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The Federal Computer Commission

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THE FEDERAL COMPUTER COMMISSION

KEVIN WERBACH*

The conventional wisdom that the computer industry thrives in the absence of government regulation is wrong. Federal Communications Commission (“FCC”) rules touch every personal computer ever made. Over the last quarter-century, the FCC has steadily increased its influence over personal computing devices and applications. Perhaps surprisingly, though, the “Federal Computer Commission” has largely been a positive force in the technology sector. Regulators are now poised to take several actions that could shape the future of the Internet and the computer industry. In this environment, exposing the Federal Computer Commission provides a foundation for reasoned policy approaches. The fate of a dynamic and important set of industries should not be decided under the influence of a myth.

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INTRODUCTION

If there is one thing Internet and communications policy advocates of all stripes can agree on, it is the folly of creating a Federal Computer Commission. There is no agency with that name, and everyone seems happy to keep things that way. Members of Congress,¹ policy advocates,² legal scholars,³ and even the Chairman of the Federal Communications Commission ("FCC" or "the

1. See Gary H. Anthes, *Telecom Overhaul Hits Roadblock in Congress*, COMPUTERWORLD, June 5, 1995, at 8 ("We already have too many federal bureaucracies and do not need to add a 'Federal Computer Commission' to the list," [Representative Rick White] said in a statement."); *Congressmen Decry the "Federal Computer Commission"*, TECH L.J., Mar. 31, 1998, <http://www.techlawjournal.com/telecom/80331fcc.htm>; Elizabeth Wasserman, *A New Year Brings Talk of New Net Rules* (Jan. 6, 1999), <http://www.cnn.com/TECH/computing/9901/06/newrules.idg/> ("We want to make sure the FCC doesn't become the Federal Computer Commission," says Ken Johnson, press secretary to Representative W.J. 'Billy' Tauzin.").

2. See, e.g., George Gilder, *Telecosm: From Wires to Waves*, FORBES ASAP, June 5, 1995, at 124, 141 (urging communications regulators to look to the computer industry in dealing with telecommunications deregulation); Stephen Labaton, *Antipiracy Rule for Broadcasts is Struck Down*, N.Y. TIMES, May 7, 2005, at A1 ("Critics had also maintained that the [C]ommission had overreached and had moved to regulate the Internet more tightly, ridiculing the agency in the aftermath of the [broadcast flag] rulemaking as the 'federal computer commission.'").

3. See, e.g., PETER HUBER, *LAW AND DISORDER IN CYBERSPACE: ABOLISH THE FCC AND LET COMMON LAW RULE THE TELECOSM passim* (1997) (comparing the unregulated computer industry with the regulated communications industry and arguing for abolition of the FCC); Tom Zeller, Jr., *Federal Effort to Head Off TV Piracy Is Challenged*, N.Y. TIMES, Feb. 21, 2005, at C1 ("This is about whether the F.C.C. is going to become the Federal Computer Commission and the Federal Copyright Commission," said Gigi B. Sohn, the co-founder and president of Public Knowledge.").

Commission”)⁴ have favorably compared the unregulated, highly competitive, innovation-rich computer industry with the Byzantine intrigues of the regulated communications industry. Even defenders of the FCC laud it for *not* extending its regulatory reach into the computer world.⁵ There is an apparent consensus that, whether the FCC is the problem or the solution for the communications world, it must not be allowed to influence other industries.

The FCC is an independent federal administrative agency that oversees all forms of interstate and international communications. Established by the Communications Act of 1934,⁶ it regulates major industries such as broadcast television, radio, cable television, wired telephone service, mobile phones, and satellite communications. For most of the FCC’s history, the primary companies it regulated—broadcasters and telephone companies—operated as either government-sanctioned monopolies or licensees of scarce government-controlled assets.⁷ The FCC subjected these companies to pervasive “public interest” regulation, far beyond what most U.S. companies experience.⁸ FCC involvement in an industry thus became an object of fear.⁹ And nothing could be scarier than the prospect of the FCC muscling in on the unregulated high-tech paradise of the computer industry.

Any view so widely shared, yet seldom examined, ought to be suspect. The trouble with the conventional wisdom is that there already *is*, in effect, a Federal Computer Commission. There has been for some time. The FCC was regulating end-user computing devices plugged into the phone network for nearly a decade before

4. See Reed E. Hundt, Chairman, Fed. Commc’ns Comm’n, Speech to the Center for National Policy: The Progressive Way (May 6, 1996), <http://www.fcc.gov/Speeches/Hundt/spreh624.txt>.

5. See Robert Cannon, *The Legacy of the Federal Communications Commission’s Computer Inquiries*, 55 FED. COMM. L.J. 167, 205 (2003) (concluding that the FCC’s market-based policies allowed new technologies to flourish); Jason Oxman, *The FCC and the Unregulation of the Internet* (Fed. Commc’ns Comm’n Office of Plans and Policy, Working Paper No. 31, 1999), http://www.fcc.gov/Bureaus/OPP/working_papers/oppwp31.pdf; Hundt, *supra* note 4.

6. Pub. L. No. 73-416, 48 Stat. 1064 (1934) (codified as amended at 47 U.S.C. §§ 151–615b (2000)).

7. See HUBER, *supra* note 3, at 4.

8. See *id.* at 24–34.

9. See *id.* at 5 (describing centralized regulation of communications as a shadow that descended upon the nation in the late 1920s and early 1930s). This perception of the FCC is eminently contestable. FCC regulation has historically served many public interest goals. However, the salient point for present purposes is how the FCC is perceived, even if unfairly.

the personal computer (“PC”) was introduced.¹⁰ The FCC began regulating wireless equipment forty years before that,¹¹ and it did not stop regulating end-user hardware when the PC came along. Quite the contrary. Over the last quarter-century, the FCC has reaffirmed and gradually increased its influence over personal computing devices.¹² More surprisingly, the Internet’s arrival only accelerated this trend. Perhaps most surprising, the Federal Computer Commission has been, in most cases, a positive force in the technology sector.

Computers¹³ are everywhere in the modern world. There are now over 600 million PCs in use worldwide, a number “expected to hit or exceed one billion by 2010.”¹⁴ More than half a billion mobile phones are sold every year,¹⁵ with increasingly sophisticated “smart phone” computing capabilities becoming standard.¹⁶ Sony, Microsoft, and Nintendo have sold a combined 100 million current-generation video game consoles, each of which has the processing power of a high-end PC.¹⁷ FCC regulations touch a significant percentage of these computing devices.¹⁸ As higher percentages of computers incorporate data networking, voice, and video capabilities, they will move even more squarely within the FCC’s regulatory ambit.¹⁹

10. See *infra* Part II.A.1.

11. See *infra* Part II.B.

12. See *infra* Part III.

13. A “computer” for purposes of this Article is a device incorporating a digital microprocessor and a direct end-user interface. Personal computers are thus only one type of computer.

14. Michael Kanellos, *A Billion PC Users on the Way*, CNET NEWS.COM, Aug. 2, 2004, http://news.com.com/2100-1003_3-5290988.html. Global PC shipments totaled nearly 200 million units in 2005. Jay Wrolstad, *Global PC Sales Leveling Off*, NEWSFACTOR TECH. NEWS, Feb. 16, 2005, http://www.newsfactor.com/hardware/story.xhtml?story_title=Global-PC-Sales-Leveling-Off&story-id=30526.

15. John Walko, *Handset Sales Reach New High in 2004*, EE TIMES ONLINE, Jan. 27, 2005, <http://www.eetimes.com/showArticle.jhtml?articleID=59100009>.

16. Keith Reed, *How Smart Is Your Cellphone?*, BOSTON GLOBE, Sept. 5, 2005, at D1.

17. Nick Wingfield & Robert A. Guth, *Console Makers Woo Creators of Videogames*, WALL ST. J., Mar. 7, 2005, at B1 (“Sony has sold more than 74 million PlayStation 2 machines compared to 20 million for Microsoft’s Xbox and more than 10 million of Nintendo’s GameCube.”).

18. See *infra* Part II. This paper focuses both on equipment marketed as “computers” (such as laptops) and end-user computing devices designated as something else (such as mobile phones).

19. The FCC’s jurisdiction is limited to the United States. However, because the United States is such a significant market, as well as a model for regulators elsewhere, the FCC’s influence is global.

The FCC followed four independent paths toward computer regulation. First, beginning with the *Carterfone*²⁰ decision in 1968, it created rules to police the interface between the telephone network and end-user communications devices.²¹ In regulating how the network talked to end-user hardware, the Commission also regulated how that hardware talked to the network.²² In the subsequent *Computer Inquiries*, the Commission gradually expanded its efforts to nurture what became the computer industry through interface regulation.²³ Second, the FCC used its authority over radio frequency emissions to define technical standards for “unintentional radiators,” including personal computers.²⁴ Again, this technical beginning laid the foundation for policy-based regulation of devices, such as the mandate that television sets include a “V-Chip” to allow blocking of violent and sexual programming.²⁵ Third, the Commission has sought to achieve social policy mandates in ways that involve further regulation of computer hardware.²⁶ And finally, in recent years, the Commission has directly addressed computer-based applications such as instant messaging (“IM”) and Voice over Internet Protocol (“VoIP”).²⁷

Many of these rules were already in place when Steve Jobs and Steve Wozniak hacked together their first Apple computer in the 1970s.²⁸ As the personal computer industry grew, however, regulatory involvement in that industry grew apace. And the first years of the twenty-first century have witnessed an unprecedented expansion of the FCC’s involvement in the computer business.²⁹ If current proposals are adopted, every significant participant in the computer industry will, as a matter of course, need to consider the implications of FCC actions for its products. Some of those products will require explicit FCC pre-approval to enter the marketplace. It is not a stretch to say that companies such as Sony and TiVo, participants in the “unregulated” computer and consumer electronics industries, will soon face more significant FCC regulation than pure

20. Use of the Carterfone Device in Message Toll Tel. Servs. (*Carterfone*), 13 F.C.C.2d 420 (1968).

21. *Id.* at 423, 426–27.

22. *See infra* Part II.A.1.

23. *See infra* Part II.A.2.

24. *See infra* Part II.B.

25. *See infra* Part II.C.2.

26. *See infra* Part II.C.

27. *See infra* Part II.D.

28. *See* STEVEN LEVY, HACKERS: HEROES OF THE COMPUTER REVOLUTION 249–50 (1984).

29. *See infra* Part III.

communications companies like Vonage and Level 3, or even today's AT&T.³⁰

The growing scope of the Federal Computer Commission is not necessarily a negative development. The FCC and other government agencies regulate not with the intent of destroying markets, but to nurture and protect them. As discussed below, most of the FCC rules affecting the computer industry have actually had a salutary effect. Moreover, there is something like a law of conservation of regulation in network industries. Increased FCC oversight of end-user hardware often goes hand-in-hand with *decreased* regulation of communications networks. The drift of communications regulation, at least since the 1980s, has been to move away from regulated monopolies and toward competitive markets for telecommunications services.³¹ However, scaling back the FCC's traditional activities may mean increased involvement in areas where the Commission was previously absent. The action has shifted from the infrastructure to the applications and data on top. The recent emphasis on deregulation of service providers may be masking a shift from one type of regulation to another.

The driving force behind the FCC's growing involvement in the computer industry is the technological trend known as convergence.³² Convergence means that communications and computing are becoming one field. Simply by doing what it has always been legally obligated to do with regard to the communications industry, the FCC finds itself deeply entangled in the computer industry. In other words, the FCC's growing influence over computers does not reflect a conscious expansion of the agency's role. The computer industry moved toward the FCC much faster than the agency itself has moved.

Unfortunately, technology policy discourse has not yet adverted to this reality. It is still trapped in a Manichaeian narrative of diabolical regulation, in which every issue comes down to more

30. On October 31, 2005, the FCC approved the takeover of AT&T by SBC Communications in a transaction valued at \$16 billion. *Regulators Approve Phone Company Mergers, with Terms*, N.Y. TIMES, Nov. 1, 2005, at C8.

31. See Dean Burch, *Common Carrier Communications by Wire and Radio: A Retrospective*, 37 FED. COMM. L.J. 85, 85 (1985) ("On this the fiftieth anniversary of its charter, the Federal Communications Commission is firmly on the road to deregulation of the telephone industry.").

32. See Kevin Werbach, *Digital Tornado: The Internet and Telecommunications Policy* iii, 5-7, 82 (Fed. Commc'ns Comm'n Office of Plans and Policy, Working Paper No. 29, 1997), http://www.fcc.gov/Bureaus/OPP/working_papers/oppwp29.pdf.

government or less, with less being the right answer.³³ This storyline is becoming increasingly untenable. The FCC *is* the Federal Computer Commission, like it or not. The question is what sort of Federal Computer Commission we will have.

Because both FCC proponents and detractors ignored FCC regulation of computer hardware and software, that regulation developed in an ad hoc fashion. The Federal Computer Commission grew up in the shadows of information and communications policy. It is rarely spoken about, let alone defended. This is a mistake. If there is to be a Federal Computer Commission, there should be a sense of how, what, and why that Federal Computer Commission regulates computer devices and applications. Rather than pretend the FCC has no business meddling in the computer industry, we should examine situations where the FCC has done so in the past and is proposing to do so in the future.

The dangers of an inchoate Federal Computer Commission can be seen in the recent FCC broadcast flag proceeding.³⁴ There, the agency directly mandated the design of digital hardware without any express statutory authorization. Under the FCC's proposal, all devices capable of receiving digital television signals, including computers, would have had to incorporate technology intended to prevent unauthorized copying of digital programming.³⁵ In defending these actions in court, the Commission and the Department of Justice adopted an expansive reading of the Communications Act, one which put few limits on the government's ability to oversee the computer industry.³⁶ The United States Court of Appeals for the District of Columbia Circuit overturned the broadcast flag rules, finding that they exceeded the FCC's statutory authority.³⁷ Although the outcome placed some constraints on the agency's actions,³⁸ the court's

33. See, e.g., LAWRENCE LESSIG, CODE AND OTHER LAWS OF CYBERSPACE 85–86, 231–34 (chiding those who blindly advocate keeping cyberspace “unregulated”); Declan McCullagh, *Taxes on Tap for Internet Chat?*, CNET NEWS.COM, July 26, 2004, http://news.com.com/Taxes+on+tap+for+Internet+chat/2010-1028_3-5281883.html (criticizing prospective FCC rules governing VoIP).

34. See *infra* Part III.D.2.

35. Digital Broadcast Content Protection: Report and Order and Further Notice of Proposed Rulemaking, 18 F.C.C.R. 23,550, 23,552 (2003) [hereinafter Broadcast Flag Order].

36. See *infra* Part IV.A.

37. *Am. Library Ass'n. v. Fed. Comm'n's Comm'n*, 406 F.3d 689, 708 (D.C. Cir. 2005).

38. See *id.* (“[T]he FCC has no authority to regulate consumer electronic devices that can be used for receipt of wire or radio communication when those devices are not engaged in the process of radio or wire transmission.”).

decision was based on narrow statutory and technical grounds.³⁹ The lack of a real policy framework opens the door to the kind of unconstrained regulatory interference the computer industry has long feared.

This Article seeks to bring the Federal Computer Commission out of the shadows. Part I sets the stage by describing the conventional wisdom about the FCC's regulation of computers. Part II catalogs the many ways the FCC actually does regulate computers and related end-user hardware or software. Part III examines how advancing technologies and other changes in the communications and computing industries are increasing the FCC's involvement in the computer industry. Part IV criticizes the lack of a clear intellectual framework for FCC computer regulation and outlines how such a framework could be developed.

Clearing out the underbrush in this way produces some important conclusions. First, more often than not, FCC regulation has advanced the development of the computer industry and its illustrious stepchild, the Internet. Second, a more clear-eyed assessment of when and how the FCC affects the computer world provides a starting point for future decisionmaking. Applying current thinking about communications regulation to the FCC's actions in the computer realm offers productive guidance for regulators.

I. FEAR AND LOATHING

In March 1998, the House Subcommittee on Telecommunications, Trade, and Consumer Protection held a hearing to question the FCC's implementation of the so-called "E-Rate" Program, a congressionally-mandated fund to subsidize Internet access for schools and libraries.⁴⁰ Representative Christopher Cox of California opened his remarks with a withering attack,⁴¹ arguing the Commission had created "essentially a two and one half billion dollar tax that is going to be used . . . for sucking the Internet into the vast web of the Federal Computer Commission."⁴²

39. See *infra* Part III.D.2.

40. See 47 U.S.C. § 254 (2000) (establishing "E-Rate" discounts for schools and libraries); Federal-State Joint Board on Universal Service: Report and Order, 12 F.C.C.R. 8776, 9002-92 (1997) (implementing the program).

41. Congressman Cox subsequently became Chairman of the Securities and Exchange Commission, another agency grappling with a volatile industry that occupies a large share of the U.S. economy. See *Cox Receives Senate's OK to Head SEC*, L.A. TIMES, July 30, 2005, at C3.

42. *Congressmen Decry the "Federal Computer Commission," supra* note 1.

As Cox's tone suggests, the term "Federal Computer Commission" produces an almost visceral recoil in policy discussions.⁴³ The computer industry⁴⁴ and its defenders celebrate the sector's high rate of growth, innovation, and competition, which they attribute to the operation of unfettered market forces.⁴⁵ If the computer industry is so successful without regulatory involvement, they ask, why is there still a need to regulate the similarly technology-driven communications sector?⁴⁶ Throughout the mid-1990s, conservatives and libertarians used this argument as the basis of a sustained campaign to abolish the FCC.⁴⁷

Then-FCC Chairman Reed Hundt rose to the defense of his agency, stating in a 1996 speech:

Those who wish to eliminate the Federal Communications Commission explain their conclusion by simply observing, well, we don't have a Federal Computer Commission, do we? And that industry is thriving, isn't it?

43. See, e.g., Labaton, *supra* note 2 (noting criticism of the FCC's broadcast flag decision for potentially regulating the Internet). The FCC shares this instinctive response to the "Federal Computer Commission" phrase. When the author revealed the title of this Article to a senior official at the Commission, his immediate response was, "Oh no."

44. This Article uses the phrase "computer industry" broadly to refer to manufacturers of personal computer hardware and software, data networking equipment, and Internet-based applications or content.

45. Well-known communications lawyer Peter Huber epitomized these arguments in an influential 1997 book. See HUBER, *supra* note 3, at 22-23.

46. The communications companies the FCC explicitly regulates ask the same question. See Neil Hickey, *Revolution in Cyberia*, COLUM. JOURNALISM REV., July-Aug. 1995, at 40, 42 (quoting former Speaker of the House Newt Gingrich as saying, "I was at a dinner one night and I asked fifteen c.e.o.s [sic] of telecommunications companies if we would be better off if [the FCC] were abolished, and all fifteen raised their hands.").

