240]

The FCC's quarantine approach in *Computer I* allowed it to avoid confronting the hard questions that the computer utility visionaries raised back in the 1960s. The emerging data processing firms such as Bunker Ramo were less concerned about avoiding regulatory oversight than about using the power of the FCC to modulate their relationships with powerful common carriers. As unregulated users of the network, they were guaranteed access, but they were limited to the service offerings the carriers developed. And the public policy considerations the computer utilities themselves raised had no place in a discussion purely focused on regulatory boundaries.

The FCC's regulatory structure has evolved to some degree, but it has largely maintained the quarantine model first adopted in *Computer I*. The Internet, however, is evolving much faster. Cloud computing, one of the most significant developments in the Internet industry, is recreating the computer utility. And as a result, the regulatory concerns of the earlier debate have become relevant once again.

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237. *See supra* Part II.C.3.

238. *See Computer I Final Decision*, 28 F.C.C.2d 267, 276 (1971) (noting that the FCC would evaluate the character of particular services on an ad hoc basis).

239. *See* HUBER ET AL., *supra* note 36, at 1090–91 (noting that the FCC "declined even to give illustrative examples to help map out the definitional territory").

240. *See Computer II*, 77 F.C.C.2d 384, 423–28 (1980) (final decision) (recognizing that "a need exists to re-examine the definitional scheme established in the *First Computer Inquiry* in order to provide greater market certainty").

III. UTILITY REDUX: TO THE CLOUD!

Every era generates new business forms in response to the shifting costs of transportation and communications.[241] Such economic innovation sparks legal innovations to cabin potential abuses. Just as copyright arose in response to the power of the English stationers' guild in the 1700s, public utility regulation was a response to railroads and telegraph operators in the 1900s. Something similar may be on the horizon at the dawn of the twenty-first century. The convergence of computing and communications is producing a phenomenon known as "cloud computing." Cloud computing is the foundation for a new class of "network utilities," which are in many ways the realization of the computer utility vision of the 1960s. These network utilities raise public policy questions similar to those considered in *Computer I*. The FCC should develop a new regulatory agenda that addresses both the ways cloud service providers depend on communications utilities and the ways they function as public utilities themselves.

A. The Rise of Cloud Computing

Cloud computing is an approach that places application processing and storage in network-based data centers, rather than in end-user devices such as personal computers.[242] There are many potential applications for this technology. For example, instead of running local email applications and downloading mail from an ISP to their own hard drives, users can access email through Google's Gmail, a web-based service that stores messages on Google's own Internet-

241. *See generally* THOMAS W. MALONE, THE FUTURE OF WORK (2004) (tracing the evolution of business in response to falling communications costs).

242. ROBERT GELLMAN, WORLD PRIVACY FORUM, PRIVACY IN THE CLOUDS: RISKS TO PRIVACY AND CONFIDENTIALITY FROM CLOUD COMPUTING 4 (2009) ("[C]loud computing involves the sharing or storage by users of their own information on remote servers owned or operated by others and accessed through the Internet or other connections." (emphasis omitted)); Peter Mell & Tim Grance, *The NIST Definition of Cloud Computing, Version 15*, NAT'L INST. STANDARDS & TECH. (Oct. 7, 2009), http://www.nist.gov/itl/cloud/upload/cloud-def-v15.pdf ("Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction."); *What Policymakers Should Know About "Cloud Computing,"* GOOGLE PUB. POL'Y BLOG (Mar. 20, 2009, 10:35 AM ET), http://googlepublicpolicy.blogspot.com/2009/03/what-policymakers-should-know-about.html (defining cloud computing as "the movement of computer applications and data storage from the desktop to remote servers").

based servers.[243] Instead of running a sales force automation package locally, a salesperson can log into Salesforce.com and access contact and sales pipeline information over the Internet.[244] And a startup such as Smugmug, which hosts photos for over 150,000 paying customers, can move from its own server array to Amazon.com's cloud infrastructure, saving $500,000 in storage costs and providing flexible capacity for growth.[245] In addition, major online services such as Google and Facebook are growing into full-fledged platforms built on top of huge reconfigurable pools of computing capacity. These platforms can integrate services on a common data layer and glean insights from user behavior across the system. They can also host third-party applications, such as the thousands built on top of Facebook.

There are many definitions of cloud computing,[246] but there is widespread agreement that the rise of cloud computing is producing significant business, network infrastructure, and public policy changes.[247] Analysts predict huge growth in cloud computing.[248] A

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243. As of February 2010, Google had approximately 170 million Gmail users worldwide. *Google Takes on Facebook and Twitter with Network Site*, BBC NEWS, http://news.bbc.co.uk/2/hi/8506148.stm (last updated Feb. 9, 2010, 7:56 PM GMT).

244. As of January 2011, Salesforce.com manages data for over 92,300 corporate customers. Press Release, Salesforce.com, Salesforce.com Unveils Service Cloud 3, the Next Generation of Social Contact Centers (Mar. 3, 2011), *available at* http://www.salesforce.com/company/news-press/press-releases/2011/03/110303.jsp.

245. *AWS Case Study: SmugMug*, AMAZON WEB SERVS. (2006), http://aws.amazon.com/solutions/case-studies/smugmug.

246. *Cloud Computing: Clash of the Clouds*, ECONOMIST, Oct. 17, 2009, at 80, 80–82.

247. *See* CARR, *supra* note 158, at 117 (noting that cloud computing and similar technology will displace current business practices); *Let It Rise*, ECONOMIST (SPECIAL REP.), Oct. 25, 2008, at 3, 3 (noting that cloud computing "will allow digital technology to penetrate every nook and cranny of the economy and of society, creating some tricky political problems along the way"); Steve Lohr, *I.B.M. to Push 'Cloud Computing,' Using Data from Afar*, N.Y. TIMES, Nov. 15, 2007, at C7 (noting that IBM is investing a large, undisclosed amount in its cloud technology); Daniel Lyons, *Today's Forecast: Cloudy*, NEWSWEEK, Nov. 10, 2008, at 24, 24 (noting that "tech giants" are "racing to deliver cloud products"); *see also* John Ciancutti, *Four Reasons We Choose Amazon's Cloud as Our Computing Platform*, THE NETFLIX TECH BLOG (Dec. 14, 2010, 9:35 AM), http://techblog.netflix.com/2010/12/four-reasons-we-choose-amazons-cloud-as.html (explaining the business benefits that a leading online video distribution company found in using a third-party cloud platform).

248. *See* Geoffrey A. Fowler & Ben Worthen, *The Internet Industry Is on a Cloud—Whatever That May Mean*, WALL ST. J., Mar. 26, 2009, at A1 (citing research firms predicting annual cloud computing revenues between $42 billion and $160 billion in 2011–12).

The growth of cloud computing does not mean that all Internet-based services will necessarily be centralized. The Internet is still an any-to-any network with no center. *See* VAN SCHEWICK, *supra* note 232, at 383–87 (describing the shift away from the end-to-end architecture of the original Internet); Werbach, *supra* note 25, at 351–53 (explaining how the

substantial majority of Americans already use services such as webmail, online data storage, and web-based productivity applications that are considered cloud computing.[249] Most experts participating in a 2010 Pew Foundation Future of the Internet Survey expected that within a decade, remote servers would be the primary means of accessing applications and sharing information, rather than local applications.[250] As John Hagel and John Seely Brown of Deloitte's Center for the Edge stated, "Cloud computing has the potential to generate a series of disruptions that will ripple out from the tech industry and ultimately transform many industries around the world."[251]

In the late 1990s, many websites resided on a single server computer. Even very popular sites might have had only a handful of servers fed by load-balancing software at a single location. In 2011, the leading Internet companies build massive, multibillion dollar data centers the size of several football fields, each housing thousands of networked computers.[252] A major service provider such as Google has as many web-connected servers as the total number of machines that were connected to the Internet in 1995, all linked into a colossal virtual supercomputer.[253] And Google is at the leading edge of a huge

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Internet is "a network at war with itself" between centralizing and decentralizing forces). There are countervailing trends toward distributed peer production at the same time as other services are shifting to centralized cloud computing. *See* YOCHAI BENKLER, THE WEALTH OF NETWORKS: HOW SOCIAL PRODUCTION TRANSFORMS MARKETS AND FREEDOM 384 (2006) (identifying countervailing forces at the physical, logical, and content layers).

249. *See* John B. Horrigan, *Cloud Computing Gains in Currency: Online Americans Increasingly Access Data and Applications Stored in Cyberspace*, PEW RESEARCH CTR. (Sept. 12, 2008), http://pewresearch.org/pubs/948/cloud-computing-gains-in-currency ("Some 69% of online Americans use webmail services, store data online, or use software programs such as word processing applications whose functionality is located on the web."); *see also* Christopher Soghoian, *Caught in the Cloud: Privacy, Encryption, and Government Back Doors in the Web 2.0 Era*, 8 J. ON TELECOMM. & HIGH TECH. L. 359, 363 (2010) ("This computing model has become firmly ingrained in the consciousness of consumers . . . .").

250. Janna Quitney Anderson & Lee Rainie, *The Future of Cloud Computing*, PEW RESEARCH CTR. (June 11, 2010), http://pewresearch.org/pubs/1623/future-cloud-computing-technology-experts.

251. John Hagel III & John Seely Brown, *Cloud Computing's Stormy Future*, HARV. BUS. REV. (Sept. 14, 2010, 9:00 AM), http://blogs.hbr.org/bigshift/2010/09/cloud-computings-stormy-future.html.

252. *See* CARR, *supra* note 158, at 65 (noting that Google has established "server farms" at covert locations around the world).