47. See Declan McCullagh, *Why the FCC Should Die*, CNET NEWS.COM, June 7, 2004, http://news.com.com/Why%2Bthe%2Bthe%2BFCC%2Bshould%2Bdie/20101028_35226979.html; see also HERITAGE FOUND., *ROLLING BACK GOVERNMENT* 40, 150-53, 156 (Scott A. Hodge ed., 1995) (recommending the establishment of private property rights in the spectrum and an end to federal management of spectrum property); GEORGE A. KEYWORTH ET AL., *THE TELECOM REVOLUTION: AN AMERICAN OPPORTUNITY passim* (1995) (describing a "Replacement Model" calling for abolition of the FCC and establishment of an "Office of Communications"); Lawrence Gasman, *Telecompetition Revisited: An Agenda*, REGULATION, Spring 1995, at 22-24, 30-31 (setting forth a plan calling for the abolition of the FCC and reliance on market-based enforcement); Peter Huber, *Abolish the FCC*, FORBES, Feb. 13, 1995, at 184 (arguing that existing government agencies and private enforcement could replace the FCC); Alan Pearce, *Telecom Reform on the Money for GOP Backers*, NETWORK WORLD, Feb. 20, 1995, at 1, 56 (quoting House Speaker Newt Gingrich's support for a student advocating abolition of the FCC).

The analogy is wrong. We don't need a Federal Computer Commission because in fact the computer industry was never a state-authorized monopoly

But communications markets are intensely concentrated, as a result of five decades of pro-monopoly laws, and the scale of investment for competition in these markets is in the hundreds of billions.⁴⁸

Hundt's defense of the FCC conceded a central point of its antagonists: government involvement would be inimical to the health of the computer industry. His point was that the communications industry was a wholly distinct world. The fact that those industries are hurtling towards one another did not enter into the equation.

Even parties who disagree about most communications policy issues thus agree that a Federal Computer Commission would be a very bad idea. According to this conventional wisdom, the computer industry thrives because government stays away.

The FCC itself has reinforced this notion. It claimed some credit for facilitating the Internet's rise, precisely because it had not regulated it.⁴⁹ In other words, the FCC looked itself in the mirror and did not like what it saw. It heeded the arguments of economists and others who criticized the Commission for hindering innovation in the communications sector.⁵⁰ When the Internet came along, the FCC was careful to steer clear lest it corrupt the brilliant new technology.

The fear and loathing of the Federal Computer Commission boogeyman jives with a reassuring bedtime story that technologists like to tell themselves. In this narrative, the computer industry and the new Internet arena are the domain of bold, self-made

48. Hundt, *supra* note 4. Ironically, Hundt and Cox were once law partners at the firm of Latham & Watkins. See Carrie Johnson, *A Step Toward a Shift at SEC*, WASH. POST, July 26, 2005, at D1 (highlighting Cox's experience at Latham & Watkins); Michael Kilian, *FCC Chief's Signals Strong on Changes in Communications*, CHI. TRIB., Aug. 7, 1994, at C1 (describing Hundt's time at Latham & Watkins).

49. See Oxman, *supra* note 5, at 24 (proclaiming the virtues of a heretofore unannounced policy of "unregulation" of the Internet). Oxman's focus was on the Internet, but his argument applied to the FCC's relationship with the computer industry as well. Other commentators have pointed out the hollowness of the FCC's claimed adherence to unregulation as a reason for the Internet's success. See, e.g., Philip J. Weiser, *Internet Governance, Standard Setting, and Self-Regulation*, 28 N. KY. L. REV. 822, 823 (2001) (attacking the "unregulation" concept).

50. See, e.g., Robert W. Crandall & J. Gregory Sidak, *Competition and Regulatory Policies for Interactive Broadband Networks*, 68 S. CAL. L. REV. 1203, 1216 (1995) ("In the United States, the particular policies that have had the effect of suppressing competitive entry or substitution in communications are almost too numerous to list.").

entrepreneurs, while the communications world is filled with coddled, risk-averse bean counters who live to exploit labyrinthine bureaucracies and artificial regulatory arbitrage.⁵¹ Unconsciously echoing nineteenth-century social Darwinists, the computer industry pats itself on the back for its demonstrated success.⁵² It looks at the communications industry as proof of the corrupting effects of public assistance. Good markets, to this way of thinking, are defined not by effective regulation, but by the absence of regulation. Nothing scares a technologist more than hearing, "I'm from the government; I'm here to help."

The symbols of Silicon Valley are lonely entrepreneurs, like the founders of HP, eBay, and Apple Computer hard at work in their garages. Those innovators did not seek prior approval from anyone. In fact, rejection by the powers-that-be was an initial motivator.⁵³ They followed their dreams, insights, technical brilliance, and business savvy, and wound up changing the world. Any regime that forces such innovators to seek authorization from a regulator before introducing new products is, needless to say, anathema to this worldview.

In today's world, however, this story of freedom from regulation falls apart. Developers can pursue their dreams in splendid isolation only if the products they develop are self-contained. Yet today, every personal computer shipped includes hardware and software for connecting to the Internet and an increasing share of computer usage depends on those Internet connections. When devices start linking up with networks, the barrier between unregulated computers and regulated communications diminishes. The computers themselves may not be subject to FCC jurisdiction, but the companies producing them must take the FCC into account.

Those who introduce devices dependent on connections to communications networks must always receive permission ahead of time, or at a minimum, tacit approval. That permission comes either from the network owner or a government agency. The producer of a stand-alone device, which the PC was for most of its existence, is the master of its own destiny.⁵⁴ The producer of network-connected

51. See CHARLES H. FERGUSON, *THE BROADBAND PROBLEM* 35, 57 (2004); Steve V. Steinberg, *Netheads vs Bellheads*, *WIRED*, Oct. 1996, at 145.

52. See generally RICHARD HOFSTADTER, *SOCIAL DARWINISM IN AMERICAN THOUGHT* (1992) (describing social Darwinism).

53. See LEVY, *supra* note 28, *passim*.

54. Other participants in the computer market itself, such as operating system vendors and distributors, may threaten the computer manufacturer. However, none of these are regulated businesses.

equipment, on the other hand, has nothing without the network. It can only innovate if the network permits.

Companies seeking to deploy broadband applications such as online gaming, VoIP, or streaming video now face exactly this dilemma. They are experiencing opposition or potential speed bumps from the phone and cable companies that dominate the last-mile broadband “pipes” into the home.⁵⁵ For most of the Internet’s history, a set of design rules, shared practices, and technical standards collectively described as the “end-to-end” principle, prevented network infrastructure owners from limiting innovation on top of the network.⁵⁶ No more. End-to-end survived in the commercial Internet world because the underlying physical networks were regulated by the FCC.⁵⁷ Under current FCC policies, broadband access providers are not obligated to follow the end-to-end principle and, as a result, they may choose not to.

There is a lively debate today about whether the government should mandate “network neutrality” to prevent such anticompetitive moves.⁵⁸ The basic idea is that the FCC could require broadband access providers to guarantee that their users can access any resource on the Internet in a nondiscriminatory way. Thus, for example, a telephone company would be prohibited from blocking customers of its broadband Internet service from using a competing VoIP service.⁵⁹

Both sides of the network neutrality debate acknowledge that network operators are likely to serve as gatekeepers for broadband applications and content. Those opposed to mandatory network neutrality believe that such restrictions will be economically efficient and will not prevent application and content providers from

55. For example, the FCC recently fined a telephone company for blocking the software ports VoIP provider Vonage uses to provide its service. See News Release, Fed. Comm’n’s Comm’n, FCC Chairman Michael K. Powell Commends Swift Action to Protect Internet Voice Services (Mar. 3, 2005), http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-257175A1.pdf.

56. See Mark A. Lemley & Lawrence Lessig, *The End of End-to-End: Preserving the Architecture of the Internet in the Broadband Era*, 48 UCLA L. REV. 925, 930–31 (2001).

57. See LAWRENCE LESSIG, *THE FUTURE OF IDEAS: THE FATE OF THE COMMONS IN A CONNECTED WORLD* 41–46 (2001); Oxman, *supra* note 5, at 15–16 (discussing FCC regulation of telephony versus internet service providers).

58. See Tim Wu, *Network Neutrality, Broadband Discrimination*, 2 J. ON TELECOMM. & HIGH TECH. L. 141, 141–44 (2003); Declan McCullagh, *Tech Companies Ask for Unfiltered Net*, CNET NEWS.COM, Nov. 18, 2002, <http://news.com.com/2100-1023-966307.html>.

59. See Declan McCullagh, *Telco Agrees to Stop Blocking VoIP Calls*, CNET NEWS.COM, Mar. 3, 2005, http://news.com.com/2100-7352_3-5598633.html.

voluntarily negotiating for the access they require.⁶⁰ Even under that viewpoint, the hardware, software, and content providers seeking to innovate in a broadband world are no longer masters of their own destiny. They must ask for, and receive through negotiation, the ability to reach their customers in the way they desire. Whether the FCC will address this issue remains uncertain, although in a 2004 speech then-Chairman Michael Powell pledged his support in principle for network neutrality.⁶¹ The Commission also adopted a nonbinding policy statement in August 2005 favoring neutrality in principle.⁶²

Communications is not a technology, a type of product, or a particular mass medium. It is a set of network industries that necessarily involves economic tensions that have historically led to regulation.⁶³ Network industries include electricity, the postal service, railroads, and the Internet.⁶⁴ Each of them, with one exception, was subjected either to federal administrative regulation or court-mandated common carriage obligations.⁶⁵ The exception, of course, is

60. See David P. McClure, *Feasibility Issues Inherent in the "Layers" Model for Internet Public Policy*, in NEW MILLENNIUM RESEARCH COUNCIL, *FREE RIDE: DEFICIENCIES OF THE MCI 'LAYERS' POLICY MODEL AND THE NEED FOR PRINCIPLES THAT ENCOURAGE COMPETITION IN THE NEW IP WORLD* 11, 14 (2004), http://www.newmillenniumresearch.org/news/071304_report.pdf; Christopher S. Yoo, *Would Mandating Broadband Network Neutrality Help or Hurt Competition? A Comment on the End-to-End Debate*, 3 J. ON TELECOMM. & HIGH TECH. L. 23, 65 (2004).

61. Michael K. Powell, Chairman, Fed. Commc'ns Comm'n, Remarks at the Fall 2004 Voice on the Net Conference (Oct. 19, 2004), http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-253325A1.pdf; Michael K. Powell, Chairman, Fed. Commc'ns Comm'n, Remarks at the Silicon Flatirons Symposium: Preserving Internet Freedom: Guiding Principles for the Industry (Feb. 8, 2004), http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-243556A1.pdf.

62. See *infra* note 331 and accompanying text.

63. Although network industries have traditionally been considered "natural monopolies" which must be regulated, there are also incentives for a platform owner to facilitate innovation and competition on top of its platform. Joseph Farrell and Phil Weiser describe these dynamics as the "internalization of complementary externalities." 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, 101 (2003); see also Michael L. Katz & Carl Shapiro, *Network Externalities, Competition, and Compatibility*, 75 AM. ECON. REV. 424, 434-36 (1985) (describing the economic benefits of product compatibility); Mark A. Lemley & David McGowan, *Legal Implications of Network Economic Effects*, 86 CAL. L. REV. 479, 549 (1998).

64. Other examples of network industries are canals, stagecoaches, the telegraph, and airlines.

65. Common carriage, a concept developed for railroads in the nineteenth century, means that the provider must serve all prospective customers indiscriminately. See Adam Candeb, *Network Interconnection and Takings*, 54 SYRACUSE L. REV. 369, 381-82 (2004).

the Internet. It is an exception that proves the rule. The Internet developed out of a government program, the ARPANET, which included neutral interconnection as one of its elements.⁶⁶ And once the Internet was privatized, there was no need for direct government regulation because the underlying network pipes were already regulated by the FCC.⁶⁷

The celebrated success story of Internet “unregulation” is therefore really about effective regulation. The FCC boogeyman has never been far from the garages of the entrepreneurial supermen. And as the Internet has matured, it has begun to raise similar regulatory issues that historically emerged from the regulated communications industries. The “vast web of the Federal Computer Commission,” about which Representative Cox warned, is hiding in plain sight.⁶⁸

II. FCC COMPUTER REGULATION: PAST AND PRESENT

The Federal Communications Commission came to regulate computers not through some bold initiative but as a by-product of its ongoing activities. Thus, understanding the scope and future prospects for the Federal Computer Commission requires a trip through history. This Part describes the four lines of regulatory activity that form the basis for the FCC’s involvement in the computer industry: the Part 68 and *Computer Inquiry* rules for wireline telephone networks, decisions governing the use of the radio spectrum for wireless communication, social policy initiatives such as the Schools and Libraries Fund and the V-Chip, and rules covering particular Internet-based applications such as instant messaging and VoIP.

The FCC was established during the New Deal to ensure, in the words of its enabling statute, “a rapid, efficient, Nationwide, and worldwide wire and radio communication service.”⁶⁹ This is an awesome scope of responsibility, touching a significant percentage of

66. See JANET ABBATE, *INVENTING THE INTERNET* 7–145 (1999) (describing the evolution of the ARPANET and its transformation into the Internet); Werbach, *supra* note 32, at 13. “Neutral interconnection” meant that every connected network was treated as a “peer,” responsible for carrying any traffic handed off to it.

67. See *infra* Part II.A.

68. See *supra* note 42 and accompanying text.

69. Communications Act of 1934, Pub. L. No. 73-416, 48 Stat. 1064 (1934) (codified as amended at 47 U.S.C. §§ 151–614 (2000)). The FCC expanded on the responsibilities of the Federal Radio Commission (“FRC”), which was set up seven years before to oversee the airwaves. While the FRC regulated only radio, the FCC had authority over all forms of interstate “communication by wire or radio.” *Id.*

the U.S. economy. Yet the FCC has a smaller budget than many other administrative agencies in Washington, D.C.⁷⁰ Although communications has exploded in market size and importance, the FCC went from an initial 233 staffers in 1934 to roughly 2,000 today, giving it fewer employees than the Internet startup Google at the time of its initial public offering.⁷¹

Nonetheless, this little agency is the target of frequent vitriol and condemnation. Descriptions of the FCC frequently paint it as either a hulking ogre meddling in everything from morality to antitrust or a bureaucratic backwater specializing in obscure rules and anachronistic regulation.⁷² It is no wonder the computer industry is so fearful of being swept up in its maw. The reality, however, is that the FCC has regulated the computer industry ever since there was a computer industry.

The discourse around technology policy is prone to hyperbole and scare tactics. It is important, therefore, to be clear what it means to say that the FCC functions as a Federal Computer Commission. Neither computer manufacturers, nor Internet access providers, nor companies such as Amazon.com, Yahoo!, and eBay that operate over the Internet, are subject to all the FCC's economic and public interest mandates in the same manner as telephone companies, cable television operators, television broadcasters, and mobile phone operators. On its face, the Communications Act applies to a limited set of entities, such as telecommunications service providers.⁷³ Most computer and Internet companies fall under FCC mandates indirectly, often in ways they do not consider regulation. The fact that a device is subject to some level of FCC oversight is not necessarily a threat to innovation and business agility. Conversely, though, the absence of those harms should not mask the existence of regulatory involvement.

70. For example, President Bush's Fiscal Year 2006 budget calls for \$304 million in funding for the FCC, compared to \$7.6 billion for the Environmental Protection Agency, \$1.4 billion for the Food and Drug Administration, \$888 million for the Securities and Exchange Commission, \$702 million for the Nuclear Regulatory Commission, and \$331 million for the Equal Employment Opportunity Commission. See Budget of the United States Government, Fiscal Year 2006, available at <http://www.whitehouse.gov/omb/budget/fy2006/pdf/budget/tables.pdf>.

71. See Verne Kopytoff & John Shinal, *Google IPO Raises \$1.2 Billion, \$85 a Share*, S.F. CHRON., Aug. 19, 2004, at A1; Museum of Broadcast Communications, Federal Commc'ns Comm'n, <http://www.museum.tv/archives/etv/F/htmlF/federalcommu/federalcommu.htm> (stating that 233 federal employees worked at the original FCC). Moreover, Google, in contrast to the FCC, is continuing to expand its staff.

72. See *supra* note 47 and accompanying text.

73. See 47 U.S.C. § 152 (2000).

Computing and communications intersect in several places. As a consequence, the relevant FCC rules derive from separate strands of legal authority and policy objectives. The four pillars of the Federal Computer Commission are: (1) rules regulating interfaces of phone (and, to a lesser extent, cable TV) networks, which in effect regulate devices using those interfaces; (2) mandates concerning radio frequency emissions, which increasingly apply to devices better described as computers than radios; (3) decisions designed to achieve social policy mandates, which in application regulate the computer industry; and (4) proceedings targeted at particular Internet applications, specifically VoIP and instant messaging.

These requirements serve many different policy goals. In telephony, for example, the FCC regulated hardware to separate devices from the regulated network. In broadcasting, by contrast, it regulated hardware to keep devices joined with, and dependent on, networks. The Part 68 rules promoted competition in the end-user equipment market, while the V-Chip addressed public policy concerns about violent television programming. The diversity of FCC computer-oriented rules contributes to the ignorance about the scope of the Federal Computer Commission. Each person perceives only the small portion of the elephant he touches.

A. *Computers Invade the Phone Network*

The domain of the wired telephone network is where the seeds of FCC computer regulation were most clearly planted. In its Part 68 terminal attachment rules, the Commission took control of the basic interfaces for connecting computers to data networks. In the *Computer Inquiries*, it defined the terms of engagement between the regulated world of telephone companies and the innovative world of computer-based applications.

1. The Battle Over Terminal Attachments

It all started with a rubber cup.⁷⁴ In 1921, an entrepreneur named Tom Carter began selling the Hush-A-Phone, a cup shaped silencer that slipped over a telephone mouthpiece.⁷⁵ A Hush-A-Phone user could talk into a phone without others nearby hearing what she was saying. At the time, this was an exciting new feature for

74. Cf. RICHARD H.K. VIETOR, *CONTRIVED COMPETITION: REGULATION AND DEREGULATION IN AMERICA* 190 (1994) ("Deregulation began more or less with a rubber cup.").

75. See *id.*; Mike Sandman Enters., Telephone History Pages, <http://www.sandman.com/telhist.html> (last visited Nov. 16, 2005) [hereinafter Telephone History Pages].

telephone callers. Some 125,000 Hush-A-Phone units were sold.⁷⁶ There was just one problem: AT&T and its affiliated companies held a legally protected monopoly over telephone service in most of the United States.⁷⁷ AT&T rented phones to customers and prohibited them from connecting their own equipment. Any such device, whether a phone or simply an add-on to a phone, was a proscribed “foreign attachment” under AT&T’s tariffs.⁷⁸

When AT&T discovered the Hush-A-Phone, the phone monopoly notified the manufacturer and its distributors that the device was a prohibited foreign attachment. In response, Hush-A-Phone filed a complaint with the FCC in 1948. There was reason for optimism. Just a year before, the Commission had determined that attachments for recording phone conversations must be permitted because they had no negative impact on the network.⁷⁹

Hush-A-Phone was not so lucky. Its complaint took seven years to work its way through the Commission. Finally, the agency reached its conclusion: the Hush-A-Phone was “deleterious to the telephone system and injures the service rendered by it.”⁸⁰ The cup muffled the

76. *Hush-A-Phone Corp. v. United States*, 238 F.2d 266, 267 (D.C. Cir. 1956).

77. See VIETOR, *supra* note 74, at 174. AT&T and its affiliates, together known as the Bell System, held a monopoly on long-distance service, as well as on local service throughout most of the country. *Id.* Independent companies, such as GTE, provided local service in a few markets. *Id.* at 222. The Bell System monopoly came under fire from MCI in the 1970s, and from the United States Department of Justice, which filed two antitrust suits. *Id.* at 205–07. Finally, in 1982, AT&T agreed to a consent decree breaking up the Bell System. The Modification of Final Judgment, which split AT&T into a competitive long distance carrier and seven regional local carriers, set the road map for the migration toward a competitive telecommunications market. *See id.* at 211–14.

78. The persistence of the foreign attachment restrictions should give pause to those who argue that broadband operators will have appropriate incentives to allow higher-level applications, devices, content, and services to take advantage of their platform. *Cf.* Yoo, *supra* note 60, at 50–53 (arguing that companies could choose not to allow competitors access without hurting competition). This viewpoint tracks the arguments of Chicago School antitrust theorists, who attacked the notion that a monopolist is likely to engage in anticompetitive leveraging into adjacent markets. *See id.* at 50. Based on this analysis, AT&T had nothing to gain from dominating the phone equipment business, for which network interconnection was an essential input. Yet AT&T fought foreign attachments tooth and nail for decades until its eventual 1968 defeat in the *Cartefone* decision. *See infra* text accompanying note 87. And in the years since that decision, not only has the competitive market produced a vibrant equipment market generating higher revenues and innovation than the captive AT&T system would have, but an even greater array of secondary markets has developed on top of those devices.

79. *Use of Recording Devices*, 11 F.C.C. 1033, 1055–56 (1947). The FCC did express concerns about privacy. *Id.* at 1050. In the case of the recording devices, unlike Hush-A-Phone, there was not even an allegation that the attachment would degrade conversations on the network. *Id.* at 1043–45.

80. *Hush-A-Phone*, 238 F.2d at 268.

speaker's voice slightly, producing a softer and slightly distorted sound on the other end of the line. In other words, it *did* harm the network, so AT&T could proscribe it.⁸¹

Hush-A-Phone was the high water mark of the FCC's willingness to defend the AT&T monopoly and stands as a symbol of the perverse consequences of that stance for competition and innovation. Viewed in another light, though, the decision reflects significant willingness by the FCC to intrude in the market for end-user equipment. *Hush-A-Phone* was not a communications company; it was a hardware vendor. It plugged into the network in exactly the same way as today's personal computers. And yet it could not continue to market its product because of a decision of the Commission.

Thankfully, Tom Carter did not give up. *Hush-A-Phone* challenged the FCC decision in court. And the Court of Appeals for the District of Columbia Circuit handed down a landmark decision that paved the way not only for competition in end-user communications hardware but also for the Internet and other information services we find so important today.⁸² The court acknowledged that AT&T's tariffs were "just and reasonable" to the extent they actually prevented harmful consequences for phone company employees or the general public.⁸³ However, it rebuked the FCC for finding any such harm. The only arguable harm of the *Hush-A-Phone* was degradation of sound quality for the other party in the conversation.⁸⁴ Other users of the phone network were completely unaffected.⁸⁵ AT&T and the FCC, the court held, had no business protecting callers from themselves.⁸⁶

Eventually, the FCC shifted its views in the court's direction. In 1968, Tom Carter challenged AT&T's refusal to allow another of his inventions, the *Carterfone*, to connect to the phone network. The *Carterfone* was a device that patched landline phone calls into a two-way radio conversation. This time, when the issue came before the FCC, Tom Carter found a more receptive audience. The FCC not only rejected the application of the Bell tariffs to bar use of the

81. The Commission reached a similar conclusion with regard to an early telephone answering machine, the *Jordaphone*, refusing to invalidate foreign attachment tariffs unless state regulators authorized their use specifically for local calls. See *Jordaphone Corp. v. AT&T*, 18 F.C.C. 644, 669-71 (1954).

82. *Hush-A-Phone*, 238 F.2d at 269.

83. *Id.* at 267.

84. *Id.* at 268.

85. *Id.*

86. *Id.* at 269.

Carterfone; it struck down all foreign attachment restrictions in those tariffs as contrary to the public interest.⁸⁷ In their place, the Commission developed a set of technical rules known as Part 68.⁸⁸

The Part 68 rules define the basic technical specifications for interconnecting with the telephone network. They specify, for example, the wiring of a phone jack.⁸⁹ Any manufacturer can review the Part 68 specification, design a compliant device, and self-certify that it meets the technical requirements for interconnection.⁹⁰ As the story is usually told, *Carterfone* was a watershed moment in the deregulation of telecommunications. It was a decision against the disastrous *Hush-A-Phone* path of regulating end-user devices.⁹¹ Histories of communications policy point to *Carterfone* as a key foundation for the eventual breakup of the AT&T monopoly and the competitive opening of the 1996 Telecommunications Act.⁹² More recently, cyberlaw scholars have pointed to *Carterfone* as the foundational decision protecting what ultimately became the Internet from regulation.⁹³

In reality, *Carterfone* merely shifted the locus of device regulation. Before *Carterfone*, AT&T and its affiliated companies decided what could be attached to the network in the form of their tariffs and their decisions about how to enforce them. After *Carterfone*, what could be connected to the network was defined by the technical standards in Part 68 of the FCC Rules. In other words, the technical and business decisions about which devices to permit moved from the private sector to a government agency.⁹⁴ Granted,

87. *Carterfone*, 13 F.C.C.2d 420, 425 (1968).

88. Connection of Terminal Equipment to the Telephone Network, 47 C.F.R. § 68 (2005).

89. *Id.* § 68.105(a).

90. 2000 Biennial Reg. Review of Part 68 of the Comm'n's Rules & Regs., Report & Order, FCC-00-400, 15 F.C.C.R. 24,944 ¶¶ 94–106 (2000) [hereinafter 2000 Biennial Review].

91. See LESSIG, *supra* note 57, at 30, 148.

92. See VIETOR, *supra* note 74, at 191–93; cf. Farrell & Weiser, *supra* note 63, at 93–94 (citing *Carterfone* as a milestone in the development of competition in telecommunications); Telephone History Pages, *supra* note 75 (highlighting the significance of the *Carterfone*).

93. See LESSIG, *supra* note 57, at 149.

94. The Commission itself acknowledges that Part 68 is, on its face, regulation of hardware manufacturers but notes that the primary burden of those regulations falls on phone companies. 2000 Biennial Review, *supra* note 90, ¶ 7 (“Thus, although our Part 68 rules appear to establish elaborate requirements for terminal equipment manufacturers, the fundamental obligation that the rules impose is on the local exchange carriers—they must allow Part 68-compliant terminal equipment to be connected freely to their networks.”).

that agency exercised its stewardship with a light hand and developed standards that allowed the industry to proceed generally as it saw fit. But from 1968 on, the FCC was the decisionmaker for any devices that depended on connectivity to the public switched telephone network. The Federal Computer Commission was born.

The FCC would ultimately define the terms of interconnection with the public switched telephone network for more than thirty years. Only in 2000 did the Commission formally transfer responsibility for certification and standards definition to a private body.⁹⁵ By then, however, the relationship between the computer industry and the government regulator was completely ingrained.

Part 68 defined technical standards from the phone network out. Simply striking down the Bell foreign attachment tariff provisions would not have accomplished much. Some terminal equipment could indeed harm the network by, for example, interfering with billing systems, degrading service to unrelated customers, or exposing telephone company personnel to the risk of electric shocks. Without government-defined standards, the phone companies could be expected to continue challenging individual pieces of terminal equipment. The FCC had to tell the phone companies exactly what sort of equipment to accept. Doing so, however, meant defining standards for interfaces. And interface standards point in two directions. They tell the provider on one side (here, the phone company) what to permit, and they tell the provider on the other side (the equipment manufacturer) what to build.

The Part 68 regime required manufacturers to register any equipment to be connected to the telephone network.⁹⁶ That registration originally could be obtained only by approval of the Commission.⁹⁷ The Commission later allowed designated private certification bodies to function as alternate sources of approval for equipment registration.⁹⁸ Finally, in 2000 it eliminated its own role in the process.⁹⁹ Terminal equipment manufacturers must now either be certified by an approved certification body or file a “supplier’s declaration of conformity,” a binding statement that the device meets the applicable technical requirements.¹⁰⁰ Those requirements

95. *Id.* ¶¶ 49–57 (setting forth the purpose of the Administrative Council for Terminal Attachments).

96. 47 C.F.R. § 68.102 (2005).

97. 2000 Biennial Review, *supra* note 90, at ¶ 2.

98. *Id.* ¶¶ 11–12.

99. *Id.* ¶ 2.

100. *Id.* ¶ 3.

themselves are now managed by private industry-led groups with the FCC only involved if a party challenges the legitimacy of the specifications.¹⁰¹

Again, calling the post-*Carterfone* regime a form of computer regulation does not mean it was more restrictive or intrusive for prospective device manufacturers than the prior arrangement. It demonstrably was not. Moreover, by removing decisionmaking power over network attachments from the dominant carrier, *Carterfone* paved the way for the later development of additional devices and services that did not carry voice phone calls at all. They would connect instead to a new kind of device: a personal computer.

Apple began selling the first mass market PC in 1977.¹⁰² That same year, Dennis Hayes introduced the personal computer modem to modulate and demodulate a digital communications signal over an analog phone line.¹⁰³ Modems were originally developed for U.S. military air defense communication in the 1950s, and AT&T Bell Labs produced the first commercial modem in 1962.¹⁰⁴ These were expensive units for businesses to hook up to their mainframe computers. Not until Apple and Hayes came along did the modem become a consumer device.

From the computer's perspective, the modem is the network endpoint. A software application running on a PC, such as a Web browser, is several steps removed from the phone network. The browser vendor, let alone the Internet-based applications such as Amazon.com and Google that appear through that browser, never need to consider the terms of network interconnection. From their perspective, connectivity is a given with government nowhere in the picture. Yet this freedom would not be possible without the FCC-defined Part 68 rules at the end of the chain.

Thanks to relentless improvements in chip performance and miniaturization, the analog modem virtually disappeared as a stand-alone device in the late 1990s. Modems today are usually built into PCs, either as separate internal components or as purely software-based functions leveraging the computer's general signal processing

101. *Id.* ¶ 2.

102. Henry Knorr, *Growth of a Silicon Empire: Bay Area's Fertile Intellectual Ground Helped Sprout High Technology Industry*, S.F. CHRON., Dec. 27, 1999, at D1.

103. Dennis Hayes, *The Humble Modem*, DATA COMMS., Oct. 21, 1997, at 80; Ripley Hotch, *PC, Phone Home*, NATION'S BUS., Feb. 1990, at 36.

104. The device, the Bell 103, ran at a whopping 300 bits per second. Most PCs today ship with built-in 56 kilobit per second analog modems, which operate nearly 200 times faster. Introduction and History of Modems, <http://www.dementia.org/~julied/tele2100/intro.html> (last visited Nov. 16, 2005).

capabilities. Costs are so low, and demand for data connectivity is so great, that PCs today rarely ship without a built-in modem. So, for all intents and purposes, the modem *is* the computer. The computer is the terminal attachment subject to the technical standards process the FCC set in motion in *Carterfone*.¹⁰⁵

2. The *Computer Inquiries* and Open Network Architecture

Where the terminal attachment rules dealt with computers at the outside edges of the phone network, the *Computer Inquiries* concerned computers inside the network. Beginning in the 1960s, phone companies and independent firms began to integrate data processing equipment into the telephone system. For example, a computer could be used to send structured data messages between two companies across the network, something known as electronic data interchange. Or it could be used to record and play back phone messages.

Such applications raise different issues than those considered in *Carterfone*. Part 68 dealt with terminal equipment that could be attached transparently to the network. Such equipment treats the phone network as a black box: an abstract delivery pipe and nothing more. However, some computer-driven services require deeper integration with the network. The phone system incorporates many

105. Most FCC regulation of wired computer interfaces concerns the telephone network. However, in at least one area, similar obligations apply to the hardware associated with cable television service. Section 629(a) of Telecommunications Act, adopted in the 1996 overhaul, requires the FCC to offer consumers the ability to purchase "navigational devices" separately from their cable company or other multi-channel video programming provider. 47 U.S.C. § 549(a) (2000). In other words, the Commission is to ensure the possibility of a third-party retail market in TV set-top boxes, analogous to the retail market in equipment connected to the telephone network. In order to achieve this goal, the FCC had to define technical standards just as it had with Part 68. See Implementation of Section 304 of the Telecommunications Act of 1996: Commercial Availability of Navigation Devices, 13 F.C.C.R. 14,775 *passim* (1998).

Differences between cable and telephony, however, made the process more complicated. Because cable TV is a paid service subject to significant levels of fraud, the set-top box also serves as a conditional access device that verifies a subscriber is entitled to service and to the particular programming package the subscriber has purchased. Because cable uses a shared distribution architecture, every cable subscriber receives premium channels such as HBO and Pay-Per-View programming over the wire. The set-top box blocks subscribers who have not paid for that programming from ever seeing it.

Enabling an independent market for set-top boxes, therefore requires industry standardization of security mechanisms as well as technical standards for separating these security functions from other aspects of the navigation device that can be competitively provided. So far, although some set-top boxes are available at retail, the results in price reductions and innovation have been nothing like that experienced in the end-user telephone equipment market.

supporting features and systems for billing, signaling, and network monitoring. Today, for example, there is a separate signaling system that sets up and manages calls parallel to the network that actually carries those calls. Such “out-of-band” signaling provides many benefits for carriers and also enables vertical features such as call waiting, voicemail, and caller ID, which are sold as premium services.

An independent company seeking to deliver similar services needs access directly into the signaling network. The outward-facing technical standards of Part 68 are not enough. Moreover, the data processing equipment involved in providing these services straddles the boundary defined in *Carterfone*. If a phone company provides a computer-enhanced service, such as voicemail, is it operating as a regulated service provider or as an unregulated network attachment provider? Even though the same service can be provided both inside and outside the network—voicemail competes with answering machines, for example—the two situations raise distinct regulatory issues.

The FCC wrestled with these questions in a long and complex series of decisions called the *Computer Inquiries*.¹⁰⁶ The Commission’s first attempt, the 1970 *Computer I* decision,¹⁰⁷ distinguished “communications” from “data processing” functions.¹⁰⁸ The division proved unworkable because computer processing was increasingly part of both activities. The *Computer II*¹⁰⁹ regime, first adopted in 1980, created a new framework separating unregulated “enhanced services” from the regulated “basic services.”¹¹⁰ The primary distinction was that enhanced services involve processing functions that “act on the format, content, code, protocol or similar aspects of the subscriber’s transmitted information, provide the subscriber additional, different, or restructured information, or

106. See *Computer III Further Remand Proceedings: Bell Operating Company Provision of Enhanced Services*, 60 Fed. Reg. 12,529–30 (proposed Mar. 7, 1995) (to be codified at 47 C.F.R. pt. 64) (recounting the history of the *Computer Inquiries*); Cannon, *supra* note 5, at 199.

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

108. See *generally id.*; *Regulatory and Policy Problems Presented by the Interdependence of Computer and Communication Services and Facilities*, 28 F.C.C.2d 291, 295–96 (1970) (tentative decision); *Regulatory and Policy Problems Presented by the Interdependence of Computer and Communications Services and Facilities*, 7 F.C.C.2d 11, 17–18 (1966) (notice of inquiry).

109. *Second Computer Inquiry (Computer II)*, 77 F.C.C.2d 384 (1980).

110. *Id.* at 387 (1980).

involve subscriber interaction with stored information.”¹¹¹ In 1996, Congress ratified the FCC framework, creating analogous statutory categories of “telecommunications” and “information services.”¹¹²

Computer II required “structural separation” for the enhanced service offerings of AT&T, at that time still the dominant monopoly phone company. AT&T and its affiliated Bell companies could offer enhanced services only by establishing formally separate subsidiaries. By requiring these unregulated subsidiaries to purchase the necessary basic services at arm’s length from the regulated carrier, anticompetitive practices could be prevented.

Like Part 68, therefore, *Computer II* was an attempt to draw a bright line between computers and the network. The telephone business could not be combined with the enhanced services business. Unlike *Carterfone*, however, the FCC in *Computer II* did not inject itself into the standards process. It used a structural remedy to substitute for direct regulation of computers and their interfaces. In contrast to the pre-*Carterfone* foreign attachment regime, the carriers had a strong incentive to deal. They could only offer enhanced services themselves if they made the necessary functionality available.

Computer II lasted only six years.¹¹³ The basic/enhanced dichotomy proved successful and was preserved in future decisions. Structural separation, however, was problematic. It constituted a significant regulatory intrusion into the business operations of AT&T and required the company to duplicate personnel and facilities between the regulated carrier and unregulated affiliate.¹¹⁴ While *Computer II* was in effect, AT&T agreed to divest the Bell Operating Companies and open the long distance market to competition. With the Reagan Revolution in full swing, the thrust of FCC policy moved toward deregulation.

In *Computer III*, launched in 1985, the FCC sought to replace structural separation with a set of nonstructural safeguards, allowing the Bell companies to offer enhanced services on an integrated basis.¹¹⁵ In other words, the same company could sell both regulated basic services and unregulated enhanced services. The primary safeguard against anticompetitive behavior in this situation was Comparably Efficient Interconnection (“CEI”). Under CEI, the

111. 47 C.F.R. § 64,702(a) (2005).

112. See 47 U.S.C. § 153(20), (43).

113. *Computer II* was superseded by Third Computer Inquiry (*Computer III*), 104 F.C.C.2d 958 (1986) (report and order).