253. *See* Brian Barrett, *Google's Insane Number of Servers Visualized*, GIZMODO (Apr. 14, 2010, 5:20 PM), http://gizmodo.com/5517041/googles-insane-number-of-servers-visualized (noting that, with more than one million servers, "[i]t is speculated that Google owns more than 2% of all the world's servers"). By comparison, in January 1995, the Internet had approximately

trend.[254] Smaller providers such as Twitter are building their own data centers, whereas others are tapping into public clouds offered by companies such as Amazon.com.[255] All of the major online service providers, as well as enterprises with their own existing data center infrastructure, are all potential or actual cloud computing providers.[256]

The rise of smart, connected mobile devices further feeds and builds on the move toward cloud approaches. Due to their small size, mobile phones do not have the same storage capacity as personal computers. Even when used for services such as email or document review, they are almost never a user's sole computing device. Rather, they provide a mobile window into the user's data. As a result of these two factors, virtually any application involving significant amounts of user data on a mobile device will incorporate remote storage and a cloud computing architecture. This is equally true for mobile access to a consumer service, such as iTunes for music or Yelp for local restaurant information, as it is for business applications such as Salesforce.com or Google Docs.[257]

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five million host addresses and an estimated one million machines actually connected and responding. *Internet Growth: Raw Data*, MIT, http://www.mit.edu/people/mkgray/net/internet-growth-raw-data.html (last visited Apr. 12, 2011).

254. *See* Gilder, *supra* note 175, at 202 ("The data centers these companies are building began as exercises in making the planet's ever-growing data pile searchable. Now, turbocharged with billions in Madison Avenue mad money for targeted advertisements, they're morphing into general-purpose computing platforms, vastly more powerful than any built before.").

255. *Where the Cloud Meets the Ground*, ECONOMIST (SPECIAL REP.), Oct. 25, 2008, at 6, 6–7.

256. *See* MICHAEL ARMBRUST, ARMANDO FOX, REAN GRIFFITH, ANTHONY D. JOSEPH, RANDY H. KATZ, ANDREW KONWINSKI, GUNHO LEE, DAVID A. PATTERSON, ARIEL RABKIN, ION STOICA & MATEI ZAHARIA, ABOVE THE CLOUDS: A BERKELEY VIEW OF CLOUD COMPUTING 1 (2009) (distinguishing public and private clouds); JOHN HAGEL & JOHN SEELY BROWN, DELOITTE CTR. FOR THE EDGE, CLOUD COMPUTING—STORMS ON THE HORIZON 5 (2010), *available at* http://www.johnseelybrown.com/cloudcomputingdisruption.pdf (describing the evolution of cloud computing providers); Mell & Grance, *supra* note 242 ("The cloud computing industry represents a large ecosystem of many models, vendors, and market niches.").

257. *See* Steven Cherry, *Forecast for Cloud Computing: Up, Up, and Away*, 46 IEEE SPECTRUM 68, 68 (2009) (noting that a large portion of the recent increases in cell phone data transmission and reception is due to cloud computing); *Mobile Will Be Key to Unlock Cloud Potential*, MUSIC WK., July 17, 2010, at 9 ("The migration of music services into the cloud is essential for the music business because of the growing importance of devices such as smartphones that decentralise access for consumers.").

B. Clouds as Utilities

1. *The New Computer Utilities.* Cloud computing bears a striking resemblance to the computer utility vision of the 1960s.[258] Like computer utilities, cloud data centers leverage economies of scale from large quantities of centrally hosted computing power. In both cases, the value proposition is that computing services delivered across the network from a remote location will be superior to the same services on a machine residing locally in a home or office. Both systems employ technical mechanisms—time sharing in the 1960s and virtualization in the 2000s—to make a single computer function like multiple independent machines. Such techiques allow many users to operate many different applications at the same time, without dedicating specific machines to anyone. Both the computer utility and cloud computing, in other words, create the illusion of a local, dedicated machine. Providers in both models could sell computing capacity on a usage basis, scaling up or down based on demand. And in both cases, platform service providers have substantial control over both services and the associated data and metadata.

There are certainly differences between the 1960s time-sharing mainframes and the fungible pools of server blades operating in Internet-connected data centers. The most sophisticated computer utility systems, such as Project MAC, were vastly less powerful and flexible than cloud platforms. The computer utility was primarily a tool for scientific research and operational functions in companies, managed by trained programmers. It was not a consumer phenomenon like the Internet that supported entertainment, productivity applications, social networking, and countless other popular activities for ordinary individuals. And, importantly, the computer utility did not have the Internet. Computer utility service bureaus had to build their own private, proprietary data networks on top of communications circuits. There was no common data-networking platform that all users and all service providers could utilize.[259] Finally, it should not be overlooked that the reality of the

258. *See* Bickerstaff, *supra* note 214, at 85 (arguing that the computer utility vision reappeared in network computing, a precursor to cloud computing).

259. Perhaps the computer utility failed initially in the marketplace for this reason. The Internet had to develop as a connectivity platform before centralized service platforms could take off through cloud computing.

computer utility never matched the expansive visions of the 1960s,[260] whereas cloud computing generates billions of dollars of activity and is poised to grow even further.[261]

Cloud computing changes the relationship of users to their applications and service providers to the network in a similar manner to the old computer utility vision. For public policy, the economic and social interactions that new technologies drive are what matters, not the internal mechanics of those technologies. The computer utility idea painted a picture for opinion leaders and policymakers of ubiquitous computational capacity deliverable to a far wider range of problems and users than was possible previously. For the FCC, it raised questions about control of data and access to communications resources that were both similar to and distinct from the telephone network analogues.

Cloud computing similarly is changing the way people think about both computers and computer networks. End-user devices can be smaller and cheaper because they draw from network-based services. This shift opened the door for new devices such as Apple's iPad, which was among the most successful consumer product introductions in history.[262] And the Internet has changed from a way to push data from one point to another into an oasis from which computing resources, applications, and personalized content can be pulled on demand when needed.[263] As policymakers consider what cloud computing means, therefore, they can look back to the way their predecessors evaluated similar questions.

The most fundamental analogy between the computer utility and cloud computing is that both are utilities in the classic sense. In the

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260. *See* CARR, *supra* note 158, at 59 (describing how early predictions that computing would one day be organized as a public utility were held back by a lack of bandwidth).

261. *See* Steve Hilton, *Cloud Computing Is No Fad*, FORBES (July 12, 2010, 12:30 PM EDT), http://www.forbes.com/2010/07/12/cloud-computing-growth-entrepreneurs-technology-informationweeksmb.html (stating that the global market for enterprise cloud-based services was $12.1 billion in 2010).

262. *See* Steve Monfort, *Apple's iPad a Runaway Sales Success*, NASDAQ NEWS (Oct. 6, 2010, 7:18 AM), http://community.nasdaq.com/News/2010-10/apples-ipad-a-runaway-sales-success.aspx ("Apple's (AAPL) iPad tablet is the hottest-selling electronic device ever, a new report from Bernstein Research shows."). The iPad depends on a built-in wireless network connection to obtain applications and content. *See The iPad: What You Need to Know*, MACWORLD (Jan. 29, 2010, 6:05 PM), http://www.macworld.com/article/146020/2010/01/ipad_faq.html (explaining the features of the iPad, including both Wi-Fi and 3G-enabled models).

263. *See generally* JOHN HAGEL III, JOHN SEELY BROWN & LANG DAVISON, THE POWER OF PULL (2010) (explaining the business impacts of the move toward a "pull" model, with cloud computing as one element supporting the shift).

case of the computer utility, the connection is inherent in the term itself. Proponents of the computer utility drew explicit parallels between large-scale remote time-sharing systems and traditional public utilities, such as electrical grids.[264] Recognizing the limitations of the analogy, they nonetheless envisioned that computer processing would become nearly as important to society as power and water, and they expected it to be delivered in a similar fashion.[265] Douglas Parkhill, author of the best-known book about the computer utility, describes the connection as follows:

> The word "utility" in the term "computer utility" has, of course, the same connotation as it does in other more familiar fields such as in electrical power utilities or telephone utilities and merely denotes a service that is shared among many users, with each user bearing only a small fraction of the total cost of providing that service.[266]

The same framing is being applied to cloud computing.[267] Former *Economist* editor Nicholas Carr, in his 2008 book *The Big Switch*,[268] paints a detailed picture of cloud computing data centers as the equivalent of electrical power plants in their economic and business impacts.[269] Carr points out that electricity was originally generated locally by individual factories operating water wheels or other mechanisms to serve their own needs.[270] With the development of large generators, the electric light, and electrical distribution infrastructure, the economics shifted. It became far more efficient for

264. *See* Greenberger, *supra* note 1, at 64 (explaining the analogy between automatic computation and electricity, and the limitations of that analogy).

265. Even during the heyday of the computer utility concept, some authors argued that similarities to traditional regulated public utilities were overblown. *See* BARNETT, JR. ET AL., *supra* note 154, at 86–88 ("The conclusion is that present and foreseeable computer utilities are not structured like public utilities . . . .").

266. PARKHILL, *supra* note 154, at 3.

267. The utility framing is also being applied to services built on top of cloud computing infrastructure. At a conference in early 2011, the CEO of the popular messaging service Twitter compared his company's offering to a public water utility: "'It needs to be water. It's instantly useful. It's simple. I don't have to re-learn how to use water,' he told the audience. 'It's always present.'" Pamela Parker, *Twitter as Utility, Like Running Water? That's Goal, Says CEO*, SEARCH ENGINE LAND (Feb. 14, 2011, 10:12 PM ET), http://searchengineland.com/twitter-as-utility-like-running-water-thats-goal-says-ceo-64803.

268. CARR, *supra* note 158.

269. *Id.* at 14–16.

270. *Id.* at 15–16.

large power plants to serve entire neighborhoods or cities than for customers to invest in their own electrical generation.[271]

Cloud computing, Carr argues, represents a similar shift away from the decentralized model of the PC toward a power-plant structure.[272] No individual can bring to bear the same resources as Google or Amazon.com. The financial investments, as well as the specialized expertise such companies develop, further widen the gap. Other systems start to be built around the centralized delivery of the core resource, a process accelerated through standardization.[273] In the end, the central utility supplants the local generation model almost everywhere. Computing is not exactly analogous to electricity, which is completely undifferentiated and difficult to store. But the same factors that led to the centralization of energy distribution are turning networked computing into a service increasingly delivered by centralized utilities.

2. *Regulation in the Clouds.* The rise of computing as a utility, in the 1960s as well as in 2011, has significant regulatory implications. The proponents of the computer utility were never slow to acknowledge that their vision implied consideration of whether computing service bureaus should be subject to the same sort of public utility regulation as AT&T and other common carriers. Similar pressure is building in the Internet era. Early in 2010, for example, danah boyd, an influential sociologist at Microsoft Research, wrote a blog post titled, *Facebook Is a Utility; Utilities Get Regulated*.[274] Her argument was that the drumbeat of privacy concerns about social networking services such as Facebook might most appropriately be addressed through government action. The argument provoked dozens of responses, most of which were fearful that government

271. *Id.*

272. *Id.*

273. *See id.* at 14–16 (describing the additional systems built around centralized delivery of electricity and noting the importance of technical standards).

274. danah boyd, *Facebook Is a Utility; Utilities Get Regulated*, APOPHENIA (May 15, 2010), http://www.zephoria.org/thoughts/archives/2010/05/15/facebook-is-a-utility-utilities-get-regulated.html [hereinafter boyd, *Facebook Is a Utility*]; *see also* danah boyd, *Facebook's Privacy Trainwreck: Exposure, Invasion, and Social Convergence*, 14 CONVERGENCE 13, 13–14 (2008) (describing the concern generated by Facebook's introduction of the News Feed feature). It is arguable whether Facebook is a cloud-computing platform. The definition of the term is somewhat loose, however, and Facebook is a huge network-based platform for remote storage, processing, and application hosting. *See* Randal C. Picker, *Competition and Privacy in Web 2.0 and the Cloud*, 103 NW. U. L. REV. COLLOQUY 1, 2–3 (2008) (describing the overlap between the shift to Web 2.0, which includes Facebook, and cloud computing).

regulation would crush Internet innovation.[275] Indeed, governments around the world spent thirty years privatizing and liberalizing lumbering public utilities, and the Internet has been held up as a shining example of private enterprise.

But boyd was on to something. Cloud computing platforms *are* utilities, in a very real sense. At the same time, they are competitive services that have thrived in the absence of communications regulation and depend on the public utility treatment of communications carriers for access to their customers. As the Internet increasingly becomes a distribution platform for centralized services, utility regulation should be the starting point for public policy discussions.

Significant public policy questions have already arisen around cloud computing. For example, the Electronic Communications Privacy Act (ECPA)[276] requires law enforcement actors to obtain a search warrant if they wish to access email stored on a user's hard drive, but it applies a much lower standard when that same email has been stored for more than six months on Google's Gmail servers, even though the user sees a parallel experience.[277] When email was primarily something that users accessed locally—as it was in 1986, when ECPA was adopted—the statutory distinction may have made some sense. In 2011, when a huge and growing percentage of email is never copied onto a local hard drive, it no longer does. In December 2010, the Sixth Circuit held that email stored remotely by ISPs and on cloud computing clusters is entitled to the same warrant requirements for government searches as locally stored messages under the Stored Communications Act provisions of ECPA.[278] The issue seems likely to

275. boyd, *Facebook Is a Utility*, *supra* note 274.

276. Electronic Communications Privacy Act of 1986, Pub. L. No. 99-508, 100 Stat. 1848 (codified as amended in scattered sections of 18 U.S.C.).

277. *See* Soghoian, *supra* note 249, at 390–91 (explaining how the Fourth Amendment's third-party doctrine offers little protection for users of electronic remote file storage services, given that the government can compel providers of such services to reveal their customers' private documents with a subpoena); David A. Couillard, Note, *Defogging the Cloud: Applying Fourth Amendment Principles to Evolving Privacy Expectations in Cloud Computing*, 93 MINN. L. REV. 2205, 2215 (2009) (noting that the third-party doctrine is especially relevant in the cloud computing world, in which information is turned over to third-party cloud service providers with increasing frequency); William Jeremy Robison, Note, *Free at What Cost?: Cloud Computing Privacy Under the Stored Communications Act*, 98 GEO. L.J. 1195, 1227 (2010) (describing how Congress relied extensively on Fourth Amendment jurisprudence in drafting the ECPA's privacy protections).

278. United States v. Warshak, Nos. 08-3997, 08-4085, 08-4087, 08-4212, 08-4429, 09-3176, 2010 WL 5071766, at *14 (6th Cir. Dec. 14, 2010).

go before the Supreme Court, if Congress does not restructure ECPA first.

Other impacts of cloud platforms are more subtle but, in the long run, more substantial. The cloud represents the full integration of computing and communications. Cloud platforms are simultaneously the network's edge and its core; they thus pose a fundamental challenge to both the technical and legal assumptions about the Internet. Companies considering using cloud computing services for their data and applications must consider a variety of legal and policy considerations regarding the treatment of their data.[279] On one level, cloud providers are simply online intermediaries, subject to contractual relationships with users and other service providers. From a broader perspective, though, the rise of cloud computing changes a default assumption that data will be within the control of the user.

The 2010–11 controversy over Wikileaks, a website that anonymously disseminates leaked documents, put a further spotlight on cloud platforms.[280] Wikileaks moved its content to the Amazon Web Services cloud-hosting platform when it faced denial-of-service attacks over its controversial distribution of thousands of leaked U.S. State Department diplomatic cables.[281] Not long after, perhaps responding to pressure from U.S. government figures, Amazon.com dropped Wikileaks as a customer.[282] Wikileaks itself may be a shady operation, but Amazon.com's willingness to cut it off raised concerns that, in a cloud computing world, freedom of speech and corporate business continuity are at the whims of a network platform provider.[283] As the federal agency concerned with promotion of innovation, economic activity, and democratic discourse through communications networks, the FCC cannot ignore this debate.

Growing dependence on cloud computing platforms will thus make regulatory concerns about these platforms increasingly salient.

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279. Steven J. Vaughan-Nichols, *Cloud Computing Creates Legal Tangles*, TECHWORLD (Aug. 3, 2010, 4:31 PM GMT), http://features.techworld.com/data-centre/3234162/cloud-computing-creates-legal-tangles.

280. Ben Rooney, *Amazon's WikiLeaks Response Threatens Cloud Computing*, WALL ST. J. TECH EUR. BLOG (Dec. 13, 2010, 10:26 AM GMT), http://blogs.wsj.com/tech-europe/2010/12/13/amazons-wikileaks-response-threatens-cloud-computing.

281. Charlie Savage, *Amazon Cites Terms of Use in Expulsion of WikiLeaks*, N.Y. TIMES, Dec. 3, 2010, at A10.

282. *See id.* (describing Amazon.com's reasoning).

283. *See, e.g.*, Eugene Robinson, *A Wiki Hornets' Nest*, WASH. POST, Dec. 14, 2010, at A23 ("At stake are issues of free speech, censorship, privacy, sovereignty and corporate power.").

As Carr points out, access to the electrical grid was initially a luxury for companies, but it quickly became essential.[284] Something similar may well happen for many software applications delivered through cloud services. All of the major categories of end-user desktop software, from email to word processing to databases to games, are being provided on a large scale through cloud computing. Web search, a service that could be delivered no other way, is a dominant force in the Internet economy.[285] Even the U.S. government is making a strong push to move federal IT systems to the cloud.[286] When systems become so mission critical, regulators must address the public policy concerns they raise. The mechanisms will be less drastic than the government-ownership or common-carrier regulation applied to traditional public utilities, but cloud platforms should be subject to reasonable policies to promote the public interest.

For at least three reasons, cloud computing is likely to produce the same kinds of dependencies that animated public utility regulation in other industries. First, there are significant economies of scale in delivering application functionality through large remote data centers. Service providers can operate, configure, and update a centrally managed collection of resources more efficiently than individual users responsible for their own personal computers.[287] Backup, business continuity, security, and other utility functions are

284. *See* CARR, *supra* note 158, at 43–44 (explaining how Chicago's manufacturers were pressured to switch to centrally provided electricity due to its significant savings in costs, personnel, and management attention).

285. *See, e.g.*, GOOGLE, GOOGLE'S ECONOMIC IMPACT: UNITED STATES 2009 (2010), *available at* http://www.google.com/economicimpact/pdf/google_economicimpact.pdf ("Google generated $54 billion of economic activity for American businesses, website publishers and non-profits in 2009."); *see also* HAMILTON CONSULTANTS, INC. WITH JOHN DEIGHTON & JACK QUELCH, ECONOMIC VALUE OF THE ADVERTISING-SUPPORTED INTERNET ECOSYSTEM 27 (2009), *available at* http://www.iab.net/media/file/Economic-Value-Report.pdf (showing that web-search is a significant segment of Internet business and the fifth largest overall).

286. *See* Jessica Rettig, *U.S. Government Takes a Step Toward Cloud Computing*, U.S. NEWS & WORLD REP. (Dec. 6, 2010), http://www.usnews.com/news/articles/2010/12/06/us-government-takes-a-step-toward-cloud-computing (describing a new White House–led effort to encourage federal agencies to choose cloud-computing options).