114. Cannon, *supra* note 5, at 199–200.

115. See *Computer III*, 104 F.C.C.2d at 958.

Bells had to detail every element of basic service functionality they were providing to their own enhanced services operations and make that same functionality available on a comparable basis to unaffiliated companies.¹¹⁶

The FCC intended CEI to be an interim step.¹¹⁷ The long term solution it envisioned was Open Network Architecture (“ONA”), the analogue of Part 68 for network-based computers. ONA meant that the Bells would break down their network into functional building blocks that they would make available on a tariffed basis. Third parties could combine those building blocks and incorporate them into their own enhanced services regardless of whether the Bells themselves offered equivalent services. The FCC itself would not set technical standards but would oversee private forums where the Bells and independent enhanced service providers (“ESPs”) could negotiate.

Like Part 68, therefore, ONA indirectly regulated computers connected to the telephone network. Unlike Part 68, which empowered end-users, that regulation protected service providers.¹¹⁸ Through ONA and the *Computer III* rules more generally, the Commission influenced the technical interfaces those services use to connect to the network. However, it does not get involved in the connections between those (unregulated) service providers and their (also unregulated) customers. Moreover, because ESPs function as network users, they need not rely on the *Computer III* procedures. They can simply purchase tariffed service offerings, such as high speed data lines, in the same manner as any business.¹¹⁹

ONA proved contentious in practice. ESPs complained that the Bell companies were not making available all the functionality they needed or were surreptitiously advantaging their affiliated operations. The United States Court of Appeals for the Ninth Circuit vacated the ONA rules in 1994, finding that the Commission had not offered

116. *Id.*

117. It was mistaken. The CEI rules remain in effect today, although in a limited form.

118. From a conceptual standpoint, those service providers are “users” of the phone network’s basic service functionality. This is the foundation of the “ESP exemption,” under which enhanced service providers need not pay the inflated “access charges” imposed on long-distance carriers. See *MTS and WATS Market Structure*, 97 F.C.C.2d 682, 711–22 (1983) (mem. op. and order); Werbach, *supra* note 32, at 50.

119. See *MTS and WATS Market Structure*, 97 F.C.C.2d at 711–22; Werbach, *supra* note 32, at 50. Some ESPs may require particular functionality inside the network, which requires use of the ONA process or a special tariff. However, Internet service providers generally can use ordinary business lines.

sufficient justification for lifting structural separation.¹²⁰ A complicated series of orders, further notices, and interim waivers followed, which has yet to come to a close.¹²¹

B. Computers as Radio-Frequency Emitters

The second thread of FCC computer regulation involves wireless communication. FCC rules govern every device that emits radio frequency energy. Although usually described as regulating "spectrum," the FCC's rules actually apply to equipment used in wireless communication. Virtually all of that equipment today involves some sort of computer. In recent years, FCC policies have evolved to facilitate computer-driven wireless innovations, although the process remains ongoing.

1. Spectrum Licensing

Around the time Tom Carter started selling his privacy-protecting rubber cup, another foundational battle was brewing in the annals of communications regulation. Wireless communication, based on the late-nineteenth century inventions of Guglielmo Marconi and Nikolai Tesla, became commercially viable in the first decades of the new century.¹²² The Radio Act of 1912 obligated radio broadcasters to obtain licenses from the Secretary of Commerce.¹²³

120. *California v. FCC*, 39 F.3d 919, 933 (9th Cir. 1995).

121. See *Computer III*, 104 F.C.C.2d 958 (1986), *on reconsideration*, 2 F.C.C.R. 3035 (1987) (phase I reconsideration order), *on further reconsideration*, 3 F.C.C.R. 1135 (1988) (phase I further reconsideration order), *on second further reconsideration*, 4 F.C.C.R. 5927 (phase I second further reconsideration order), *vacated*, *California v. FCC*, 905 F.2d 1217 (9th Cir. 1990); *Computer III, Phase II*, 2 F.C.C.R. 3072 (1987) (phase II order), *on reconsideration*, 3 F.C.C.R. 1150 (1988) (phase II reconsideration order), *on further reconsideration*, 4 F.C.C.R. 5927 (1989) (phase II further reconsideration order), *vacated*, *California v. FCC*, 905 F.2d 1217 (9th Cir. 1990); *Computer III Remand Proceedings*, 5 F.C.C.R. 7719 (1990), *on reconsideration*, 7 F.C.C.R. 909 (1992), *petitions for review denied*, *California v. FCC*, 4 F.3d 1505 (9th Cir. 1993); *In the Matter of Computer III Remand Proceedings: Bell Operating Company Safeguards and Tier I Local Exchange Company Safeguards*, 6 F.C.C.R. 7571 (1991) (BOC Safeguards Order), *on reconsideration, dismissed in part*, 11 F.C.C.R. 12513 (1996), *vacated in part*, *California v. FCC*, 39 F.3d 919 (9th Cir. 1994), *cert. denied* 514 U.S. 1050 (1995); *In the Matter of Computer III Further Remand Proceedings: Bell Operating Company Provision of Enhanced Services*, 13 F.C.C.R. 6040 (1988) (further notice of proposed rulemaking), *Computer III Remand Order*, 14 F.C.C.R. 4289 (1999) (review of *Computer III* and ONA safeguards and requirements), *on reconsideration*, 14 F.C.C.R. 21628 (1999) (*Computer III* further remand proceedings).

122. See 1 ERIK BARNOUW, *A TOWER IN BABEL: A HISTORY OF BROADCASTING IN THE UNITED STATES* 12 (1966); Kevin Werbach, *Supercommons: Toward a Unified Theory of Wireless Communication*, 82 TEX. L. REV. 863, 868-70 (2004).

123. Radio Act of 1912, Pub. L. No. 62-264, 37 Stat. 302 (1912) (repealed 1927).

However, two court cases in the mid-1920s essentially stripped the Commerce Department of the authority to reject license requests, producing fears of an imminent “chaos of the airwaves.”¹²⁴

Congress responded with the Radio Act of 1927.¹²⁵ It definitively established that the federal government controlled use of the radio spectrum and that broadcasters could only operate subject to the approval and terms established by a new government agency, the Federal Radio Commission (“FRC”). Seven years later, the FRC was subsumed into a new agency that also had authority over AT&T and the telephone business: the Federal Communications Commission.¹²⁶

For nearly eighty years, the FRC and FCC have exercised dominion over private sector wireless communication in the United States.¹²⁷ The primary mechanism of this dominion is the license. Without a license, no one is permitted to transmit.¹²⁸ With a license, a broadcaster can exclude anyone else from interfering with transmissions in its frequency.¹²⁹ Based on this power, the FCC

124. See *Hoover v. Intercity Radio Co.*, 286 F. 1003, 1007 (D.C. Cir. 1923) (holding that it was the Secretary of Commerce’s mandatory duty to issue licenses to persons or corporations that come within the classification designated in the Radio Act); *United States v. Zenith Radio Corp.*, 12 F.2d 614, 617 (N.D. Ill. 1926) (holding that “the Secretary of Commerce is required to issue the license subject to the regulations in the act” and that Congress retained the power to prescribe additional regulations).

125. Pub. L. No. 69-632, 44 Stat. 1162 (1927) (repealed 1934).

126. Communications Act of 1934, Pub. L. No. 73-416, 48 Stat. 1064 (1934) (codified as amended at 47 U.S.C. §§ 151–615b (2000)).

127. See BARNOUW, *supra* note 122, at 195–201; Yochai Benkler, *Overcoming Agoraphobia: Building the Commons of the Digitally Networked Environment*, 11 HARV. J.L. & TECH. 287, 298–301 (1998); Thomas W. Hazlett, *The Wireless Craze, the Unlimited Bandwidth Myth, the Spectrum Auction Faux Pas, and the Punchline to Ronald Coase’s “Big Joke”*: An Essay on Airwave Allocation Policy, 14 HARV. J. LAW & TECH. 335, 360–73 (2001); Patrick S. Ryan, *Application of The Public-Trust Doctrine and Principles of Natural Resource Management to Electromagnetic Spectrum*, 10 MICH. TELECOMM. & TECH. L. REV. 285, 288–89, 299–305 (2004). The FCC has primary authority over private wireless communications. Government use of wireless frequencies is controlled by the National Telecommunications and Information Administration of the Department of Commerce and by the Interdepartment Radio Advisory Committee with representation from key federal agencies. For an overview of the mechanics of U.S. spectrum policy, see Charles L. Jackson, *Use and Management of the Spectrum Resource*, in *NEW DIRECTIONS IN TELECOMMUNICATIONS POLICY* 247–71 (Paula L. Newbery ed., 1989).

128. The exceptions are “unlicensed” bands, which allow anyone to transmit, subject to technical requirements. See Werbach, *supra* note 122, at 874; Kevin Werbach, *Radio Revolution: The Coming Age of Unlicensed Wireless* 16, 25–27 (New America Foundation and Public Knowledge, 2003), available at <http://www.werbach.com/docs/RadioRevolution.pdf>. Technically speaking, though, unlicensed frequency bands are “licensed by rule”: they are subject to license restrictions, but any user is allowed to transmit under those licenses.

129. Though spectrum licenses were originally developed for radio broadcasters and point-to-point communications, they now apply for a wide range of wireless services,

oversees everything from television to mobile phones to satellite radio.¹³⁰

At first glance it appears that the FCC regulates the radio spectrum. In reality, the “spectrum” is just an intellectual construct to describe how radios traditionally distinguished signals by associating them with a carrier wave of a defined oscillation frequency.¹³¹ The FCC cannot alter the physics by which electromagnetic radiation propagates through the air between transmitters and receivers. What the FCC and its predecessor have always regulated are radios.

The FCC regulates wireless communication through the issuance of licenses. An FCC license is permission to deploy transmitters and authorize deployment of receivers that conform to the technical standards defined in the license.¹³² It is a form of hardware regulation. Today, when virtually every radio incorporates significant electronics, if not a full-fledged computer, it is tantamount to computer regulation.

Radio regulation is in many ways more intrusive than the FCC’s rules governing the wired telephone world. There is no such thing as a radio not “connected to the network,” except perhaps a radio that is turned off. A device that transmits on a certain frequency cannot be operated if it is not permitted under an FCC-granted license. An inventor can create a nonconforming piece of terminal equipment so long as he does not connect that equipment to a phone jack. But that same inventor cannot turn on a nonconforming radio transmitter, or she runs the risk of federal marshals or FCC enforcement personnel physically confiscating it as a “pirate radio.”¹³³ Such restrictions apply even if no receivers are actually affected by the alleged interference.¹³⁴ Moreover, radio regulation traditionally defined not just the frequencies licensees could use but the businesses they could

including television, mobile phone systems, microwave relays for the phone network, satellite communications, data communications, military radar systems, and global positioning system satellite navigation.

130. See *Nat’l Broad. Co. v. United States*, 319 U.S. 190, 215–16 (1943). This decision granted the FCC broad authority to regulate any devices using the radio spectrum. *Id.* At the time, that primarily meant radio broadcasting, but the same logic applies to more recent forms of wireless communication as well.

131. See Werbach, *supra* note 122, at 868–69.

132. See *id.* at 923.

133. 47 U.S.C. § 510(a) (2000) (stating that equipment used in unlicensed transmissions may be seized by the U.S. government).

134. *Id.*; see David P. Reed, *Comments for FCC Spectrum Policy Task Force on Spectrum Policy*, ET Docket No. 02-135 (F.C.C. July 8, 2002), http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513982332.

enter.¹³⁵ For example, a broadcast license cannot be used to deliver mobile phone service. More intrusive examples of government hardware regulation are difficult to find.

The presumption of FCC hardware regulation is so ingrained in wireless that manufacturers assume FCC restrictions even when none exist. A group of professors and unlicensed wireless enthusiasts contacted leading manufacturers of chipsets for wireless fidelity (“WiFi”) data devices.¹³⁶ They requested access to their application programming interfaces, a standard form of documentation for programmers seeking to build applications using the chips.¹³⁷ The group’s objective was to develop open source software for mesh networking that can be used to link together multiple wireless nodes into a single network.

The two dominant chipset vendors both responded that such disclosure was illegal under FCC rules.¹³⁸ Their apparent claim was that modification of the chipsets would allow creation of rogue software-defined radios (“SDR”), which could impermissibly impinge on licensed frequencies.¹³⁹ As a practical matter, the devices the group sought to build would not be sophisticated enough to fall under the FCC’s SDR rules, and the FCC regulations at issue cover hardware, not software. Nonetheless, the incident illustrates how FCC regulation of “spectrum” turns into pervasive regulation of computers involved in wireless communication.

135. See Evan Kwerel & John Williams, *A Proposal for a Rapid Transition to Market Allocation of Spectrum 4* (Fed. Comm’ns Comm’n, Working Paper No. 38, 2002) (“Most spectrum is currently designated for specific uses or users . . .”).

136. Christian Sandvig et al., Hidden Interfaces to “Ownerless” Networks 13–14 (Sept. 2004) (unpublished manuscript), http://www.spcomm.uiuc.edu/users/csandvig/research/Hidden_Interfaces.pdf. WiFi is a family of protocols for wireless local area networks issued by the Institute of Electrical and Electronic Engineers. For information on the commercial growth of WiFi, see generally Amey Stone, *Wi-Fi: It’s Fast, It’s Here—and It Works*, BUSINESSWEEK ONLINE (Apr. 3, 2002), http://www.businessweek.com/technology/content/apr2002/tc2002041_1823.htm.

137. Sandvig et al., *supra* note 136, at 13–14.

138. *Id.* at 17.

139. An SDR is not locked into a specific frequency range or modulation scheme but can vary its parameters through software commands. William Lehr et al., *Software Radio: Implications for Wireless Services, Industry Structure, and Public Policy 3–5* (Aug. 30, 2002) (unpublished manuscript), http://itc.mit.edu/itel/docs/2002/Software_Radio_Lehr_Fuencis.pdf.

FCC licenses only directly cover radio transmitters.¹⁴⁰ There is no legal prohibition on building a device designed to receive signals in a different format, much as there is no prohibition on building terminal equipment that does not actually plug into the telephone network. However, such a device would have virtually no commercial possibilities. A television set that cannot pick up television broadcasts is a glorified paperweight.¹⁴¹ By regulating how broadcasters transmit, the FCC effectively regulates how receivers receive.

Because radio interference is in reality a function of how well receivers distinguish intended signals from other transmissions and background noise, the interference parameters in the license effectively create a sensitivity floor for associated receivers.¹⁴² A viable receiver must be sufficiently sensitive to distinguish signals that are broadcast in compliance with FCC license terms. Thus, the primary FCC regulation of radio transmitters generates secondary regulation of the far more numerous radio receivers.¹⁴³

In its 2002 Spectrum Policy Task Force Report, the FCC identified the lack of directly imposed receiver standards as a problem.¹⁴⁴ The indirect floor on receiver performance implied by the Commission's transmitter standards is only the level necessary to reliably receive the intended transmission. A poor quality receiver that passes this test may be abnormally sensitive to out-of-band signals from unrelated transmitters.¹⁴⁵ The existence of such receivers can make it difficult for the FCC to authorize new uses of those other frequencies. In effect, poor quality receivers reduce the useful

140. In fact, the Commission has questioned whether it has the statutory authority to impose regulation directly on receivers. See Interference Immunity Performance Specifications for Radio Receivers, ET Docket No. 03-65, Notice of Inquiry (F.C.C. rel. Mar. 24, 2003), http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513982332. On the other hand, the FCC's broad interpretation of its authority in the broadcast flag proceeding would seem to countenance receiver performance standards for wireless devices as well. See *infra* Part III.D.2.

141. This assumes, of course, that the set is used to receive content over the air. The same television set could function effectively as a cable television receiver, because then the signals would not be subject to FCC licenses.

142. See Werbach, *supra* note 122, at 887-93.

143. This is true at least in the case of broadcast services. In a two-way system such as a mobile phone network, every receiver is also a transmitter.

144. Spectrum Policy Task Force Report, ET Docket No. 02-135 (F.C.C. Nov. 15, 2002), <http://hraunfoss.fcc.gov/edocs-public/attachmatch/DOC-228542A1.pdf>.

145. An out-of-band signal is one that is received in a frequency other than those in which the licensee is authorized to transmit.

carrying capacity of the spectrum.¹⁴⁶ Recognizing that the Commission's goal should be to maximize the amount of communication that can take place over the airwaves, the Task Force Report sought comment on whether the Commission should impose performance standards on receivers.¹⁴⁷

Beyond the primary regulation of transmitters and the secondary regulation of receivers, FCC radio regulation has a tertiary application as well. The theory behind the regulatory regime for broadcasting is that broadcasters are given licenses to use the public airwaves for free to deliver a service that has significant impacts on democratic discourse. In return, the broadcasters are required to adhere to a "public interest" standard. They must show they are serving the public interest in order for their licenses to be renewed.¹⁴⁸ And they are limited in what they can broadcast through, for example, indecency, children's programming, and political broadcasting rules. Such deep government intrusions into the content of speech are rarely tolerated in other contexts. Moreover, they create a foundation for more recent content-based regulations which do in fact dictate hardware choices, including the V-Chip and broadcast flag.¹⁴⁹

As with the terminal adapter rules in the telephone world, the FCC's radio hardware regulation is not necessarily deleterious. In the early days of broadcasting, technical rules may indeed have been needed to prevent a cacophony of competing users.¹⁵⁰ The FCC's proposed expansion of its licensing requirements to encompass receiver standards is designed to improve efficiency in spectrum utilization, thereby allowing more users or service providers access to the airwaves.¹⁵¹ However, much of the government's involvement in wireless has been restrictive rather than facilitative of hardware innovation. There is an emerging consensus of experts, even joined

146. See Werbach, *supra* note 122, at 961. The alleged conflict between ultra-wideband and global positioning systems is an example. See Revision of Part 15 of the Comm'n's Rules Regarding Ultra-Wideband Transmission Sys., First Report and Order, 17 F.C.C.R. 7435 (2002) [hereinafter Ultra-Wideband Order].

147. See Spectrum Policy Task Force Report, *supra* note 144.

148. At least in theory. The Commission has not denied a license renewal in many years.

149. See *infra* Part II.C.2, III.D.2.

150. Even this is not so clear, however. See Thomas W. Hazlett, *The Rationality of U.S. Regulation of the Broadcast Spectrum*, 33 J.L. & ECON. 133, 160-61 (1990) (claiming that a common law regime for spectrum regulation based on property rights would have emerged if the 1927 Radio Act had not been adopted); Werbach, *supra* note 122, at 869-71.