287. *See* Ian Foster, Carl Kesselman, Jeffrey M. Nick & Steven Tuecke, *Grid Services for Distributed System Integration*, COMPUTER, June 2002, at 37, 40 ("Unlike yesterday's computing services companies, which tended to provide offline batch-oriented processes, today's e-utilities often provide resources that both enterprise computing infrastructures and in-house and outsourced business processes use. Thus, one consequence of exploiting the economies of scale that e-utility structures enable is further decomposition and distribution of enterprise computing functions."); *see also* Brian Hayes, *Cloud Computing*, COMM. ACM, July 2008, at 9, 11 (describing the challenge of scalability in cloud computing).

significantly more efficient if deployed across a large virtualized cloud of computers. The cost is shared across all of the customers, and the cloud provider can develop expertise beyond that of individual companies.

Second, because it allows many users to share large utility computing clusters, cloud computing is a better solution when demand fluctuates.[288] Consider a startup launching a new web-based service. It has to ensure that it has enough processing and storage capacity to meet user demand. If the company must provision servers itself, there may be a substantial cost and delay to increase capacity if it underestimates demand. And if the company overestimates demand, it will spend unnecessary resources provisioning servers that it does not use. In one case, the service may crash, and in the other, the company wastes money. Neither is an attractive outcome. Moreover, demand forecasting is a constant exercise. What if the company runs a special promotion that causes a short-term spike in usage?[289] Or what if it offers an enterprise service that is lightly used on the weekends? No individual company can match supply and demand as efficiently as a cloud-based aggregator of capacity.

In a cloud-computing environment, on the other hand, companies share virtual capacity in massive clouds. The scale of the cloud platforms makes capacity a commodity for the provider, so overprovisioning does not create the same difficulties as it does for individual companies. The cloud provider can also deploy virtualization software and other technical mechanisms to more efficiently utilize its capacity.[290] Aggregation of demand across different services with different requirements naturally tends to smooth out spikes. Especially in a fast-changing environment, the cloud approach therefore provides a more efficient and higher-performing solution than companies could provide through local self-provisioning.

Third, cloud computing allows the service provider to capture and aggregate large volumes of user data. This information can help the service provider improve its service, or it can open up new

288. *See* Michael Armbrust, Armando Fox, Rean Griffith, Anthony D. Joseph, Randy Katz, Andy Konwinski, Gunho Lee, David Patterson, Ariel Rabkin, Ion Stoica & Matei Zaharia, *A View of Cloud Computing*, COMM. ACM, Apr. 2010, at 50, 52–53 (describing the importance of having adequate computing resources to handle demand fluctuations).

289. *See id.*

290. Mladen A. Vouk, *Cloud Computing—Issues, Research and Implementations*, 16 J. COMPUTING & INFO. TECH. 235, 237–38 (2008).

business opportunities. Gmail, which generates revenue through targeted advertisements, is a good example. Google does not need to charge for its email service, even though the gigabytes of storage it offers to users are not costless to provide. Instead, Google monetizes Gmail by algorithmically matching message text to targeted advertisements.[291] Google can make this model work only because it can aggregate large numbers of ads and large volumes of email text in the same computing environment as its analytical software.

3. *The Deregulatory Dance.* The FCC has, to date, not taken interest in these developments the way it confronted the computer utility concept in the 1960s. There are several reasons it has not. The cloud computing market is still new and fast-changing. The market leaders, such as Amazon.com, Salesforce.com, Microsoft, and Google, are pure information technology firms, not communications carriers.[292] Though some of them are now very large companies, no one player dominates the market, and none appears to control an essential competitive input.[293] Barriers to entry are low, and new entrants such as Twitter can quickly grow into major forces. Rules

291. Jason Isaac Miller, Note, *"Don't Be Evil": Gmail's Relevant Text Advertisements Violate Google's Own Motto and Your E-mail Privacy Rights*, 33 HOFSTRA L. REV. 1607, 1612–14 (2005).

292. Telecommunications networks have traditionally been subject to government requirements to provide nondiscriminatory access. *See* Thomas B. Nachbar, *The Public Network*, 17 COMMLAW CONSPECTUS 67, 70 (2008) (describing nondiscriminatory access regimes). The rationale for doing so has never been definitely established. Professor Thomas Nachbar has examined three common arguments for the public network concept—necessity, holding out, and market power—and has found them all wanting. *Id.* at 79. Instead, he emphasizes the value of nondiscrimination rules to reduce transaction costs and promote standardization. *Id.* at 108–09.

293. The essential facilities doctrine in antitrust law gives the government the authority to impose remedies when a company exercises bottleneck control over an element that is essential for competitive entry. *See* Thomas F. Cotter, *The Essential Facilities Doctrine*, *in* ANTITRUST LAW & ECONOMICS 157, 157 (Keith N. Hylton ed., 2010) (explaining that the essential facilities doctrine requires a monopolist to provide competitors with access to a facility if that access is essential for effective competition); J. Gregory Sidak & Abbott B. Lipsky, Jr., *Essential Facilities*, 51 STAN. L. REV. 1187, 1190–91 (1999) (explaining that the central principle of the essential facilities doctrine is that a monopolist must provide reasonable access to a facility essential to other competitors if it is feasible to do so).

The doctrine suffered a serious blow from the Supreme Court in *Verizon Communications Inc. v. Law Offices of Curtis V. Trinko, LLP*, 540 U.S. 398, 410–11 (2004). Some scholars have attempted to rehabilitate the doctrine, especially as applied to communications infrastructure and the Internet. *See* Brett Frischmann & Spencer Weber Waller, *Revitalizing Essential Facilities*, 75 ANTITRUST L.J. 1, 8 (2008) ("The best cases for the essential facilities model typically involve the denial of access to infrastructure and networks, particularly in the context of regulated industries in transition.").

designed for the slow-moving, highly concentrated public-utility world seem a poor fit. The most significant reason, however, is the shift away from intrusive regulation of monopolies toward facilitation of competition as a central regulatory goal.[294]

The period in which the FCC adopted *Computer I* represented the turning point toward this new approach to communications regulation. The FCC's decision not to treat data processing as a communications service was based on its recognition of the limits of that regulatory box. As the FCC stated,

> Government intervention and regulation are limited to those areas where there is a natural monopoly, where economies of scale are of such magnitude as to dictate the need for a regulated monopoly, or where such other factors are present to require governmental intervention to protect the public interest because a potential for unfair practices exists.[295]

None of these factors was true for the computer utilities in the 1960s, and none is true for modern cloud computing providers. Again, it was in *Computer I* that these two threads of skepticism of regulation and skepticism about its absence came together for the converging worlds of communications and computing.

Computer I was never really a fight over whether the FCC would regulate independent data processing companies. Despite the broad framing of the proceeding, blanket regulation of data processing services was never actually on the table.[296] No commenters seriously argued that all remote data processing should be considered a regulated common carrier offering.[297] In its decision, the FCC quickly concluded that "the offering of data processing services is essentially competitive," and that no regulation was needed when unregulated companies provided those services.[298] It spent the bulk of its efforts setting out the justification and specific terms for regulation of common carriers in their interaction with the data processing market.

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294. *See supra* Part II.A.

295. *Computer I Tentative Decision*, 28 F.C.C.2d 291, 297 (1970).

296. *See* Dunn, *supra* note 198, at 380 (calling this possibility "only hypothetical" and "not seriously considered by any of the respondents to the inquiry").

297. *Id.*

298. *Computer I Tentative Decision*, 28 F.C.C.2d at 297. It offered a caveat: "[h]owever, if there should develop significant changes in the structure of the data processing industry, or, if abuses emerge which require the exercise of corrective action by the Commission, we shall not hesitate to re-examine the policies set forth herein." *Id.* at 298.

The important decisions in *Computer I* involved not the unregulation of data processing services, but the regulation of the network operators on which they depended. The FCC recognized that computer utilities and other remote data processing services needed communications circuits to deliver their offerings to customers. And it recognized that carriers might fail to provide those circuits or to provide them in a discriminatory manner, especially if the carriers were themselves competitors in the data processing market. That, after all, was the lesson of the Bunker Ramo incident. As the FCC stated, "The dangers identified by respondents and by the SRI study relate primarily to the alleged ability of common carriers to favor their own data processing activities by discriminatory services, cross subsidization, improper pricing of common carrier services, and related anticompetitive practices and activities."[299]

Intriguingly, one of the arguments against regulation of computer utilities was that, if they were classified as carriers, the terms of their interconnection with other carriers would be outside the FCC's jurisdiction.[300] It was not until the FCC began the process of allowing MCI to interconnect with AT&T for competitive long-distance service, and until the courts and Congress eventually changed their approach to internetwork interconnection, that such questions came within the FCC's purview. In other words, the FCC's refusal to regulate data processing services in *Computer I* was based on more than its stated desire to avoid unnecessary intrusion into a competitive market.[301] The FCC had to keep data processing unregulated as a basis for regulating the essential inputs supporting that market.

The FCC was not ignorant of the regulatory concerns that networked data processing services posed. Nor did it consider the computer utility outside of its jurisdictional authority. It made the justifiable decision that the potential harms of regulating a nascent, competitive industry exceeded the potential benefits of such regulation. Common carrier regulation at the time meant far more extensive government intrusion than even the most dominant incumbent network operators experience in 2011. And although

299. *Id.* at 301–02.

300. *See* Manley I. Irwin, *Federal Regulations and Monopoly*, *in* COMPUTERS AND COMMUNICATIONS, *supra* note 156, at 199, 206 ("The Federal Communications Commission generally regards carrier-to-carrier leasing arrangements as beyond its jurisdiction, and appeals to Congress for legislative authority to acquire this jurisdiction have so far been unsuccessful.").

301. *See supra* note 209 and accompanying text.

experts such as Parkhill and Professor Fano described the significance of the computer utility in expansive terms,[302] data processing service bureaus were a small, specialized industry at the time of *Computer I*, especially compared to the massive AT&T and other regulated communications carriers. There was no guarantee that the computer utility would reach its potential, and indeed, the centralized vision of the 1960s was never realized.