151. See *supra* note 140.

by the FCC itself, that “command and control” regulation of frequency use produces significant inefficiencies and limits innovation.¹⁵² Users and market forces, rather than bureaucrats, can best determine the uses of the airwaves that maximize social welfare.

2. Unlicensed Wireless

Though frequency-based exclusive licensing remains by far the dominant mode of radio regulation, the FCC also allows some wireless communications on an unlicensed basis.¹⁵³ In these situations, the FCC allows anyone to transmit, provided that they meet technical requirements designed to limit interference. Those technical specifications are hardware regulations. They operate even more directly to control equipment manufacturers than the license-based rules, because the manufacturers must formally seek approval before they can market their devices. However, as with Part 68 in the wired world, direct regulation into interfaces and technical standards corresponds to lighter regulation of the associated services and applications. The primary regulations involved, Part 15 of the FCC Rules, date back to 1938, but in recent years the FCC has greatly expanded their scope.¹⁵⁴

The Part 15 rules are parallel to Part 68 on the surface. The FCC defines basic technical standards to ensure that devices do not create negative externalities for other users and service providers. However, there are differences. Where *Carterfone* separated the end-user device business from the network business, Part 15 eliminates the need for a network business, allowing devices to connect to one another without a central service provider. Unlike the privatized structure that replaced most of the Part 68 requirements after 2000,¹⁵⁵ Part 15 radio manufacturers must still submit their devices directly to the FCC for certification.¹⁵⁶ Because the threat of rogue wireless devices interfering with licensed transmissions is seen today as more

152. See Spectrum Policy Task Force Report, *supra* note 144 (proposing a general shift away from “command and control” spectrum regulation); Benkler, *supra* note 127, at 314–15; Ellen P. Goodman, *Spectrum Rights in the Telecosm to Come*, 41 SAN DIEGO L. REV. 269, 271 (2004); Hazlett, *supra* note 127, at 403–05; Werbach, *supra* note 122, at 872, 876; Gerald R. Faulhaber & David Farber, *Spectrum Management: Property Rights, Markets, and the Commons* 19 (2002) (working paper), http://rider.wharton.upenn.edu/~faulhaber/SPECTRUM_MANAGEMENTv51.pdf; Eli M. Noam, *The Fourth Way for Spectrum* (May 29, 2003), <http://search.ft.com/search/article.html?id=030529006357>.

153. See Werbach, *supra* note 32, at 12; Werbach, *supra* note 122, at 876–78.

154. See 47 C.F.R. § 15.1 (2005).

155. See *supra* note 95.

156. *Id.* § 15.103.

significant than that of rogue terminal equipment harming the phone network, the Part 15 approval requirements are both more stringent and more detailed than those of Part 68.

Significantly, Part 15 also includes rules governing devices that are not engaged in wireless communications at all.¹⁵⁷ Many pieces of equipment emit electromagnetic radiation. Even when this radiation is not designed to send or receive communications signals, it can interfere with other devices which *are* trying to do so. In order for the FCC's wireless rules to achieve their goal of protecting authorized communications devices and services, they must also cover these non-communications devices.

There are now millions of Part 15 devices in use—from keyless entry systems for cars to garage door openers to wireless home networks.¹⁵⁸ In particular, sales of WiFi and related unlicensed wireless data networking equipment are soaring.¹⁵⁹ Following the recommendations of its 2002 Spectrum Policy Task Force Report, the FCC is expanding the scope of unlicensed operation to facilitate deployment of new technologies.¹⁶⁰ It was the first communications regulator in the world to authorize ultra-wideband, an unlicensed technology that uses such low power that it can coexist invisibly in the same frequencies as other services.¹⁶¹ The FCC has proceedings underway to enable other innovations such as software-defined radio¹⁶² and unlicensed underlays in broadcast television frequencies.¹⁶³

Virtually all of these new unlicensed technologies require intelligent devices with significant computing power. They will be deployed not just in mobile phones, but in PCs, computer networks, personal digital assistants, handheld digital music players, and interactive home entertainment hubs. They will pass down the familiar computer industry price/performance curve of Moore's

157. These include what the FCC calls "unintentional" and "incidental" radiators. See *infra* text accompanying notes 165–71.

158. Kenneth Carter et al., *Unlicensed and Unshackled: A Joint OSP-OET White Paper on Unlicensed Devices and Their Regulatory Issues* 1 (FCC Office of Strategic Planning Working Paper No. 39, 2003), http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-234741A1.pdf.

159. See Gartner Group, *Wireless LAN Equipment: Worldwide, 2001–2007* (Jan. 2003), <http://www.gartner.com/DisplayDocument?id=366466>.

160. See Spectrum Policy Task Force Report, *supra* note 144.

161. See Ultra-Wideband Order, *supra* note 146.

162. See Lehr et al., *supra* note 139, at 18; *Authorization and Use of Software Defined Radios, First Report and Order*, 16 F.C.C.R. 17,373 *passim* (2001).

163. See *Unlicensed Operation in the TV Broadcast Bands*, 69 Fed. Reg. 34,103, 34,103–34,112 (proposed June 18, 2004) (to be codified at 47 C.F.R. pt. 15).

Law,¹⁶⁴ becoming cheaper and more powerful over time. They will migrate further into software with adaptive wireless communications functions tying into applications and content of the relevant devices. In short, like WiFi, intelligent devices will colonize computers. And the FCC rules governing their use will come along with them.

The FCC also regulates two categories of noncommunications devices under Part 15. Unintentional radiators are devices that generate energy for internal use, such as personal computers.¹⁶⁵ The circuit boards and other components inside the computer manipulate electromagnetic energy to perform computations. Although such devices do not intend to radiate that energy externally, they will do so unless sufficiently shielded. The second category, incidental radiators, is even further removed from wireless communication.¹⁶⁶ It includes devices such as electric motors and light switches that generate electromagnetic fields through the basic physics of their operation.

Incidental radiators are subject to the general requirement that they not cause interference with authorized communications systems.¹⁶⁷ Unintentional radiators, which pose a more direct interference threat, face more significant regulation. Such devices must either be certified by the FCC, covered by a declaration of conformity based on measurements by an accredited laboratory, or subjected to formal self-verification.¹⁶⁸ The requirements vary depending on whether the device is intended for consumer or commercial/industrial use.¹⁶⁹

Because PCs are unintentional radiators, they cannot be sold without carrying an FCC approval seal.¹⁷⁰ As a practical matter, therefore, every personal computer ever made has been subject to FCC regulation. That regulation may require nothing more than a self-declaration.¹⁷¹ Nonetheless, it is striking that the FCC logo and authorization appears on each and every “unregulated” personal

164. Moore's Law, named for Intel co-founder Gordon Moore, holds that the processing power of a microprocessor, at a given price, will double every eighteen months. It has held true for forty years of computer industry development.

165. 47 C.F.R. § 15.3(z) (2005) (defining unintentional radiators).

166. *Id.* § 15.3(n) (defining incidental radiators).

167. *See id.* § 15.13.

168. *Id.* §§ 15.1, 15.101.

169. *See id.* § 15.3(h), (i).

170. *See* Edward A. Yorkgitis, Jr., *Personal Computer Equipment Authorization: A Shifting Regime*, *COMPUTER LAW.*, Aug. 1996, at 22–23. Some PCs are also intentional radiators, because they incorporate wireless radios. The two sets of rules operate independently.

171. *See* 2000 Biennial Review, *supra* note 90, ¶ 95.

computer. And as more computers serve as wireless communications devices in their own right, FCC involvement will only grow.

C. Computer Regulation as Social Policy

The FCC also regulates computers to achieve social policy objectives. The Schools and Libraries Subsidy Program and the V-Chip for blocking certain television programming are two examples of FCC actions that impacted the computer industry to address broad “public interest” concerns rather than, as with the wireline and wireless rules, to ensure smooth economic functioning of markets.

1. Schools and Libraries Subsidies

One initiative that brought together the FCC’s social policy agenda and the computer industry was the Schools and Libraries Program created by the Telecommunications Act of 1996.¹⁷² This so-called “E-Rate” was a much touted subsidy program for schools and libraries. Section 254(h) of the Act requires telecommunications carriers to provide basic telephone services to schools and libraries at discounted rates.¹⁷³ The Commission also has authority to require that “advanced services” (essentially, high speed data connections) be available at a discount to schools and libraries.¹⁷⁴

To implement these provisions, the FCC set up a subsidy fund, capped at \$2.25 billion per year, generated through surcharges on long distance telephone calling.¹⁷⁵ The discounts apply not only to traditional telephone service but also to Internet access and related data communications services.¹⁷⁶ Then-Chairman Reed Hundt

172. See 47 U.S.C. § 254(b)(6) (2000). Rural health care facilities are also covered. See *id.* § 254(b)(3).

173. See *id.* § 254(h).

174. *Id.* § 254(c)(3) (“[T]he Commission may designate additional services for such support mechanisms for schools, libraries and health care providers for purposes of subsection (h).”); *id.* § 254(h)(2).

175. See Jerry Hausman & Howard Shelanski, *Economic Welfare and Telecommunications Regulation: The E-Rate Policy for Universal-Service Subsidies*, 16 YALE J. ON REG. 19, 30 (1999); *supra* note 40.

176. Fed.-State Joint Bd. on Universal Serv., 12 F.C.C.R. 8776 ¶ 426, at 9003 (1997) (quoting H.R. Conf. Rep. 104-458, at 132 (1996), reprinted in 1996 U.S.C.C.A.N. 124, 144); cf. BENTON FOUND., GREAT EXPECTATIONS: LEVERAGING AMERICA’S INVESTMENT IN EDUCATIONAL TECHNOLOGY 18 (Norris Dickard ed., 2002) (assessing the effects of the E-Rate program); William E. Kennard & Elizabeth Evans Lyle, *With Freedom Comes Responsibility: Ensuring that the Next Generation of Technologies Is Accessible, Usable and Affordable*, 10 COMMLAW CONSPECTUS 5, 7 (2001) (defending the E-Rate program).

championed the Commission's role in connecting classrooms and libraries to the burgeoning information superhighway.¹⁷⁷

The FCC's creation of a significant program to support Internet connectivity was what led Representative Cox at the 1998 hearing to attack FCC Chairman Kennard for moving toward a Federal Computer Commission.¹⁷⁸ By interpreting the statutory language broadly, Cox argued, the FCC set itself up to decide which computer equipment and services schools and libraries could purchase at a discount. And by creating a large fund to support these expansive discounts, the FCC was imposing higher surcharges on consumers' telephone bills. Though Representative Cox may have had legitimate concerns about how the FCC was managing the E-Rate program,¹⁷⁹ his reference was somewhat fanciful. Subsidizing Internet services is not the same as regulating them.¹⁸⁰ And the FCC, as described above, already exerts great influence over the Internet through other types of regulation.

There were, however, elements of the E-Rate program that directly touched the computer industry. The 1996 Act specifies that schools and libraries receive discounts on telecommunications and information services.¹⁸¹ The program was designed to subsidize network connectivity, not PCs and other hardware that schools and libraries might also desire. This created a problem when subsidy recipients wished to link up to the Internet using unlicensed wireless connections. There is no "service" needed to communicate between a WiFi wireless card in a classroom laptop and a base station

177. See Reed Hundt, Chairman, Fed. Comm'n's Comm., Speech to the National School Boards Association: Giving Schools and Libraries the Keys to the Future (Jan. 27, 1997), <http://www.fcc.gov/Speeches/Hundt/spreh704.html>.

178. See *supra* text accompanying note 42–44.

179. The Schools and Libraries Program has successfully disbursed several billion dollars, and the percentage of classrooms with Internet connections has grown substantially. However, the program was controversial from the start. See Jessica Malman, Note, *Connecting Students to "The Net": Guiding Principles from State Constitutions*, 7 GEO. J. POVERTY L. & POL'Y 53, 82 n.174 (2000); Shira Levine, *E-Rate Under Fire*, AMERICA'S NETWORK, May 15, 2003, at 14. In recent years, it has repeatedly come under scrutiny for mismanagement and fraud. The FCC took the extraordinary step in the summer of 2004 of suspending subsidy payments until the problems could be addressed. See Norman Oder, *\$40M in E-Rate Funds Suspended*, LIBRARY J., Nov. 1, 2004, at 16.

180. One legitimate concern was that Internet service providers would be required to contribute to the subsidy pool for Schools and Libraries funding. The FCC surcharge applies only to telecommunications services, not "information services" such as Internet access. There were arguments, though, that for competitive parity or because the services being deployed would benefit the Internet industry, it should pay in as well. The FCC, however, rejected those arguments.

181. See 47 U.S.C. § 254(h) (2000).

elsewhere in a school. The hardware itself is the service.¹⁸² Even though the configuration just described is a direct substitute for a wired connection between the two points, the FCC concluded that it could not subsidize the wireless network.¹⁸³

The treatment of wireless connections in the Schools and Libraries Subsidy Program is a case of the FCC *excluding* computer hardware because its mandate was limited to network-based services. The impact, though, was to increase the relative cost to schools of buying WiFi gear, because the competing wired solution qualified for the subsidy. Indirectly, therefore, the FCC altered the competitive dynamics for computer hardware vendors.

2. The V-Chip

The 1996 Act also mandated that all television sets with screens over thirteen inches manufactured after January 2000 incorporate a so-called “V-Chip” to allow parental blocking of violent and sexually explicit programming.¹⁸⁴ The FCC oversaw the implementation of the statutory scheme, which included a ratings system for programming. With the V-Chip requirement now in force, parents can block their children from viewing content based on the ratings criteria. Thus, every television set sold today incorporates a piece of FCC-mandated hardware, which interfaces with FCC-mandated ratings.

The V-Chip, on its face, applies to televisions, not computers. That line, however, is blurring.¹⁸⁵ PC vendors are starting to sell models with built-in TV tuners. Microsoft offers a version of its operating system, Windows XP Media Center Edition, designed to control television and other entertainment devices and to display broadcast television on the computer monitor.¹⁸⁶ Digital video recorders, such as TiVo, use general purpose computers with

182. This is a broader trend. *See infra* Part III.B.

183. Fed.-St. Joint Bd. on Universal Serv., *supra* note 176.

184. *See* Technical Requirements to Enable Blocking of Video Programming based on Program Ratings, ET Docket No. 97-206 (Fed. Commc’n’s Comm’n, Mar. 13, 1998), http://fcc.gov/bureaus/engineering_technology/Orders/1998/fcc98036.pdf (report and order); News Release, Fed. Commc’n’s Comm’n, Commission Finds Industry Video Programming Rating System Acceptable; Adopts Technical Requirements to Enable Blocking of Video Programming (The “V-Chip”) (Mar. 12, 1998), http://ftp.fcc.gov/Bureaus/Cable/News_Releases/1998/nrcb8003.html; *see also* J.M. Balkin, *Media Filters, the V-Chip and the Foundations of Broadcast Regulation*, 45 DUKE L.J. 1131, 1156 (1996) (suggesting that as filtering devices such as the V-Chip become more effective, content restrictions should become more suspect).

185. *See infra* Part III.A.

186. *See* Windows XP Media Center 2005 Home Page, <http://www.microsoft.com/windowsxp/mediacenter/default.msp> (last visited Nov. 16, 2005).

specialized software to record and control TV programming. A raft of new Internet Protocol Television (“IPTV”) offerings from start-ups as well as larger players promises to deliver a vast array of TV content over broadband Internet links directly to TV sets or local storage devices.¹⁸⁷ Although the Commission took pains to emphasize that only devices capable of receiving traditional over-the-air broadcast programming were subject to the V-Chip requirement, that still includes PCs with TV tuner cards or other mechanisms allowing them to receive TV broadcasts.¹⁸⁸

The V-Chip is both hardware regulation and content regulation. It requires equipment manufacturers to incorporate something into their hardware, and it places limits on broadcasters’ ability to deliver programming to viewers. The FCC’s authority to mandate it derives directly from the 1996 Act, so the Commission did not need to allude to its more general regulatory authority over broadcasting.¹⁸⁹ However, the nature of the regulation—protecting children from inappropriate content—directly parallels preexisting FCC rules to enforce the public interest obligations of broadcasters.¹⁹⁰ The difference is that the target is no longer just broadcast licensees; computer manufacturers are swept into the ring as well.

D. Application-Directed Computer Regulation

In at least two cases, FCC regulation of computer applications has been direct and explicit. Both involve software functionality delivered through the Internet. In 2001, the FCC imposed conditions on the AOL-Time Warner merger relating to instant messaging, based on concerns about anticompetitive behavior in this nascent Internet-based market. In 2004, the Commission issued two

187. See Jay Greene, *Microsoft May Be a TV Star Yet*, BUSINESSWEEK, Feb. 7, 2005, at 78; John Markoff, *New Service by TiVo Will Build Bridges from Internet to the TV*, N.Y. TIMES, June 9, 2004, at C1; *Global IPTV Revenue Predicted to Top \$17 Billion by 2010*, BROADCAST ENGINEERING ONLINE, Jan. 23, 2005, <http://broadcastengineering.com/newsletters/bth/20050123/iptv-revenue-global-20050123/index.html>; David Short, *The Many Facets of IPTV*, BROADCAST ENGINEERING ONLINE, Jan. 1, 2005, http://broadcastengineering.com/mag/broadcasting_facets_iptv/index.html.

188. Courtney Macavinta, *FCC Approves PC-TV V-Chips*, CNET NEWS.COM, Mar. 13, 1998, http://news.com.com/FCC+approves+PC-TV+V-chips/2100-1023_3-209031.html.

189. This distinguishes the V-Chip from the Commission’s subsequent decisions to require digital TV tuners and a broadcast flag for digital programming. See *infra* Part III.D.2.

190. In this way, the V-Chip parallels the All-Channel Receiver Act, which directed the FCC to regulate television sets in order to protect UHF broadcast licensees. See *infra* text accompanying note 289.

declaratory rulings and launched two rulemaking proceedings related to VoIP, also known as “Internet telephony.”

The distinguishing characteristic of these actions is that they involve regulation not of network infrastructure, but of specific functionality provided through digital computer networks. In other words, not only do these rules apply to activities traditionally in the domain of unregulated information services, but they also involve direct regulation of software.¹⁹¹ Infrastructure regulation could perhaps be explained away as an outgrowth of the FCC’s traditional activities, but software regulation is something new. These are therefore the clearest examples that the perceived “no regulate zone” around the computer industry is illusory.

These two steps went largely unremarked upon in the computer industry. Both decisions stemmed directly from existing FCC mandates—antitrust review in the IM case, telecommunications regulation for VoIP. Furthermore, the application-specific nature of these decisions makes them appear idiosyncratic. Regulating a particular application because of its particular market characteristics may seem less rapacious than regulating devices which can be used to provide a wide range of applications. The IM rules were further limited in their direct application to a single vendor, AOL. Nonetheless, the Commission’s actions belie claims that software markets are removed from the reach of government regulators.

1. Instant Messaging Interoperability

The FCC’s foray into instant messaging took place in the context of a merger review. The Commission is required to review all mergers that involve transfers of FCC licenses.¹⁹² It has the power to block transactions or to impose conditions that the merged company must fulfill. AOL’s blockbuster acquisition of Time Warner involved transfers of cable television licenses, bringing the matter under FCC review.¹⁹³

191. See Timothy Wu, *Application-Centered Internet Analysis*, 85 VA. L. REV. 1163, 1163–66 (1999) (providing a general discussion of computer applications and the Internet’s layered architecture).

192. See 47 U.S.C. § 310(d) (2000). The Commission’s merger review authority exists in parallel with antitrust review by the United States Department of Justice and, in some cases, the Federal Trade Commission.

193. Applications for Consent to the Transfer of Control of Licenses and Section 214 Authorizations by Time Warner Inc. and America Online, Inc., Transferors, to AOL Time Warner Inc., Transferee, 16 F.C.C.R. 6547 ¶ 1 (2001) [hereinafter AOL-Time Warner Merger Order].

Although its merger review authority derives from the transfer of licenses, the FCC is not limited to imposing conditions linked to those licenses. Instead, it can broadly consider the competitive implications of the proposed transaction. In analyzing the AOL-Time Warner deal, therefore, the Commission was not limited to considering competitive effects on the cable market. At the time, one of AOL's fastest growing services was IM. IM is an Internet-based software application, typically using a stand-alone desktop client, that allows users to exchange messages with a designated list of recipients. Unlike email, the messages appear on the recipient's screen immediately after they are sent, and the IM software includes "presence" capabilities to indicate when other users are online and logged into the service. There are roughly 275 million IM users worldwide.¹⁹⁴

When the FCC reviewed the merger in 2000, AOL controlled sixty-one percent of the IM market through its own AIM service and the similar ICQ service it obtained from an earlier acquisition.¹⁹⁵ AOL refused to open the interfaces to its IM products, meaning that users of competing IM products could not communicate with AIM and ICQ users.¹⁹⁶ Time Warner did not offer its own IM client. However, concerns were raised that, by establishing a digital media colossus that dominated both Internet access and content markets, the AOL-Time Warner merger would create anticompetitive effects in the nascent IM market.¹⁹⁷ A particular rationale for the concern was the sense at the time that IM would be the basis of lucrative new communications services, incorporating not just text messages but voice and video.¹⁹⁸

194. See Verne Kopytoff & Benjamin Pimentel, *Yahoo, Microsoft Link Instant Messages*, S.F. CHRON., Oct. 13, 2005, at C1.

195. Applications for Consent to the Transfer of Control of Licenses and Section 214 Authorizations by Time Warner Inc. and America Online, Inc., Transferors, to AOL Time Warner Inc., Transferee; Petition of AOL Time Warner Inc. for Relief from the Condition Restricting Streaming Video AIHS, 18 F.C.C.R. 16,835 ¶ 6 (2003) [hereinafter IM Removal Order]. Microsoft had the next largest market share, 22.2 percent, followed by Yahoo! at 19.3 percent. See *id.*

196. Most other IM providers also refused to interconnect. However, AOL's large share of the market made its decision the most competitively significant.

197. See AOL-Time Warner Merger Order, *supra* note 193, at 6552-53; Gerald R. Faulhaber, *Access ≠ Access, + Access*, 2002 MICH. ST. L. REV. 677, 704-05 (2002).

198. See Faulhaber, *supra* note 197, at 705. Whether because of or in spite of the FCC's actions, those new IM-based markets developed more slowly. However, they are now starting to take root. For example, AOL recently announced it would launch a VoIP service tied into its IM software. See James S. Granelli & Chris Gaither, *AOL to Offer Net Phone Service*, L.A. TIMES, Mar. 9, 2005, at C5.

In its merger review, the FCC concluded that the IM business was generally not competitive and that AOL was taking advantage of its dominant position to thwart IM competition.¹⁹⁹ The Commission worried that, especially with Time Warner's cable assets becoming broadband Internet access platforms, a merged AOL-Time Warner would dominate next-generation "advanced IM-based high speed services" ("AIHS").²⁰⁰ Therefore, the Commission required the company to interoperate with other IM providers before releasing an AIHS, either by adopting an open technical protocol or through private contracts with leading unaffiliated IM providers.²⁰¹ AOL-Time Warner could escape from this requirement if it could show the condition no longer served the public interest, that there had been a material change of circumstances, or that it was no longer a dominant provider of IM services.²⁰²

As it turned out, many of the perceived benefits of the AOL-Time Warner combination never materialized because the Internet bubble began to collapse shortly after the transaction's announcement in 2000. Nor did the expected AIHS explosion arrive. IM providers did begin to incorporate rich media capabilities such as voice and video into their clients, but both the pace of innovation and the revenue-generating potential of the market were slower to emerge than anticipated. One reason was that efforts to facilitate interoperability among the major IM clients proceeded slowly, even under the shadow of the FCC merger condition. In 2003, Time Warner successfully petitioned the FCC to remove the IM condition, claiming changed circumstances and introducing evidence that AOL's share of the IM market was dropping.²⁰³

The AOL IM merger condition is striking in that it is indisputably a case of direct FCC regulation of a software application.²⁰⁴ This was not a matter of infrastructure regulation spilling over onto new digital devices, nor a generic social policy initiative with impacts on Internet-based services. It was a deliberate attempt to regulate competition in an information services market.

199. See AOL-Time Warner Merger Order, *supra* note 193, at 6603 ¶ 129.

200. See *id.* at 6603 ¶¶ 128, 130.

201. See *id.* at 6626 ¶¶ 187-88.

202. See *id.* at 6628 ¶ 195.

203. See IM Removal Order, *supra* note 195, at 16,837 ¶ 6. Subsequently, AOL and competitors have made some voluntary progress toward interoperability. See Jim Hu & David Becker, *IM Giants Drop Some Barriers to Peace*, CNET NEWS.COM, July 15, 2004, http://news.com.com/IM+giants+drop+some+barriers+to+peace/2100-1032_3-5270067.html (noting progress toward IM interoperability).

204. See Weiser, *supra* note 49, at 843.

Then-Commissioner and later Chairman Michael Powell dissented from the decision to require IM interoperability, arguing that it represented an unwarranted intrusion into the previously unregulated Internet realm.²⁰⁵ The FCC majority, however, saw AOL-Time Warner's potential dominance of next generation IM services as a threat to the very openness and competition that had allowed the Internet to remain unregulated until then.²⁰⁶

The IM condition is even more extraordinary in that the Commission's first foray into Internet application regulation occurred not in a rulemaking proceeding, with full opportunity for public comment on proposed Commission decisions, but in the context of a merger review. The Commission argued that there was insufficient time for a rulemaking because in the interim, AOL-Time Warner could consolidate its dominance of IM services beyond the point of no return.²⁰⁷

The FCC's IM regulation efforts lasted only two years.²⁰⁸ It is therefore tempting to view the decision as an anomaly. And indeed, it is unlikely the Commission would have jumped into the IM market or Internet applications generally without the forcing factor of the AOL-Time Warner merger review. The episode, however, provides some lessons that will be relevant to future FCC computer regulation in other areas.

First, the Commission justified its authority to regulate IM based on its broad ancillary jurisdiction under Title I of the Communications Act.²⁰⁹ Although the Commission has rarely relied on this expansive yet vague authority, it did not hesitate to do so in the IM context, even though it was entering an industry where it had previously disclaimed intent to regulate. Second, the Commission viewed the IM market similarly to the telephone industry it had regulated since its inception. Both are network industries, characterized by strong tipping potential once a dominant provider

205. See Application for Consent to the Transfer of Control of Licenses by Time Warner, Inc. and America Online, Inc. Transferors, to AOL Time Warner, Inc. Transferee, 16 F.C.C.R. 6701 (2001) (mem. op. and order) (statement of Commissioner Michael K. Powell).

206. See AOL-Time Warner Merger Order, *supra* note 193, at 6603 ¶ 129.

207. See *id.* at 6625 ¶ 186.

208. See IM Removal Order, *supra* note 195, at 16,835 ¶ 1. This was an important change since the original order was the elevation of Michael Powell, a critic of the original decision, to FCC Chairman, with a Republican majority on the Commission.

209. See AOL-Time Warner Merger Order, *supra* note 193, at 6610 ¶ 148 (citing 47 U.S.C. §§ 151-170 (2000)).

emerges.²¹⁰ The dominant provider in such situations can strengthen its control by refusing to interconnect with rivals. The solution in telephony was mandatory “common carrier” interconnection for AT&T, the dominant firm, in return for protection of AT&T’s monopoly status.²¹¹

The AOL IM condition sought to achieve similar results solely with an indirect interoperability mandate. Yet the decision had a number of qualifiers. Only AOL was directly required to make its service interoperable, it only had to do so if it introduced an AIHS, and it could interoperate through either an open protocol promulgated by a standards body or private contracts. In contrast to Part 68 for terminal attachments, therefore, the Commission felt that IM interoperability could be achieved without direct government engagement in the process.²¹²

2. Voice over Internet Protocol

VoIP straddles the line between Internet application and regulated communications service. It is a software-defined function delivered on top of the Internet, and yet, to the end-user, it can appear identical to traditional telephony.²¹³ Consumer VoIP providers such as Vonage, AT&T, and cable TV operators are delivering VoIP over broadband access connections in competition with incumbent phone companies. Those phone companies themselves are deploying VoIP infrastructure in their networks. Consequently, VoIP is beginning to put pressure on the economics of the telephone business.²¹⁴

Some VoIP services provide specialized hardware to end-users and incorporate dedicated network links and interconnection points with the public switched telephone network. Others, however, operate purely through software residing on a personal computer or other device.²¹⁵ The leading example is Skype, a peer-to-peer

210. See *id.* at 6613–15, ¶¶ 153–60.

211. See Burch, *supra* note 31, at 85.

212. See AOL-Time Warner Merger Order, *supra* note 193, at 6627, ¶ 191.

213. See Review of Regulatory Requirements for IP-Enabled Services, 69 Fed. Reg. 16,193–202 (proposed Mar. 29, 2004) (to be codified at 47 C.F.R. ch. 1) [hereinafter IP-Enabled Services NPRM]; *Voice Over Internet Protocol: Hearing Before S. Comm. on Commerce, Science, and Transportation*, 108th Cong. (testimony of Kevin Werbach, Founder, Supernova Group, LLC), available at http://commerce.senate.gov/hearings/testimony.cfm?id=1065&wit_id=2993.

214. See *Net Phones Start Ringing Up Customers*, BUSINESSWEEK, Dec. 24, 2003, at 45; *The Phone Call Is Dead; Long Live the Phone Call*, ECONOMIST, Dec. 4, 2004, at 6.

215. Thomas J. Fitzgerald, *Should Your PC Be Your Telephone?*, N.Y. TIMES, Dec. 2, 2004, at G6.

application that has been downloaded more than 200 million times since its launch in late 2003.²¹⁶

The FCC's initial response to VoIP was to stay as far away as it could from anything that could be considered regulation. When a trade association of long distance resellers, America's Carriers Telecommunications Association ("ACTA"), petitioned the Commission in 1996 to prohibit early VoIP offerings by "non-tariffed uncertified entities," the Commission sought comment but took no action.²¹⁷ Two years later, Senator Ted Stevens, the powerful chairman of the Senate Appropriations Committee, attached a provision to the Commission's budget, pointedly directing the FCC to justify its nonregulation of VoIP.²¹⁸ The Commission responded with an April 1998 report to Congress, known as the "Stevens Report," reaffirming its hesitation to impose traditional carrier regulation on VoIP.²¹⁹ The Commission acknowledged that some "phone-to-phone" VoIP services "lack[] the characteristics that would render them 'information services,' within the meaning of the statute, and instead bear the characteristics of 'telecommunications services.'" ²²⁰

216. James Fallows, *In Internet Calling, Skype Is Living Up to the Hype*, N.Y. TIMES, Sept. 5, 2004, at B45; Andy Reinhardt, *Net Phone Calls, Free—and Clear; Skype's Radical Technology and Marketing Threaten the Very Foundations of Telecom*, BUSINESSWEEK, Nov. 1, 2004, at 60; Skype, <http://www.skype.com> (last visited Nov. 16, 2005) (listing Skype downloads to date); Press Release, Skype, Skype Voicemail and Windows v1.3 Launched (June 13, 2005), http://www.skype.com/company/news/2005/voicemail_v13.html (stating that Skype has over 42 million registered users, increasing by approximately 150,000 per day and over 1.5 million paying users of its SkypeOut offering).

217. See The Provision of Interstate and International Interexchange Telecommunications Service Via the "Internet" by Non-Tariffed Uncertified Entities, America's Carriers Telecommunication Association, Petition for Declaratory Ruling, Special Relief, and Institution of a Rulemaking, RM 8775 (Mar. 4, 1996), available at http://www.fcc.gov/Bureaus/Common_Carrier/Other/actapet.html. The Commission has broad latitude in how to respond to petitions for rulemaking, and in the case it simply did not proceed with any further action.

218. See Departments of Commerce, Justice, and State, the Judiciary, and Related Agencies Appropriations Act of 1998, Pub. L. No. 105-119, § 623, 111 Stat. 2440, 2521-22 (1997) (codified at 47 U.S.C. § 254 (2000)). Stevens and other senators were concerned that, if VoIP remained unregulated, it would siphon revenues from "universal service" funding mechanisms derived from regulated telecommunications revenues. See *Universal Services Hearing, Before the Subcomm. on Communications of the S. Comm. on Commerce, Science, and Transportation*, 105th Cong. (1997) (statement of Senator Ted Stevens) ("I am concerned that the continued exemption of information service providers from access charges, with their inherent contribution to universal service, amounts to a continued subsidy by other telecommunications users.") (on file with the North Carolina Law Review).

219. See Fed.-St. Joint Bd. on Universal Serv., Report to Congress, CC Docket No. 96-45, 13 F.C.C.R. 11,501, 11,519-25 ¶¶ 36-45 (1998) (Apr. 10, 1998) [hereinafter Stevens Report].

220. *Id.* at 45 ¶ 89.

Nonetheless, it stopped short of a commitment to follow through with this conclusion in a rulemaking proceeding and stressed that its statement was tentative and nonbinding.²²¹

Not for another six years would the Commission formally take up the VoIP question. In the interim, the rollout of broadband networks and the entry of new competitors significantly raised the profile and competitive implications of VoIP.²²² Such benign neglect was in keeping with the Commission's longstanding hesitancy to engage in express regulation of competitive computer-based functionality, variously articulated as the "unregulation" policy²²³ or the "nascent services doctrine."²²⁴ It contrasted, however, with the Commission's willingness to influence the nascent IM platform in the AOL-Time Warner merger order.²²⁵

Moreover, VoIP is not just a new computer-based capability that can easily be distinguished from traditional regulated communications services; it can be a direct substitute for those services. The Commission's reticence to address VoIP, while it may well have been justified, was therefore not a simple case of resisting the temptation to expand into the computer industry. VoIP represents the computer industry invading and potentially subsuming the communications industry.²²⁶ Whatever the ultimate outcome, it was always clear that the FCC would at some point have to address VoIP.²²⁷

In February 2004, the Commission finally adopted two VoIP decisions. The first was a declaratory ruling concerning Free World Dial-Up ("FWD"), a VoIP service provided by pulver.com.²²⁸ The Commission concluded that FWD, which charged no fees and offered no guaranteed interconnection with the public switched telephone

221. *See id.* at 45–46 ¶¶ 90–91.

222. *See* IP-Enabled Services NPRM, *supra* note 213, at 16,194.

223. *See* Oxman, *supra* note 5, at 25.

224. Kathleen Q. Abernathy, Comm'r, Fed. Comm'n's Comm'n, Remarks Before the Federal Communications Bar Association New York Chapter: The Nascent Services Doctrine (July 11, 2002), <http://www.fcc.gov/Speeches/Abernathy/2002/spkqa217.html>.

225. *See supra* Part II.D.1.

226. Kevin Werbach, *A Layered Model for Internet Policy*, 1 J. TELECOMM. & HIGH TECH. L. 37, 45 (2002).

227. The Commission's prolonged silence on VoIP created uncertainty among industry participants and investors, and fostered conflicts when incumbents sought to collect fees from VoIP providers that applied to other carriers. *See* Kevin Werbach, *Time to Regulate VoIP*, VON MAG., Nov-Dec. 2003, <http://www.vonmag.com/issue/2003/novdec/columns/werbach.htm>.

228. *See* Petition for Declaratory Ruling that pulver.com's Free World Dialup is Neither Telecomms. nor a Telecomms. Serv., 19 F.C.C.R. 3307, 3324 (2004).

network, was an unregulated information service, not a regulated telecommunications service.²²⁹ The second action was a notice of proposed rulemaking on IP-Enabled Services.²³⁰ In that proceeding, the Commission squarely raised the welter of regulatory issues that VoIP engendered, including whether to impose common carrier obligations and universal service funding obligations.²³¹ Later in 2004, the FCC took three other actions relating to VoIP. It declared AT&T's VoIP transport service, which transparently routed traditional phone traffic using VoIP protocols, a telecommunications service subject to regulated interstate access charges.²³² It launched a proceeding to consider VoIP providers' obligations under the Communications Assistance to Law Enforcement Act ("CALEA"), which requires telecommunications carriers to make their networks amenable to lawful wiretaps.²³³ And it declared voice over broadband offerings, such as Vonage, subject to exclusive federal jurisdiction, preempting state attempts to apply traditional common carrier regulation.²³⁴

In 2005, the Commission went still further. It issued an order requiring "interconnected" VoIP providers to offer enhanced 911 ("E911") capabilities to their customers.²³⁵ E911 allows telephone subscribers in an emergency to directly connect to a local public safety switchboard by dialing 911, while automatically transmitting location information the public safety dispatcher can use to send police, fire, or other personnel to the scene. Traditional telephone companies are required to implement E911 capabilities. The FCC reasoned that since VoIP can be a substitute for such telephone services, it should also face such obligations: "[t]he record clearly indicates, however, that consumers expect that VoIP services that are interconnected with the PSTN [public switched telephone network]

229. *See id.*

230. *See* IP-Enabled Servs., 19 F.C.C.R. 4863, 4917-18 (2004).

231. *See id.* at 4892-4915.