The FCC's decision to address the inputs to networked data processing services, rather than the policy considerations of those services, in *Computer I* should be understood within its historical context. It was not a conclusion that computer-based services should never be the subjects of communications policy. Nonetheless, dominant network operators are using the very categories the FCC crafted for data processing startups to escape from obligations designed to protect the innovative potential of those startups' descendants.

C. The Network Utility Agenda

As William Shakespeare famously wrote, "What's past is prologue."[303] Just as the FCC in 1968 had to balance regulation, deregulation, and unregulation in a fast-changing technological environment, the FCC in 2011 must confront the development of cloud computing platforms into network utilities. Just as the FCC in 1968 faced market realities mismatched with the statutory language of its jurisdictional delegation, so too did the FCC in 2011. In the *Computer I* Tentative Decision, the FCC set the appropriate standard for resolving such conundrums: "we should look to the basic purpose of regulatory activity in the context of our general national policy, as well as the specific statutory guidelines given this agency."[304] The solution to the contemporary challenges of cloud computing likely requires some legislative reform in addition to FCC action. Either way, a clear sense of objectives will be important to frame the issues and avoid missteps.

The FCC's engagement with the Internet has focused increasingly on the end-user connection to the network, as well as on competition and investment in broadband access. The network

302. *See supra* notes 163–66, 264–66 and accompanying text.

303. WILLIAM SHAKESPEARE, THE TEMPEST act 2, sc. 1, l. 247 (Yale Univ. Press 2006).

304. *Computer I Tentative Decision*, 28 F.C.C.2d at 297.

neutrality controversy epitomizes this emphasis.[305] As important as those questions are, they represent only a limited subset of the issues that the FCC must address as the Internet and communications converge. The concerns about user protections and competition in the broadband-access market may well be temporary, because they hinge on limited competition. If the FCC is successful in promoting competition, the concerns about network neutrality abate. Network neutrality has thus been far less of a controversy in Europe, where open access policies have resulted in significantly more competition in broadband access.[306]

In contrast, interactions within the network may not be amenable to a competitive solution. Recall the Comcast–Level 3 fight over charges to carry Netflix video traffic.[307] Comcast had a terminating-access monopoly on the connection to its customers. No matter how many broadband access competitors there were, Level 3 was still forced to use Comcast's last-mile connection to reach customers who had chosen Comcast as their broadband access provider. If Comcast's charges distorted the market and unreasonably restricted Level 3 or Netflix, competition cannot be the solution. Only

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305. *See supra* notes 11–13 and accompanying text.

306. *See* Martin Cave & Pietro Crocioni, *Does Europe Need Network Neutrality Rules?*, 1 INT'L J. COMM. 669, 669 (2007) ("[O]ne of the chief reasons for the lack of panic [over network neutrality] in Europe is the presence of a fairly robust and comprehensive regulatory framework . . . ."); Kenneth R. Carter, J. Scott Marcus, Adam J. Peake & Tomoaki Watanabe, A Comparison of Network Neutrality Approaches in: The U.S., Japan, and the European Union 19–22 (July 28, 2010) (unpublished manuscript), *available at* http://ssrn.com/abstract=1658093 ("The European communications market is a relatively competitive environment. . . . This success in competitive alternatives stems from a European emphasis on pro-competitive and explicitly technologically neutral regulation[, which] is at the heart of the EU approach. . . . There have been few calls for additional obligations assuring Network Neutrality in the market, and [there have been] no prominent cases of discriminatory behaviour against content operators."); Neelie Kroes, Vice-President for the Digital Agenda, Eur. Comm'n, Net Neutrality—The Way Forward, Speech at the European Commission and European Parliament Summit on "The Open Internet and Net Neutrality in Europe" 2 (Nov. 11, 2010), *available at* http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/10/643&format=PDF&aged=1&language=EN&guiLanguage=en ("A healthy competitive environment allows tackling many potential problems at their root, avoiding the emergence of monopolistic gatekeepers which could create serious dangers for net neutrality. This is why the debate is different [in Europe] than in the United States."). The level of concern about network neutrality in Europe does appear to have increased, however. *See* Council Directive 2009/140/EC, 2009 O.J. (L 337) 37, 69 (EC) (declaring that the European Commission "attaches high importance to preserving the open and neutral character of the Internet" and that it "will monitor closely the implementation of these provisions in the Member States, introducing a particular focus on how the 'net freedoms' of European citizens are being safeguarded").

307. *See supra* Part I.B.

direct oversight of the network interconnection relationships can address the problem. This is a familiar situation in telecommunications regulation.[308] Additionally, competition may hurt more than it helps with concerns such as privacy, if it produces a race to the bottom among providers.

By focusing on competition and network neutrality, therefore, the FCC may be missing larger concerns. The FCC should broaden its focus to the evolving Internet platform, which is integrally connected to the communications networks over which it has oversight responsibilities. It should relax its sharp distinction between regulated and unregulated services and hone in on the major competitive, pro-innovation, and consumer-protection issues for a network of cloud services fed by communications carriers. Although it is impossible to anticipate all of the issues that will arise, four major categories of concerns present themselves. All of them were present in the computer utility debates before and during *Computer I*.

1. *Connectivity.* The convergence of computing and communications means that networked data services are dependent on communications inputs. The first concern for cloud computing services, as it was for computer utilities in the 1960s, is the availability of nondiscriminatory access to networks.

A carrier might block or discriminate against data processing services in the provision of network connectivity for several reasons.[309] It might simply wish to collect rents from upstream providers, a practice that Chicago School antitrust scholars generally consider

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308. *See* Jean-Jacques Laffont, Patrick Rey & Jean Tirole, *Network Competition: I. Overview and Nondiscriminatory Pricing*, 29 RAND J. ECON. 1, 2 (1998) ("Unconstrained interconnection negotiations raise two concerns. First, it is often suggested that during the transition toward competition, entrants may be handicapped by the incumbent's reluctance to provide access to its network on a reciprocal basis and at a reasonable price. Second, some wonder whether, in the mature phase, established networks could not use their interconnection agreements to enforce collusive behavior."); Daniel F. Spulber & Christopher S. Yoo, *Toward a Unified Theory of Access to Local Telephone Networks*, 61 FED. COMM. L.J. 43, 91–102 (2008) ("Interconnection access disrupts network management to a much greater degree than retail and wholesale access."). *See generally* Glen O. Robinson & Dennis L. Weisman, *Designing Competition Policy for Telecommunications*, 7 REV. NETWORK ECON. 509 (2008) (describing the essential facilities doctrine and its dynamic relationship with network sharing).

309. *See* VAN SCHEWICK, *supra* note 232, at 218–73 ("[A] discriminatory network enables a network provider to engage in noncooperative strategic behavior."). *See generally* Joseph Farrell & Philip J. Weiser, *Modularity, Vertical Integration, and Open Access Policies: Towards a Convergence of Antitrust and Regulation in the Internet Age*, 17 HARV. J.L. & TECH. 85 (2003) (explaining why platform owners might overly restrict or discriminate against activities on their platforms, despite the strong incentives to the contrary).

acceptable.[310] Alternatively, the carrier might see the data processing service as being in actual or potential competition with its own core activities. AT&T and Western Union made this argument in the Bunker Ramo incident.[311] The argument against competition had far more force at that time because telephone service was a regulated monopoly. Companies such as AT&T bore special burdens in part because, at least in theory, the absence of competition allowed for necessary network investment and universal service. In 2011, carriers cannot claim the right to exclude competitors as part of a grand regulatory compact. Competition is the norm rather than the exception. Carriers that block or discriminate in this manner are simply protecting their turf against competitive incursion. The regulatory question is therefore whether such actions should be blocked as an improper exercise of market power.

The carrier might participate in the data processing market itself. As both a supplier and a competitor, the carrier would have incentives to disadvantage an unaffiliated data processing service or to cross-subsidize its own competitive offerings.[312] This was not an option for AT&T after *Computer I*. But it was the subject of much of the discussion in that proceeding, because other regulated common carriers also wished to offer computer utility services. The FCC in *Computer I* used a structural solution.[313] It required common carriers

310. *See* ROBERT H. BORK, THE ANTITRUST PARADOX: A POLICY AT WAR WITH ITSELF 225–31 (1978) ("Vertical mergers are means of creating efficiency, not of injuring competition. There is a faint theoretical case . . . that vertical mergers can be used by very large firms for purposes of predation under exceptional circumstances, but it is highly doubtful that that narrow possibility has any application to reality."); RICHARD A. POSNER, ANTITRUST LAW 223–29 (2d ed. 2001) ("Were vertical integration deemed a suspect practice . . . , all commercial activity would be placed under a cloud as the courts busied themselves redrawing the boundaries of firms, even though the normal motivation for and consequence of vertical integration are merely to reduce the transaction costs involved in coordinating production by means of contracts with other firms."); RICHARD A. POSNER & FRANK H. EASTERBROOK, ANTITRUST 557–58 (2d ed. 1981).

311. *See supra* Part II.C.1.

312. The vertical leveraging theory has been the subject of substantial academic debate. *See* DANIEL F. SPULBER & CHRISTOPHER S. YOO, NETWORKS IN TELECOMMUNICATIONS: ECONOMICS AND LAW 143–51 (2009) (critiquing the concept).