232. *See* Petition for Declaratory Ruling that AT&T's Phone-to-Phone Telephony Servs. are Exempt from Access Charges, 19 F.C.C.R. 7457, 7472 (2004).

233. *See* Comm'n's Assistance to Law Enforcement Act and Broadband Access and Servs., 19 F.C.C.R. 15,676, 15,707-10 (2004) [hereinafter CALEA NPRM].

234. *See* Vonage Holdings Corp. Petition for Declaratory Ruling Concerning an Order of the Minn. Public Utils. Comm'n, 19 F.C.C.R. 22,404, 22,432 (2004).

235. *See* IP-Enabled Servs., ¶ 74 (F.C.C. June 3, 2005) [hereinafter IP-Enabled Servs.], available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-05-116A1.pdf. The Commission defined "interconnected" VoIP services, a new category not derived from any statutory language, as "those VoIP services that can be used to receive telephone calls that originate on the [public switched telephone network ("PSTN")] and can be used to terminate calls to the PSTN." *Id.* ¶ 24.

will function in some ways like a ‘regular telephone’ service.”²³⁶ Thus, a broadband application utilizing Internet protocol data transmission from end to end is subject to the same requirements as a regulated Title II circuit-switched telephone company. Although the Commission’s decision was limited to such “interconnected” VoIP services, the definition leaves significant room for interpretation.²³⁷

Unlike IM, the FCC never expressed concern about the competitive dynamics of the VoIP market itself. Rather, its interest stemmed from a conviction that VoIP would have significant competitive effects on the traditionally regulated telecommunications industry and might in fact converge with that industry. Nonetheless, VoIP is not a communications service tied to a particular infrastructure; it is a software layer on top of the Internet.²³⁸ From a technical standpoint, the Skype VoIP client is identical to the ICQ IM client or the Microsoft Internet Explorer Web browsing client. FCC regulation of VoIP is therefore inherently a form of computer regulation.

Thus, in virtually every area in which it operates, stretching decades into the past and up to the present day, the FCC has engaged in regulation of computer-based industries. Contrary to popular belief, FCC regulation of personal computers, other computing hardware, software applications, and data networks is not a new prospect. It is a well established tradition. There may be no entity officially called the Federal Computer Commission, but the computer industry is subject to a host of legal requirements overseen by an agency with the acronym FCC.

III. THE FUTURE: FCC INSIDE

To this point, one could plausibly acknowledge the FCC’s history of regulating computing devices and still believe it to be a dying anachronism. FCC actions in previous decades took place amid a backdrop of pervasive regulation and government protected monopoly. That has gradually disappeared, replaced by a policy that

236. *Id.* ¶ 23.

237. In August 2005, the Commission applied the same formulation to wiretapping, ordering “interconnected VoIP providers” to comply with the Communications Assistance to Law Enforcement Act. *See* Communications Assistance to Law Enforcement Act, 69 Fed. Reg. 56,976 (Sept. 23, 2004) (to be codified at 47 C.F.R. pts. 22, 24, 26); FCC First Report and Order and Further Notice of Proposed Rulemaking, Communications Assistance to Law Enforcement Act and Broadband Access and Services. ET Docket No. 04-295 (adopted Aug. 5, 2005, released Sept. 23, 2005), available at <http://ftp.fcc.gov/FCC-05-153A1.pdf> [hereinafter CALEA Order].

238. *See supra* note 213.

favors market forces wherever possible.²³⁹ Perhaps the Federal Computer Commission is a vestige of the old preregulation order, which will fade away as market competition breaks out everywhere in the communications world.

The truth is otherwise. Surprising as it may sound, the FCC is actually poised to increase its involvement in computer-based businesses. The reason is not a revanchist movement to restore the good old days of *Hush-A-Phone*. Technology itself is the cause for the coming growth of the Federal Computer Commission. The evolution of computer and communications technologies is blurring lines that once distinguished devices from networks and is increasing the importance of end-user hardware in controlling network connections. The same innovations that allow for new competition—and thus deregulation—in traditional communications markets are posing new regulatory challenges that demand a response from the FCC.²⁴⁰

FCC decisions are playing an important role in key market developments involving the Internet and digital media. The Commission is becoming something like the semiconductor giant Intel, a powerful force in computing that is often invisible to end users. To build its brand, Intel launched a huge marketing campaign with the slogan “Intel Inside.” The coming era of convergence and user-defined networks will be an era of “FCC Inside.”

Several factors will support this solidification of FCC computer regulation. The long term technology trend towards convergence of computing and communications means the historically distinct computer industry will move ever closer to the FCC’s “home” regulatory turf. Specifically, as intelligent end-user hardware plays an increasingly important role in defining applications flowing across communications networks, FCC regulation of those networks will be harder to distinguish from regulation of the constituent devices. Business dynamics in the information technology world will further reinforce these trends by pushing Internet and information technology companies further into the communications world.

239. See Joseph D. Kearney & Thomas W. Merrill, *The Great Transformation of Regulated Industries*, 98 COLUM. L. REV. 1323, 1350–58 (1998).

240. Former FCC Chairman Michael Powell appreciated this fact, although he had little success in denting the prevailing myth of FCC unregulation. See David Kaut, *FCC Commissioner Ponders Extent of Regulation Among Rivals on Internet*, 77 Antitrust & Trade Reg. Rep. (BNA) 417, 417 (1999) (quoting then-FCC Commissioner Michael Powell as stating that “if you don’t believe that [current] regulatory choices . . . have a direct and indirect effect on the development of the Internet, you’re really missing something.”). I am indebted to Phil Weiser for pointing out this quote to me.

Finally, public policy impulses to address issues such as intellectual property and law enforcement will push the FCC still further into the world of computer regulation.

A. *Two Aspects of Convergence*

The most basic reason to expect further FCC involvement in the computer industry is the phenomenon of convergence. To put it simply, the gap between the “unregulated” computer world and the “regulated” communications world is shrinking.

The term “convergence” is heavily laden with baggage. A thousand business plans were launched on the premise that all forms of information and entertainment are becoming interchangeable, undermining the legal and business distinctions among formerly distinct platforms such as broadcast television, mobile telephony, the telephone network, and cable television. While these grandiose dreams proved premature, convergence is a very real phenomenon.

Convergence has at least two distinct meanings, which are often conflated.²⁴¹ The first is what former FCC Chairman Michael Powell liked to call “the digital broadband migration.”²⁴² When translated into digital form, all information is theoretically interchangeable. The bit, the fundamental unit of digital communications and processing, is universal.²⁴³ A data network that carries documents can also carry pictures and voice conversations and any other type of media. This contrasts with analog networks, which are hard-wired for a single service. Every major communications technology has been engaged in a digital migration over the past two decades. Telephone networks, broadcast television, cable, radio, and mobile phone networks are all shifting from analog systems to digital transmission.²⁴⁴

The implications of the digital migration for communications policy are profound. Networks that once did not—and could not—compete with one another, such as the telephone and cable wires into houses, suddenly become competing platforms for digital broadband

241. See Werbach, *supra* note 32, at 5–6.

242. See Michael K. Powell, Comm’r, Fed. Comm’ns Comm’n, Remarks Before the Progress and Freedom Foundation: The Great Digital Broadband Migration (Dec. 8, 2000), <http://www.fcc.gov/Speeches/Powell/2000/spmcp003.html>.

243. C.E. Shannon, *A Mathematical Theory of Communications*, 27 BELL SYS. TECH. J. 379–423, 623–56 (1948), available at <http://cm.bell-labs.com/cm/ms/what/shannonday/shannon1948.pdf>.

244. In some cases, such as digital television and radio, the transition is still in progress. Digital broadcasts are available, but the majority of users still tune into the old analog offerings.

applications. Different regulatory obligations apply to seemingly identical service offerings because of legacy rules tied to the physical network.²⁴⁵ Markets once considered doomed to monopoly or oligopoly enjoy new competitive possibilities because digital broadband platforms lower barriers to entry and transform cost structures. And a raft of new functionality becomes available to end-users.

There is, however, a second aspect of convergence. Computers are converging with communications devices. Where the digital migration concerns the information, content, applications, and services delivered through communications networks, the second aspect of convergence concerns the equipment involved. Historically, computers were self-contained data processing devices, while communications equipment was connected, but not very sophisticated or adaptable. In other words, computers were smart but lonely, while communications devices were social and dumb. A telephone was basically a microphone and audio amplifier, while a radio was a glorified tuning fork.

Today, computers are ubiquitous in communications networks. From end-user equipment to the switching, billing, and monitoring functions deep inside the infrastructure, it is difficult to find a corner of the communications world today where computers do not play a leading role. A “basic” mobile phone handset sold today has more processing power than a stand-alone personal computer not long ago.²⁴⁶ It typically includes speed dialing, address books, calendaring, text messaging, downloadable ringtones, screen savers, games, and other application functions. It also uses digital signal processors and other sophisticated hardware to receive signals effectively and economize on power.²⁴⁷

At the same time, computers are becoming communications devices. Virtually every PC has an analog modem port and an Ethernet port; a majority of new laptops also include WiFi and/or Bluetooth wireless radios as well.²⁴⁸ Microsoft includes a full Session Initiation Protocol VoIP communications software stack in the

245. See Werbach, *supra* note 226, at 57–64 (proposing a “layered model” of communications policy to address these asymmetries). Myself and others have proposed a “layered model” of communications policy to address these asymmetries. See *id.* at 57–64.

246. See Dominic White, *ARM Optimistic of Where Chips Will Fall in Digital Age*, DAILY TELEGRAPH (London), July 20, 2004, at 30.

247. See Brad Stone, *Your Next Computer*, NEWSWEEK, June 7, 2004, at 51.

248. See Dean Takahashi, *WiFi Stands Alone*, SAN JOSE MERCURY NEWS, Dec. 24, 2004, at 1C (“In 2003, 31 percent of laptops had WiFi built-in. This year, about 61 percent are expected to have it, according to IDC.”).

current version of Windows.²⁴⁹ VoIP softphone applications such as Skype allow users to make phone calls using only their PC, and IPTV platforms turn PCs into sophisticated television receivers.²⁵⁰ And this does not even include the millions of personal digital assistants, smartphones, and other devices which deliberately blur the line between communications and computing. A Treo from PalmOne, for example, is capable of sending and receiving email, browsing the Web, instant messaging, playing music clips, taking and displaying photos, managing calendars, and running game software. Yet this do-it-all computer is marketed primarily as a phone.

We are not so far away from a world in which every end-user personal computer is also a communications device and every end-user communications device is a computer. Chipsets, input/output subsystems, and radio components are becoming so cheap that they look virtually free to device designers. Intel and other major semiconductor vendors are working to integrate and miniaturize communications components so that they can be incorporated into chipsets with minimal overhead. Any device that at some point may benefit from connections to the outside world will therefore be capable of communication, and any device that may benefit from flexibility and sophistication will therefore be capable of computation.²⁵¹

As with the other elements of convergence, this development is both exciting and perplexing. In a world of limited overlap between computers and communications, it was possible to ignore the overhang of FCC regulation on computing devices. If FCC rules affect virtually all end-user computers, that is much less feasible.

The FCC is like a grand old hotel built many yards inland from a beach. Over time, as the beach erodes, the water creeps closer to the hotel until it reaches the edge of the property. The hotel has not grown or moved at all; the water has come to it. The bulwarks that once divided the regulated world of telephone companies and broadcasters from the unregulated paradise of computers and Internet applications are collapsing.

249. See Neal Shact, *The Era of Always-On*, TELEPHONY ONLINE, Oct. 11, 2004, http://telephonyonline.com/ar/telecom_era_alwayson/.

250. See *supra* text accompanying note 187.

251. See Kevin Werbach, *It's in the Chips*, FEATURE, July 8, 2002, <http://www.thefeature.com/article?articleid=15350>.

B. *Hardware-Defined Networks: God's Box as Pandora's Box*

The second development that will raise the tension over FCC regulation of computers and data networks flows from the first. When communications devices were relatively unsophisticated, they had to depend on sophisticated, centralized networks. The paradigmatic communications networks of the twentieth century—the public switched telephone network and television broadcasting—both adopted this model.²⁵² The PSTN grew and developed around room-sized mainframe computers called switches, which controlled traffic and managed other functions across pieces of the network. Television depended on high powered signals emerging from tall broadcast towers. If there was any sophisticated computing in these networks, it was built into the core infrastructure.

Today's intelligent end-user devices make possible a different network architecture. Smart devices can connect to one another directly, without the mediation or control of centralized infrastructure.²⁵³ This architecture is sometimes called peer-to-peer, but it is broader than that. It means networks are defined not by service providers, but by end-users and the devices they operate. These networks are therefore customer- or hardware-defined.

VoIP, for example, is changing the nature of telephony by transforming voice phone calls from a service baked into the network into a class of applications that can run on any platform. VoIP connections run on top of broadband Internet links. There is always a computer in the mix, whether managing the broadband connection, embedded in the phone-shaped device that plugs directly into a data line, or running VoIP software such as Skype that supports calling directly through the PC.

Computer hardware and software thus become the “carrier” of the VoIP communication. This shift is ultimately forcing the FCC to consider whether and how its many rules governing telecommunications apply to VoIP.²⁵⁴ The Commission has not completed the IP-Enabled Services proceeding that will address these questions and may not for some time.²⁵⁵ It seems unlikely, however,

252. See David Isenberg, *The Rise of the Stupid Network*, <http://www.rageboy.com/stupidnet.html> (last visited Nov. 16, 2005).

253. See Benkler, *supra* note 127, at 322–26.

254. See *IP-Enabled Servs.*, 19 F.C.C.R. 4863, 4917–18 (2004).

255. The departure of Chairman Powell in March 2005 will delay most complex or controversial FCC decisions, and the new Chairman Kevin Martin will need time to get up to speed. Nonetheless, the FCC did adopt the VoIP E911 protocol in the first months of Martin's Chairmanship. See *IP-Enabled Servs.*, *supra* note 235, ¶ 2.

that the outcome will be a complete reaffirmation of the hands-off approach of the ACTA petition and the Stevens Report. With major incumbent providers deploying VoIP, a blanket decision not to regulate this new software application would be tantamount to deregulating much of the established telecom industry. And in the VoIP E911 Order, the FCC has already decided that at least some VoIP services should comply with at least some forms of traditional telephone regulation.²⁵⁶ The Commission will therefore have to come up with an approach that is neither underinclusive nor overinclusive. It seems committed to avoiding excessive or unnecessary burdens on the computer industry and data networks, merely because they enable functionality that resembles traditional telephony. This goal, however, creates conflicts with other equally powerful FCC objectives.

The growth of unlicensed wireless communications is also expanding the importance of hardware-centric networks. Like VoIP, unlicensed wireless connections do not require a network operator in the center. Anyone can use the available spectrum capacity without the approval of a license holder. Individual devices can communicate with one another and relay traffic on a peer-to-peer basis and can link together with other devices in a “mesh” configuration.²⁵⁷ Just as the Internet has no central service provider ensuring that information gets to the right place, a mesh wireless network can operate in a decentralized fashion. Users simply need a device capable of connecting to the network.

In San Francisco, California, a project called SFLAN is building a carrierless, hardware defined wireless network among volunteers who place access points at their houses or offices.²⁵⁸ Each volunteer can share a wired broadband connection among users in range of the wireless signal, essentially creating a “commons” based on community contributions.²⁵⁹ The key is that connectivity exists wherever a contributor places the necessary access point hardware. The devices, not service providers, determine the reach of the network. Various other commercial and noncommercial projects around the world are using similar approaches.²⁶⁰

256. See *id.* ¶ 4.

257. See Steven M. Cherry, *Broadband a Go-Go*, 40 IEEE SPECTRUM 6, 20 (2003); Glenn Fleishman, *Take the Mesh-Networking Route: Mesh Networks Offer an Agile, Cost-Effective Alternative*, INFOWORLD, Mar. 10, 2003, at 24.

258. See Jason Ankeny, *Brewster Kahle, Founder, SFLan*, WIRELESS REV., Mar. 1, 2004, at 3; SFLAN, <http://www.archive.org/web/sflan.php> (last visited Nov. 16, 2005).

259. See Benkler, *supra* note 127, at 326–28.

260. See Cherry, *supra* note 257, at 20–25; Sandvig et al., *supra* note 136, at 4.

Hardware-centric networks are not limited to telecommunications and wireless communication. In broadcasting, intelligent end-user devices are beginning to substitute for networks in aggregating and selecting content. The traditional role of a broadcast or cable network vis-à-vis content is to choose certain programs to make available and to package those programs for consumption by users, typically on a set matrix of channels and times. A television set does not define what a viewer can watch and when; a broadcaster or cable operator does. A computer with a hard drive connected to the network can usurp that function.

Digital video recorders (“DVRs”) from vendors such as TiVo record television programming based on user selections from an electronic program guide or algorithms designed to identify content appealing to the user. They also give users the ability to pause and rewind live TV by recording automatically in the background. TiVo has over three million customers for its market-leading DVR, either under its own brand or through licenses to other hardware vendors.²⁶¹ In addition to stand-alone competitors, cable and direct broadcast satellite providers are selling set-top boxes with DVR functionality built in.²⁶² Microsoft’s Windows Media Center Edition also includes DVR capabilities.²⁶³

Although DVR penetration is still relatively low, the devices have captured both popular imagination and the attention of broadcasters worried that users will skip through commercials.²⁶⁴ Led by the Apple iPod, analogous handheld devices giving users greater control over music and other audio content are selling briskly.²⁶⁵ The next evolution will be for these devices to incorporate Internet connections.²⁶⁶ At that point, the device is no longer just a new

261. See Mike Musgrove, *TiVo Subscribers Top 3 Million Milestone*, WASH. POST, Feb. 19, 2005, at E1.

262. See Cliff Edwards, *Interactive TV: What’s in the Cards?*, BUSINESSWEEK, Jan. 31, 2005, at 32.

263. Jay Greene, *Microsoft Sharpens Up Its Elbows; It’s Taking on TiVo in TV Digital Recording and Google in Web Searches*, BUSINESSWEEK, Nov. 22, 2004, at 125.

264. FCC Chairman Powell, a TiVo user himself, called the device “God’s machine” in remarks at a conference. See Warren St. John, *Friend or Foe? The Cult of TiVo Cometh*, N.Y. TIMES, Apr. 20, 2003, § 9, at 1. He was rebuked by the broadcast industry for supporting the destruction of its business model.

265. See Andy Serwer, *It’s iPod’s Revolution: We Just Live in It*, FORTUNE, June 27, 2005, at 43. Apple recently added video capability to the iPod, opening up an additional frontier for user-controlled media. Richard Siklos, *Cool, a Video iPod. Want to Watch “Lost”?*, N.Y. TIMES, Oct. 16, 2005, § 3, at 5.