313. *See Computer I Tentative Decision*, 28 F.C.C.2d 291, 302 (1970) ("[W]e are hereby adopting a policy that communications common carriers shall furnish data processing services only through separate corporate entities."). Interestingly, the FCC observed that the major interstate common carriers, such as GTE and Western Union, had already been voluntarily offering their data processing services through separate subsidiaries before *Computer I* was adopted. *Id.* at 304. AT&T was foreclosed at the time from offering unregulated services such as data processing. *See supra* note 210 and accompanying text.

that provided data processing services to use separate subsidiary companies, subject to "maximum separation," to ensure fair arms-length dealing with the parent.[314]

Connectivity issues go beyond nondiscrimination.[315] A further dimension concerns the free flow of data through the network. Paul Baran, who developed the packet-switching technology that underlies the Internet, recognized this problem early on. In a 1968 white paper expanding on an article in *Public Interest* magazine, he argued that "[a] new pronouncement by the regulatory agencies of a doctrine of free interchange of signals across the boundaries of individual systems would be of tremendous technological benefit."[316] Baran's call for a "doctrine of free exchange of signals" sounds eerily like the "freedom to connect" that more recently became a mantra of both the noted network policy analyst David Isenberg[317] and Secretary of State Hillary Clinton.[318]

The computer utilities of the 1960s were private, noninterconnected systems. The Internet, however, was designed primarily for the purpose of universal interconnectivity.[319] A technologist such as Baran, who straddled both efforts, could see that the free flow of data was the ultimate technical and public policy objective. But the FCC in the *Computer Inquiries* was focused more

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314. *Computer I Tentative Decision*, 28 F.C.C.2d at 298. These rules were modified in the 1980 *Computer II* decision, replaced with nonstructural safeguards in the 1986 *Computer III* decision, and then effectively abandoned when the FCC classified broadband as an information service in 2002, Inquiry Concerning High-Speed Access to the Internet over Cable and Other Facilities, 17 FCC Rcd. 4798 (2002) (declaratory ruling and notice of proposed rulemaking) (cable broadband); Appropriate Framework for Broadband Access to the Internet over Wireline Facilities, 17 FCC Rcd. 3019 (2002) (notice of proposed rulemaking) (DSL service).

315. *See generally* Werbach, *supra* note 83 (distinguishing between the concepts of interconnection and nondiscrimination).

316. Baran, *supra* note 154, at 3.

317. *See* F2C: FREEDOM TO CONNECT, http://freedom-to-connect.net (last visited Apr. 12, 2011).

318. *See* Press Release, U.S. Dep't of State, Remarks on Internet Freedom (Jan. 21, 2010), *available at* http://www.state.gov/secretary/rm/2010/01/135519.htm (transcribing an interview in which Secretary Clinton defined "the freedom to connect" as "the idea that governments should not prevent people from connecting to the internet, to websites, or to each other"); Mark Landler, *Clinton Makes Case for Internet Freedom as a Plank of American Foreign Policy*, N.Y. TIMES, Jan. 22, 2010, at A6 ("Her speech was the first in which a senior American official had articulated a vision for making Internet freedom a plank of American foreign policy.").

319. *See* Werbach, *supra* note 83, at 1250 ("The internet was devised to bridge different networks . . . ."); Werbach, *supra* note 25, at 400–02 ("For those who created it, the Internet had one paramount objective: it was designed to transport packets of data transparently across a network of networks."); *supra* Part II.D.

on the regulation of carriers providing traditional telephone services than on the development of the converged data processing market. Interconnectivity was something that would develop, if at all, through the functioning of the competitive market. The interconnectivity of the Internet, however, was heavily influenced in its early days by government involvement. And with the rise of cloud computing and massive data aggregation platforms, the potential for fragmentation is increasing.[320]

2. *Capacity and Robustness.* Connectivity was not the only issue before the FCC in *Computer I*. Nor is it the only important consideration in the interface between network operators and Internet-based services in 2011. Even if network operators do not discriminate in their treatment of unaffiliated data processing services, they could either provide insufficient capacity to support those services or fail to offer the features and functions required. The lead author of the SRI report to the FCC in the *Computer I* proceeding stated that "[p]erhaps the most critical issue presented by the computer inquiry is whether or not the telephone carriers are going to be capable of meeting the rapidly growing demand for low-cost data communications."[321] Such concerns are especially significant in light of the rapid growth of the unregulated markets. Insufficient network capacity could be a crippling blow to digital services looking to cope with rapid scaling.

The FCC's *Computer I* Final Decision and its subsequent decisions did not impose any requirements on regulated carriers to offer sufficient capacity and functionality.[322] The FCC in its *Computer*

320. *See* Werbach, *supra* note 25, at 353–83 ("From the physical infrastructure that delivers data across the globe to the content-based services that drive advertising and transactions, the Internet is becoming a less uniform, less universal place.").

321. Dunn, *supra* note 198, at 371.

322. The FCC later established the Open Network Architecture (ONA) process under *Computer III* to encourage carriers and enhanced service providers to negotiate such arrangements, but it was a failure. *See* Werbach, *supra* note 19, at 22–26 (describing how ONA "proved contentious in practice" and was ultimately vacated by the Ninth Circuit in 1994).

The FCC's decision not to impose service requirements on carriers to support data-networking services parallels the NSF's decision not to impose performance standards on the Internet's network access points when privatizing the NSFNet backbone. *See Management of NSFNET: Hearing Before the Subcomm. on Sci. of the H. Comm. on Sci., Space, and Tech.*, 102d Cong. 80 (1992) (statement of Mitchell Kapor, President, Elec. Frontier Found., Chairman, Commercial Internet Exch.) ("As the Internet was growing, the NSF wisely instituted an AUP that allowed for a wide variety of uses of the network, including some that could strictly be

I Tentative Decision stated that "the adequacy of present tariff offerings of common carriers, and particularly the question of interconnection, was the subject of considerable comment from many computer respondents."[323] Nonetheless, it essentially punted on interconnection terms. The FCC committed to review tariff offerings and to investigate concerns that data processing services were not receiving sufficient capacity or needed functionality.[324] It also noted that two unrelated proceedings were causing changes in carrier tariffs that would benefit the computer industry. In the *Carterfone*[325] proceeding, the FCC forced AT&T to allow users to connect any devices they wished to the network.[326] Around the same time, the FCC began to require AT&T to interconnect its lines with MCI, then a private microwave service operating in the Midwest.[327] This decision liberalized carrier interconnection tariffs, which could have meant more flexibility in dealing with other systems, such as computer utilities.

Considerations of capacity and robustness will be increasingly important for the environment of cloud computing. Cloud providers lack the industrial-strength equipment and long-standing commitment to "five nines" reliability that are hallmarks of telephone network operators.[328] The Internet developed with a best-efforts culture, which allowed for the cost savings and flexibility that contributed to its success. As cloud computing platforms become the foundation for major business activities, however, reliability becomes increasingly important. Outages of major network platforms such as Gmail can inconvenience millions of users and interrupt significant business

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classified as 'commercial.' This open policy encouraged extensive use of the Internet and made it a success.").

323. *Computer I Tentative Decision*, 28 F.C.C.2d 291, 292 (1970).

324. *See id.* at 292–93 (highlighting "[f]ormal hearings" and "[i]nformal conferences" in progress and a study commissioned by the National Academy of Sciences).

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

326. *Id.* at 423–24 ("[W]e . . . conclude that the tariff [barring the Carterfone] has been unreasonable, discriminatory, and unlawful in the past, and that the provisions prohibiting the use of customer-provided interconnecting devices should accordingly be striken [*sic*]."); *see* Werbach, *supra* note 19, at 18–19 ("The FCC not only rejected the application of the Bell tariffs to bar use of the Carterfone; it struck down all foreign attachment restrictions in those tariffs as contrary to the public interest.").

327. MCI eventually grew into the competitor with AT&T that forced the breakup.

328. "Five nines" refers to 99.999 percent uptime.

activities.[329] Twitter was so unreliable during its period of rapid growth that it became known for the "fail whale" graphic that appeared during its frequent outages.[330]

In addition to these internal reliability and capacity issues, cloud providers depend on sufficient capacity from communications network operators. Virtualized server clusters may be easily scalable as demand increases, but network ports and circuits are not. The Comcast–Level 3 dispute arose, at least from Comcast's perspective, for precisely this reason. Comcast claimed that Level 3 suddenly demanded additional ports into Comcast's network and dramatically increased its outbound traffic flow when it signed Netflix as a customer.[331] To Comcast, Level 3 was at fault for ramping up its capacity demands suddenly. To Level 3, Comcast was at fault for failing to provide the necessary capacity to bring Netflix's traffic to Comcast's subscribers. The FCC will need to consider what role to take in enhancing the reliability and robustness of increasingly mission-critical networked services that depend on communications networks.

3. *Data Integrity and Privacy.* The third category of issues concerns what the data-networking services do with data. "Privacy" does not do justice to the range of concerns about the informational practices of cloud providers; "information governance" might be a better term.[332]

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329. On May 14, 2009, an error in Google's traffic routing resulted in the unavailability of all Google services globally for two hours, which marked a fifteen-fold drop in global Internet traffic. Ryan Singel, *Google Fails Around the World Thursday Morning*, WIRED EPICENTER (May 14, 2009, 12:40 PM), http://www.wired.com/epicenter/2009/05/google-fails-around-the-world; Ryan Singel, *When Google Goes Down, It Falls Hard*, WIRED EPICENTER (May 14, 2009, 5:13 PM), http://www.wired.com/epicenter/2009/05/when-google-goes-down-it-goes-down-hard. For a continuously updated collection of cloud services failures, see CLOUDFAIL.NET, http://cloudfail.net (last visited Apr. 12, 2011).

330. Rob Walker, *A Successful Failure*, N.Y. TIMES MAG., Feb. 15, 2009, at 17, 17.

331. *See* Letter from Lynn Charytan, Vice President of Legal Regulatory Affairs, Comcast Corp., to Marlene H. Dortch, Sec'y, FCC 3 (Dec. 17, 2010), *available at* http://fjallfoss.fcc.gov/ecfs/document/view?id=7020924384 ("Level 3 contends that it is perfectly fair to shift *all* the going-forward costs of sustaining exploding Internet growth onto *one* network in a two-network arrangement.").

332. *See* David Lazer & Viktor Mayer-Schoenberger, *Governing Networks*, 27 BROOK. J. INT'L. L. 819, 838–40 (2002) ("The informational, coordinative and competitive modes of policy interdependence each pose governance challenges in decentralized regulatory systems."); Michael J. Madison, *Information Governance*, 25 J. MARSHALL J. COMPUTER & INFO. L. 673, 676 (2009) (arguing that the notion of information governance includes "material, conceptual and social" influences).

Discussions about the computer utility in the 1960s frequently raised concerns about personal data.[333] As one 1967 monograph stated, "Personally, the thought of a system that will record and store information on what I purchased for how much *at what time and place* everytime I purchase so much as a newspaper or candy bar frightens me."[334] Numerous scholars and other experts identified privacy as an independent rationale that might justify government regulation of computer utilities.[335] There were also concerns about security and data integrity. If a user's data were stored in a remote computer utility, what assurance did the user have that the data would be maintained properly?[336]

Many similarities between such worries and contemporary concerns about cloud service providers exist.[337] Aggregation of vast stores of data is one of the hallmarks of modern Internet leaders, such

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333. *See* PARKHILL, *supra* note 154, at 149 ("How, then, in the day of the computer utility are we to protect a citizen's private files from surreptitious examination by overzealous public officials?").

334. Paul Armer, *Social Implications of the Computer Utility* 6 (RAND Paper Series, Paper No. P-3642, 1967).

335. ARTHUR R. MILLER, THE ASSAULT ON PRIVACY 210 (1971); Jeffrey Meldman, *Centralized Information Systems and the Legal Right to Privacy*, 52 MARQ. L. REV. 335, 335–36 (1968); Arthur R. Miller, *Computers, Data Banks and Individual Privacy: An Overview*, 4 COLUM. HUM. RTS. L. REV. 1, 11 (1972); *see also* Edward J. Grenier, Jr., *Computers and Privacy: A Proposal for Self-Regulation*, 1970 DUKE L.J. 495, 496–97 (proposing a self-regulatory alternative to federal privacy regulation for the computer industry). *See generally The Computer and Invasion of Privacy: Hearings Before the Special Subcomm. on Invasion of Privacy of the H. Comm. on Gov't Operations*, 89th Cong. 2 (1966) (statement of Rep. Cornelius E. Gallagher, Chairman, Special Subcomm. on Invasion of Privacy of the H. Comm. on Gov't Operations) ("What we seek at this point is to create a climate of concern, in the hope that guidelines can be set up which will protect the confidentiality of reports and prevent invasion of individual privacy . . . ."); ANNETTE HARRISON, THE PROBLEM OF PRIVACY IN THE COMPUTER AGE: AN ANNOTATED BIBLIOGRAPHY (1967) (providing an annotated listing of over three hundred publications relating to the problem of privacy and computers).

336. Security and integrity concerns back in the computer utility era bear substantial similarities to today's cloud computing environment. *See, e.g.*, BARNETT, JR. ET AL., *supra* note 154, at 83–84 ("[P]erhaps the problem of most concern to a potential utility user is the security of his data base held in the memory units of [the] utility system. Although this problem has been solved conceptually, the solutions have not always enjoyed complete success in implementation."); *see also* Armer, *supra* note 334, at 13–14 ("Unauthorized access and copying are more difficult matters, requiring much more work and inventiveness. . . . Computer-utility personnel will include . . . system programmers. [They] are obviously in the most sensitive position of all, for they 'know all' concerning the protective features built into the hardware and software."). Armer goes as far as to suggest that "[c]learly, we . . . need the equivalent of bank examiners to insure the overall integrity of [the system]." Armer, *supra* note 334, at 14.

337. *See* Picker, *supra* note 274, at 9–11 ("[C]ontrol of users' datastreams can implicate privacy and competition concerns . . . .").

as Google and Facebook.[338] What these and other providers can do with personally identifiable information has become a major area of concern.[339] The Obama administration has begun an effort to examine digital privacy issues, including the formation of an interagency task force and reports from the Federal Trade Commission and the Department of Commerce.[340] Public policy activity in this area seems bound to increase.

The FCC made privacy a significant element of its original *Computer I* Notice of Inquiry.[341] As it noted, "Privacy, particularly in the area of communications, is a well established policy and objective of the Communications Act."[342] The Communications Act includes customer proprietary network information (CPNI) rules for

338. *See, e.g.*, MARY MADDEN, SUSANNAH FOX, AARON SMITH & JESSICA VITAK, DIGITAL FOOTPRINTS: ONLINE IDENTITY MANAGEMENT AND SEARCH IN THE AGE OF TRANSPARENCY 2 (2007), *available at* http://www.pewinternet.org/~/media//Files/Reports/2007/PIP_Digital_Footprints.pdf.pdf (noting the vast array of personal data stored online); Soghoian, *supra* note 249, at 361 (listing Google and Amazon.com as cloud services that provide customers with large data storage capabilities); Daniel J. Solove, *Privacy and Power: Computer Databases and Metaphors for Information Privacy*, 53 STAN. L. REV. 1393, 1411 (2001) (noting Amazon.com's ability to keep track of customer purchases); Konstantinos K. Stylianou, *An Evolutionary Study of Cloud Computing Services Privacy Terms*, 27 J. MARSHALL J. COMPUTER & INFO. L. 593, 595 (2010) (naming Yahoo! Mail, Google Docs, and Amazon EC2 as cloud services that "aggregate large amounts of data"); Omer Tene, *What Google Knows: Privacy and Internet Search Engines*, 4 UTAH L. REV. 1433, 1435 (2008) ("Google's access to and storage of vast amounts of personal information create a serious privacy problem . . . ."); Maria Aspan, *How Sticky Is Membership on Facebook? Just Try Breaking Free*, N.Y. TIMES, Feb. 11, 2008, at C1 (noting the difficulty of removing private information from Facebook once it has been posted); Johann Cas, *Privacy in Pervasive Computing Environments—A Contradiction in Terms?*, IEEE TECH. & SOC'Y MAG., Spring 2005, at 24, 25 (noting privacy concerns in developing pervasive computing systems).

339. *See, e.g.*, Michael A. Froomkin, *The Death of Privacy?*, 52 STAN. L. REV. 1461 (2000); Paul T. Jaeger, Jimmy Lin & Justin M. Grimes, *Cloud Computing and Information Policy: Computing in a Policy Cloud?*, 5 J. INFO. TECH. & POL'Y 269 (2008); Jeffrey H. Reiman, *Driving to the Panopticon: A Philosophical Exploration of the Risks to Privacy Posed by the Highway Technology of the Future*, 11 SANTA CLARA COMPUTER & HIGH TECH. L.J. 27 (1995); Daniel J. Solove, *The Digital Person and the Future of Privacy*, *in* PRIVACY AND IDENTITY: THE PROMISE AND PERILS OF A TECHNOLOGICAL AGE 3 (Katherine Strandburg ed., 2005); Bruce R. Wells, *The Fog of Cloud Computing: Fourth Amendment Issues Raised by the Blurring of Online and Offline Content*, 12 J. CONST. L. 223 (2009); Couillard, *supra* note 277; *Cloudy with a Chance of Rain*, ECONOMIST, Mar. 5, 2010, at 6; Stephen H. Wildstrom, *Google's Gmail Is Great—But Not for Privacy*, BUS. WK., May 3, 2004, at 30; Jason Kincaid, *Google Privacy Blunder Shares Your Docs Without Permission*, TECHCRUNCH (Mar. 7, 2009), http://techcrunch.com/2009/03/07/huge-google-privacy-blunder-shares-your-docs-without-permission.

340. *See* Edward Wyatt & Tanzina Vega, *F.T.C. Backs Plan to Honor Privacy of Online Users*, N.Y. TIMES, Dec. 1, 2010, at A1 (discussing the FTC's report and proposal to allow users to opt out of behavioral tracking).

341. *Computer I NOI*, 7 F.C.C.2d 11, 15–17 (1966).

342. *Id.* at 16.

telecommunications carriers, which limit the carriers' ability to use network management data for marketing purposes.[343] The phone company knows who its customers are calling, but it cannot sell that information to a marketer or offer those customers a new product based on the identity of their friends. Those CPNI rules did not apply to unregulated data processing services. In *Computer I*, the FCC considered whether it was appropriate to impose similar obligations on how computer utilities handled customer data. At the same time as the FCC addressed data privacy in *Computer I*, Congress held several hearings on the topic.[344]

In the end, the FCC declined to adopt any privacy requirements in *Computer I*.[345] The FCC was concerned that such action would exceed its jurisdictional authority, and that it might be better addressed by other agencies or Congress.[346] Indeed, many dimensions of privacy and information governance go beyond the expertise of the FCC. There are some privacy-related questions, however, that communications regulators are best situated to address. As danah boyd and Professor Randal Picker observe, cloud computing platforms bear many of the indicia of public utilities, such as telephone companies, that are subject to special obligations in their handling of user data.[347]

Whether such obligations should extend to services such as Facebook and Google is a debatable proposition. There are good arguments that market forces or more targeted interventions may be sufficient. Drawing a bright line between telephone companies

343. 47 U.S.C. § 222(c)(1) (2006) ("Except as required by law or with the approval of the customer, a telecommunications carrier that receives or obtains customer proprietary network information by virtue of its provision of a telecommunications service shall only use, disclose, or permit access to individually identifiable [CPNI] in its provision of (A) the telecommunications service from which such information is derived, or (B) services necessary to, or used in, the provision of such telecommunications service, including the publishing of directories.").

344. *See* Davison et al., *supra* note 220, at 309–15 (discussing congressional action to protect privacy in the computer field).

345. *See Computer I Tentative Decision*, 28 F.C.C.2d 291, 294–95 (1970) (noting that the FCC would "give further consideration" to regulatory action regarding privacy needs); McDonald, *supra* note 154, at 8 (noting that the FCC's *Computer* decisions and the deregulatory political environment kept computers from being federally regulated).

346. *See Computer I Tentative Decision*, 28 F.C.C.2d at 294–95 ("The privacy issue in its broadest sense has numerous social and public policy implications which go well beyond the pale of our jurisdiction over communications . . . .").

347. *See* Picker, *supra* note 274, at 9–11 (discussing the effects of privacy restrictions on the cable industry); boyd, *Facebook Is a Utility*, *supra* note 274 (arguing that Facebook is like a utility and will likely be regulated).

subject to stringent information privacy restrictions and other digital data aggregators, however, creates an artificial distinction. Some of those unregulated providers include cable operators competing in the same broadband access market as the telephone companies; others include platforms like Google Voice and Skype that are able to collect user behavior data in the same manner as telephone companies.[348]

4. *Transparency.* The final area for consideration is transparency. In a way, *Computer I* was all about transparency. The questions in the Notice of Inquiry largely concerned the terms and conditions of services that carriers provided to data processing providers.[349] *Computer I* was, in effect, the FCC's way of understanding marketplace conditions. The FCC did not adopt any formal transparency mandate because it did not have to. The regulated carriers were subject to tariffing requirements that obligated them to disclose the terms and conditions of their offerings. Those tariffs have gone by the wayside, however, and unregulated computer-based services have never had to file them.

The FCC adopted a transparency mandate in its Open Internet Order.[350] It added this principle, along with a nondiscrimination rule, to the four consumer-protection principles it had articulated in 2005. The Comcast-BitTorrent imbroglio demonstrated how the lack of transparency about broadband access networks' practices could create confusion and uncertainty. Comcast imposed a network management system that disadvantaged peer-to-peer file sharing, but neither customers, nor other services providers, were aware of its terms.[351] Comcast itself often seemed unclear about what it was doing,

348. For a comparison between VoIP and legacy voice services, see Dong Hee Shin, *VoIP: A Debate Over Information Service or Telephone Application in US: A New Perspective in Convergence Era*, 23 TELEMATICS & INFORMATICS 57, 59–61 (2006); and see also Daniel B. Garrie, Matthew J. Armstrong & Donald P. Harris, *Voice Over Internet Protocol and the Wiretap Act: Is Your Conversation Protected?*, 29 SEATTLE U. L. REV. 97, 105–08 (2005).

349. *Computer I NOI*, 7 F.C.C.2d 11, 7–15 (1966).

350. *See* Preserving the Open Internet, 25 FCC Rcd. 17,905, 52 Commc'ns Reg. (P & F) 1, 31–32 (Dec. 21, 2010) (report and order) (adopting a universal transparency requirement for mobile broadband).

351. The FCC was particularly harsh on Comcast's choice to keep its network management practices secret from its customers. *See* Formal Complaint of Free Press and Public Knowledge Against Comcast Corporation for Secretly Degrading Peer-to-Peer Applications, 23 FCC Rcd. 13,028, 13,059 (2008) (memorandum opinion and order), *vacated*, Comcast Corp. v. FCC, 600 F.3d 642 (D.C. Cir. 2010) ("[A]lthough Comcast eventually disclosed some elements of its network management practices to customers, Comcast's first reaction to allegations of

perhaps because its engineers and lawyers were not communicating internally. One of the FCC's requirements in its 2008 order sanctioning Comcast was that the company file a report detailing the practices it had engaged in.[352] Comcast also had to file a description of the new, protocol-agnostic network-management system it had adopted instead.[353] The company did so, even while successfully challenging the legal authority for the FCC's actions.[354]

Comcast's disclosure of both its discriminatory practices and its replacement network management approach created a learning experience for the company, the FCC, and the industry. Engineers knew that peer-to-peer systems and other developments were straining broadband networks, especially the shared last-mile systems of cable operators. The degree of the problem and the efficacy of solutions, however, were difficult to gauge when companies kept mum about their actual experiences. The Comcast order, however, was a one-time requirement for a specific situation. A more universal transparency requirement might help prevent and resolve similar disputes in the future.[355]

The Comcast–Level 3 dispute illustrates the perils of a nontransparent environment. The terms of Comcast's business relationship with Level 3, as with all of its backbone peering and transit contracts, are private.[356] Comcast's decision to impose new

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discriminatory treatment was not honesty, but at best misdirection and obfuscation. If Comcast actually believed its practices were reasonable, it should not have behaved in this manner. A hallmark of whether something is reasonable is whether a provider is willing to disclose to its customers what it is doing. To the extent that Comcast wishes to employ capacity limits in the future, it should disclose those to customers in clear terms.").

352. *Id.* at 13,059–60; *see also* Letter from Kathryn A. Zachem, Vice President, Comcast Corp., to Marlene H. Dortch, Sec'y, FCC (Sept. 19, 2008), *available at* http://fjallfoss.fcc.gov/ecfs/document/view?id=6520169715 (describing Comcast's network management practices, in compliance with the FCC order).

353. *Formal Complaint of Free Press and Public Knowledge*, 23 FCC Rcd. at 13,059–60; *see also* Letter from Kathryn A. Zachem, Vice President, Comcast Corp., to Marlene H. Dortch, Sec'y, FCC 1 (Jan. 5, 2009), *available at* http://fjallfoss.fcc.gov/ecfs/document/view?id=6520192582 (reporting that Comcast had discontinued and replaced the network management practices for which it was censured).

354. *See* Comcast Corp. v. FCC, 600 F.3d at 644 (vacating the 2008 order).

355. Gerald Faulhaber & David Farber, *The Open Internet: A Customer-Centric Framework*, 4 INT'L. J. COMM. 302, 315–16 (2010); Richard S. Whitt, *Evolving Broadband Policy: Taking Adaptive Stances to Foster Optimal Internet Platforms*, 17 COMMLAW CONSPECTUS 417, 530–31 (2009).

356. For an explanation of the moral hazard that undisclosed peering agreements entail, the opportunistic behavior they may spur, and how information asymmetry between the principal and agent can be taken advantage of by the agent, see COSTAS COURCOUBETIS & RICHARD

usage-based charges on Level 3 would never have even entered the realm of policy discussion had Level 3 not gone public. Both parties engaged in a pattern of strategic partial disclosures to advance their claims. There is no neutral way to ascertain the economics and the typicality of the Comcast–Level 3 arrangement.

There are sometimes business reasons to keep a negotiation confidential. In the case of network interconnection, however, the strategic value seems limited, at least in light of the benefits of disclosure. Large networks have often kept their backbone-peering terms confidential, and they have even subjected those with whom they are interconnected to nondisclosure agreements.[357] Comcast is actually one of the more liberal companies on that score, posting its peering terms on a public website.[358]

Transparency creates ancillary benefits as well. Transparency about standards and protocols will push toward greater portability of data across cloud platforms. This portability would benefit users and would create new opportunities for innovation. Furthermore, network researchers have lacked comprehensive data on Internet traffic flows since the NSF privatized the Internet backbone.[359] If the FCC promotes the open dissemination of data through standard formats, researchers can apply this data to many other problems. Furthermore, the mere knowledge that business arrangements and internal technical practices may be made public can influence corporate behavior. Companies will be less likely to employ

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WEBER, PRICING COMMUNICATION NETWORKS: ECONOMICS, TECHNOLOGY AND MODELLING 286–87 (2003); and see also Ioanna D. Constantiou & Nikolaos A. Mylonopoulos, *Towards Sustainable Quality of Service in Interconnection Agreements: Implications from Information Asymmetry*, ECIS 2001 PROC. 865, 866 (2001) (same).

357. *See* Kende, *supra* note 95, at 56 (referring to the nondisclosure agreements that cover contracts between backbones); Werbach, *supra* note 25, at 370 (noting the confidential nature of peering agreements).

358. *See* Press Release, Comcast Corp., *supra* note 98 (describing Comcast's agreement with Level 3).

359. *See* KIMBERLY CLAFFY, CAIDA, TEN THINGS LAWYERS SHOULD KNOW ABOUT THE INTERNET 2 (2008), *available at* http://www.caida.org/publications/papers/2008/lawyers_top_ten/lawyers_top_ten.pdf (noting that the current legal framework constrains researchers' access to adequate information to conduct accurate analyses); Sascha D. Meinrath & kc claffy, *The COMMONS Initiative: Cooperative Measurement and Modeling of Open Networked Systems*, 16 COMMLAW CONSPECTUS 407, 411 (2008) (same); Colleen Shannon, David Moore, Ken Keys, Marina Fomenkov, Bradley Huffaker & k claffy, *The Internet Measurement Data Catalog*, ACM SIGCOMM COMPUTER COMM. REV., Oct. 2005, at 97, 98 (2005) ("One of the most fundamental problems remains access to current data.").

questionable network management practices if they know their actions will become public.

CONCLUSION

The task for the FCC and, ultimately, Congress, is to formulate a regulatory program that promotes wealth creation, innovation, and civic values in the novel environment of converged communications and computing. The choices first made in *Computer I* continue to influence public policy for network industries. Quarantining data services from regulation and attempting to police the dividing line is an increasingly treacherous proposition. Internet-based digital services should not be subject to the strictures of traditional common carrier regulation, but they do raise a series of important policy considerations. The FCC's emphasis on regulatory questions relating to broadband access masked an evolution of the Internet toward more centralized platforms. The basic public policy challenge for the FCC will not be the choice between regulation and deregulation, or between closed and open networks. It will be to translate the age-old concept of public utilities into the contemporary environment of cloud computing.