266. The primary limiting factor on such developments today is copyright concerns. See *infra* Part III.D.2. TiVo has a home media option, which allows users to share content

interface on television or radio; it becomes the center of an entirely new form of media. And content-oriented media regulations will start to apply to devices that share little with the over-the-air broadcasters who were their original targets.²⁶⁷

C. *Technology Industry Business Dynamics*

The computer industry is also moving toward the FCC for its own technical and business reasons. Though hardware and software are distinct elements of a computer system and largely separate industries with diverging economics, the line between the two domains is not absolute. In many cases, the same function can be performed either through hardware or software.²⁶⁸ VoIP is an example of a communications capability that is migrating into computer software, as vendors seek new sources of revenue and opportunities to increase the value of their platforms. Skype softphone software performs the same function as a hardware-based VoIP phone. Microsoft's XBox gaming console has a headset and microphone jack. With the optional XBox Live online gaming service, it can be used for VoIP chats among players in multiplayer games, even though no one would think of it as primarily a communications device.²⁶⁹ In another example of market-driven convergence, Yahoo!, a major Internet content "portal," recently acquired Dialpad, a VoIP provider, which it sees as synergistic with its Yahoo! Messenger IM software.²⁷⁰

The plasticity of hardware and software makes it even harder to identify the line between regulated communications networks and the unregulated computer industry. A computer can turn into a communications device with the addition of some software and that

between TiVos in a home, and it recently won approval for a service that can distribute protected content to other personal devices. See Markoff, *supra* note 187.

267. The broadcast flag is a good example. See *infra* Part III.D.2.

268. In general terms, software is more adaptable and replaceable than hardware, while hardware-based systems tend to operate faster. However, special-purpose chips called Application Specific Integrated Circuits ("ASICs") can be custom-designed to perform specific application functions, which otherwise would be implemented in software running on general-purpose hardware. There are also various means of making hardware more flexible, such as rewriteable memory.

269. In fact, Microsoft is arguably the largest voice over broadband provider in the United States thanks to the Xbox, with over one million Xbox Live customers as of mid-2004. Kevin Werbach, *Not Your Parents' Phone System*, TECH CENT. STATION, Aug. 25, 2004, <http://www.techcentralstation.com/082504E.html>.

270. See Elinor Mills, *Yahoo To Buy Net Phone Services Company*, CNET NEWS.COM, June 14, 2005, http://news.com.com/Yahoo+to+buy+Net+phone+services+company/2100-7352_3-5746926.html.

functionality can later be incorporated into the device's hardware or vice versa. The FCC is wrestling with exactly this problem in its consideration of VoIP.²⁷¹ The menagerie of categories it has adopted in different VoIP-related decisions, none of which seem to apply beyond the immediate context, reflects this difficulty. Technology companies will implement functionality in the way that makes the most sense at any given time, complicating the environment for regulators.

The computer industry is also finding itself facing questions about communications regulation because of its own business issues. The personal computer market is maturing as penetration rates reach near-saturation levels in most of the developed world and push against the limits of income levels elsewhere.²⁷² The industry's ability to improve performance year after year is becoming its own enemy as users see little reason to upgrade when their existing computer has all the power for the set of functions they associate with the device. As a result, companies such as Microsoft and Intel are looking for new market opportunities that either extend or escape their PC stronghold.

Microsoft is aggressively moving into markets such as smart mobile phone operating systems, home media hubs, and voice communications which have traditionally been subject to FCC regulation.²⁷³ Moreover, as Microsoft becomes more active in delivering applications or content that ride over broadband connections to the home, it finds itself potentially at odds with regulated phone and cable companies that control the "last-mile" broadband access networks. As a result, Microsoft has become more active, filing comments in FCC proceedings and meeting with FCC commissioners to promote its policy views.²⁷⁴ Microsoft is now a

271. See generally IP-Enabled Servs., 19 F.C.C.R. 4863 (2004) (examining issues related to services making use of Internet Protocol and acknowledging the convergence of services and devices).

272. See generally DAVID BANK, *BREAKING WINDOWS* (2001) (describing Microsoft's struggles to continue its growth as the PC industry matures).

273. See John Markoff, *Microsoft Is Ready to Supply a Phone in Every Computer*, N.Y. TIMES, June 12, 2001, at A1 (discussing Microsoft's development of voice-based services); John Markoff, *Vision of Personal Computers as Heart of Home Entertainment*, N.Y. TIMES, Nov. 17, 2003, at C1 (describing Microsoft's pursuit of the home entertainment market); Aaron Ricadela, *Gates Sees PC, Cell, and Desk Phone in Communications "Triumvirate,"* INFO. WK., Mar. 8, 2005 (discussing Microsoft's real-time collaboration products).

274. For example, Microsoft was among the organizers of the Coalition of Broadband Users and Innovators, which pressed the FCC to mandate "network neutrality" for broadband providers. See McCullagh, *supra* note 58. Intel was a prime mover in the High

strong advocate of open communications networks, perhaps surprising those who view it as benefiting from tight platform control in its home market. Intel has similarly become more active, especially on spectrum policy, as it commits significant resources to unlicensed wireless radio chipsets.²⁷⁵ These companies and others like them are finding FCC decisions increasingly strategic to their business future.

D. Growing Public Policy Mandates

As described above, the FCC has long engaged in computer regulation to serve policy goals beyond basic enablement of communication.²⁷⁶ Recently, however, the Commission and Congress have begun to expand the range of policy objectives that involve regulation of computer hardware. These policy initiatives generally relate to industries in transition: broadcast television with the shift to digital transmission and the telephone industry with the growth of VoIP and broadband.

The V-Chip was a striking example of a regulatory mandate designed to achieve traditional public interest objectives in communications policy—but by imposing requirements on nontraditional actors.²⁷⁷ Broadcasters have been subject to content controls since the dawn of television because of the social importance of the medium and the fact they received free licenses to use the public airwaves. Television set manufacturers, on the other hand, are used to focusing on the quality of the picture, not what that picture represents. The V-Chip brought the two issues together. Still, the V-Chip was a narrowly drawn mandate. Though it had some crossover effects into computer hardware, the rules were circumscribed to devices clearly functioning as televisions, and the conditional blocking functionality required was fairly simple and inexpensive to implement. Most important, the FCC's authority to impose the V-Chip was clearly spelled out in a congressional mandate.²⁷⁸

The FCC is now venturing into public policy waters further removed from the congressional life raft. In the digital television

Tech Broadband Coalition, which advocates various polices including light regulation of new broadband networks. Matt Richtel, *Tech Industry Lobbies for More Broadband Use*, S.F. CHRON., June 10, 2003, at B2.

275. See John Markoff, *Led by Intel, True Believers in Wi-Fi Say It Will Endure*, N.Y. TIMES, July 14, 2003, at C1.

276. See *supra* Part II.C.

277. See *supra* Part II.C.2.

278. The V-Chip was included in the Telecommunications Act of 1996. See Telecommunications Act of 1996, Pub. L. 104-104, § 505, 110 Stat. 56, 136(1996) (codified at 47 U.S.C. §§ 151-170 (2000)).

("DTV") tuner proceeding, the FCC relied on an old law whose applicability to the requirements imposed was questionable.²⁷⁹ In the broadcast flag proceeding, it was forced to use its generic "ancillary jurisdiction" to justify a requirement with no direct statutory nexus.²⁸⁰ In the CALEA proceeding, the Commission proposed to apply to VoIP obligations that Congress expressly exempted information service providers from meeting. Finally, in its efforts to craft a regulatory approach to broadband Internet access, the FCC may have won judicial blessing for the blankest regulatory slate yet, Title I infrastructure regulation. All of these requirements have significant implications for the computer industry.

1. The DTV Tuner Mandate

The FCC's DTV tuner requirements are part of the extended transition from analog to digital television. In 1996, Congress agreed to give broadcasters additional spectrum for digital broadcasting at no charge, while allowing them to keep their current analog spectrum. The rationale was that only this way could the transition to digital high definition broadcasting occur without undue disruption to users and threats to free over-the-air TV. In return for this free spectrum, valued at the time at \$70 billion,²⁸¹ the broadcasters committed to rolling out digital TV on a defined schedule. Once the transition was completed, ostensibly by 2007, the broadcasters were to return their analog spectrum.²⁸²

The pace of digital TV deployment has not matched the schedule of the 1996 Act.²⁸³ Many broadcasters have upgraded their transmission facilities and begun broadcasting high definition digital signals. Those transmissions are useless, however, unless viewers have television sets equipped to receive them. Standard analog television sets are incapable of receiving in high definition. Many sets sold today, especially larger units, are "digital ready." However, even those sets require a digital tuner, which can either be built into the set or be part of a set-top box. About twenty-five million TV sets are

279. See *infra* note 284 and accompanying text.

280. See *infra* Part IV.A.

281. Editorial, *A Fix for the Broadcast Giveaway*, N.Y. TIMES, Oct. 11, 2000, at A34.

282. *Boob Tubes Going Digital by 2007*, REUTERS, Oct. 28, 2003, <http://www.wired.com/news/technology/0,1282,60997,00.html>.

283. See Eric A. Taub, *Pact Lifts an Obstacle to HDTV Transition*, N.Y. TIMES, Jan. 2, 2003, at G7 ("The switch from analog to digital high definition television has been slow and bumpy.").

sold every year in the United States.²⁸⁴ According to the FCC, there are eighty-one million TV sets in the United States not connected to a satellite or cable service, and that consequently will only receive digital signals over the air.²⁸⁵ Depending on market forces to convert those sets to digital reception could mean a long wait. And that wait would slow the return of broadcasters' valuable analog spectrum, not to mention the other benefits of digital broadcasting.

In order to speed the DTV transition, the FCC adopted a rule requiring television manufacturers to phase in digital tuners.²⁸⁶ Consumer electronics manufacturers objected strenuously to the FCC ruling, arguing that digital tuners would add hundreds of dollars to the cost of a set.²⁸⁷ The FCC, however, argued that prices would drop as volumes increased, so that the added cost would be minimal relative to the price of the device.²⁸⁸

The FCC relied for legal authority on the All Channel Receiver Act, a statute passed in 1962 to ensure that television sets could receive both VHF and higher-frequency UHF channels.²⁸⁹ The statutory language directed the Commission to "require that apparatus designed to receive television pictures broadcast simultaneously with sound be capable of adequately receiving all frequencies allocated by the Commission to television broadcasting."²⁹⁰ The FCC concluded the statute was sufficiently broad to cover digital channels, even though it was passed decades before the advent of digital broadcasting.²⁹¹ The United States Court of Appeals for the District of Columbia Circuit agreed, rejecting a challenge by the Consumer Electronics Association to the FCC's legal authority.²⁹²

284. See Review of the Commission's Rules and Policies Affecting the Conversion to Digital Television, 17 F.C.C.R. 15,978, 16,019 (second report and order and second mem. op. and order) (separate statement of Chairman Michael K. Powell) [hereinafter DTV Tuner Order].

285. *Id.*

286. The phase-in period runs from July 2004 to July 2007, depending on the size of the set.

287. See DTV Tuner Order, *supra* note 284, at 15,982.

288. See *id.* at 15,995.

289. All Channel Receiver Act of 1962, Pub. L. No. 87-529, 76 Stat. 15 (codified at 47 U.S.C. § 303(s) (2000)).

290. *Id.*

291. See DTV Tuner Order, *supra* note 284, at 15,989.

292. *D.C. Appeals Court Denies CEA Request to Overturn FCC DTV Tuner Rule*, 44 BROADCAST ENGINEERING ONLINE, Nov. 4, 2003, http://broadcastengineering.com/news/broadcasting_washington_dc_appeals/.

In the DTV tuner order, the FCC adopted a far-reaching mandate on a hardware product that is present in more than ninety-five percent of American homes.²⁹³ It did so to fulfill a congressional mandate and to effectuate well established public policy goals. However, it did so on its own initiative. And this action, ostensibly directed at televisions, will apply to any broadcast TV receiver, including computers and screens connected to DVRs or Media Center PCs. As described above, the line between televisions and computers is blurring and will blur more over time.²⁹⁴

2. The Broadcast Flag

Even more potentially far-reaching was the FCC's "broadcast flag" mandate. Another barrier to digital TV adoption is content owners' reluctance to permit programming to be transmitted digitally to homes. Because a digital stream offers pristine quality and does not degrade when recorded, movie studios and other content creators worry that viewers will copy and retransmit their programs in violation of copyright laws.²⁹⁵ These industries are worried they will go down the same path as the record industry, which is struggling with rampant growth of peer-to-peer file sharing networks and other mechanisms for digital copying of music. Viewers can record TV programming today, but only at the relatively low quality of analog broadcasts.²⁹⁶

To address the content owners' concerns, the FCC promulgated rules requiring broadcasters and TV set manufacturers to implement

293. Among U.S. households, 98.2% have at least one television set. See Media Info Center, Audience Penetration, <http://www.mediainfocenter.org/compare/penetration/> (last visited Nov. 16, 2005).

294. See *supra* Part III.A (discussing convergence).

295. Susan P. Crawford, *The Biology of the Broadcast Flag*, HASTINGS COMM. & ENT. L.J. 603, 609 (2004); John Borland, *FCC Nears Vote on TV "Broadcast Flag,"* CNET NEWS.COM, Oct. 28, 2003, http://news.com.com/FCC+nears+vote+on+TV+'broadcast+flag'/2100-1028_3-5097927.html; Susan P. Crawford, *Shortness of Vision: Regulatory Ambition in the Digital Age* (February 2005) (unpublished draft, on file with the North Carolina Law Review).

296. Content owners also resisted recording of analog broadcasts, via the VCR, when that technology first became commercially available. Motion Picture Association of American head Jack Valenti famously likened the VCR to the Boston Strangler. See *Home Recording of Copyrighted Works: Hearings on H.R. 4783, H.R. 4794, H.R. 4808, H.R. 5250, H.R. 5488, and H.R. 5705 Before the H. Subcomm. on Courts, Civil Liberties, and the Admin. of Justice of the H. Comm. on the Judiciary*, 97th Cong. 8 (1983) (statement of Jack Valenti, President, Motion Picture Association of America). The Supreme Court rejected content owners' entreaties to bar the VCR as a tool of contributory copyright infringement in the landmark "Betamax" case. See *Sony Corp. v. Universal City Studios*, 464 U.S. 417, 456 (1984).

a “broadcast flag.”²⁹⁷ Like the V-Chip, the broadcast flag involves a special signal embedded in the broadcast stream, mechanisms for identifying different kinds of content, and a device in the receiver capable of interpreting that information.²⁹⁸ The broadcast flag device in the receiver prevents the user from recording content if its owner does not wish to allow such recording.

The FCC was on shakier ground with the broadcast flag than with the DTV tuner mandate. In requiring tuners, the FCC was at least mandating digital TV capabilities as a way of fulfilling the congressional mandate to move toward digital TV. The broadcast flag actually removed a capability users have today with their televisions—the ability to record programming on VCRs. It brought the FCC squarely into a raging dispute about intellectual property in the digital age,²⁹⁹ an area where the Commission had not traditionally been active. Moreover, there was no specific authorizing statute like the All Channel Receiver Act. Several organizations filed a court challenge, asserting that the Commission had no authority to implement such a requirement.³⁰⁰ In May 2005, the United States Court of Appeals for the District of Columbia Circuit agreed, vacating the broadcast flag rules as an *ultra vires* assertion of agency authority.³⁰¹

The broadcast flag requirements would have applied to computers even more so than the V-Chip. The FCC’s order specified that the broadcast flag is required for “Covered Demodulator Products.”³⁰² A demodulator is essentially any device that can take a digital television broadcast signal and display it on a screen.³⁰³ In other words, it is a digital tuner. The broadcast flag therefore covered all digital DVRs, as well as personal computers like Windows Media Center PCs that have a digital tuner built in. Even mobile phones are

297. Broadcast Flag Order, *supra* note 35, at 23,552.

298. See *supra* Part II.C.2.

299. See LESSIG, *supra* note 57, at 187–88; Heather Green, *Are the Copyright Wars Chilling Innovation?*, BUSINESSWEEK, Oct. 11, 2004, at 210; Dan Hunter, *Culture War* (Aug. 10, 2004) (unpublished manuscript, on file with the North Carolina Law Review).

300. *Am. Library Ass’n v. FCC*, 406 F.3d 689, 691 (D.C. Cir. 2005).

301. *Id.* at 699.

302. 47 C.F.R. § 73.9002(b) (2005) (“No party shall sell or distribute in interstate commerce a covered demodulator product that does not comply with the demodulator compliance requirements and demodulator robustness requirements.”).

303. *Id.* § 73.9000(g) (defining “demodulator” as a component, or set of components, that is designed to perform the function of 8-VSB, 16-VSB, 64-QAM or 256-QAM demodulation and thereby produce a data stream for the purpose of digital television reception).

now becoming digital television broadcast devices³⁰⁴ and could therefore have fallen under the broadcast flag mandate. Moreover, emerging “place shifting” software from startups such as Sling Networks and Orb Networks can seamlessly move digital content from televisions to other devices such as PCs and phones.³⁰⁵ If the FCC regulated devices to ensure effective copy protection for digital broadcasts, it would have a hard time ignoring such developments.

Perhaps without intending to, the FCC has become a front in the battle between the computer industry and content owners over digital copy protection. This is not to say there is no nexus between the FCC’s actions and the identifiable communications policy goal of digital TV broadcasts, nor is it to assert that the broadcast flag is necessarily a bad idea.³⁰⁶ Both are contestable propositions. What is not contestable is that a conflict many cyberlaw scholars and major technology companies consider central to the future of the computer industry is being waged at the FCC.

The District of Columbia Circuit, at least temporarily, put a halt to such efforts. However, reading the court’s decision as a firewall, cabining the FCC’s regulatory adventures in computerland, would be a mistake. First, the decision did not reject the broadcast flag per se; it merely held that the FCC could not adopt it without further congressional authorization.³⁰⁷ The same forces that pushed the FCC to adopt the broadcast flag in the first place immediately mobilized in favor of legislation doing just that.³⁰⁸ Something like the broadcast flag, administered by the very same FCC, could well be mandated for digital TV transmission. Such a requirement would be more limited than the earlier broadcast flag, in that an express statutory authorization would put constraints on the FCC’s authority, and would involve elected officials in the policy deliberations over the issue. On the other hand, it would serve as express congressional ratification of the FCC’s entry into the digital intellectual property wars.

304. See Lucas van Grinsven & Astrid Wendlandt, *TV for Mobile Phones Almost Ready for Prime Time*, REUTERS, Feb. 23, 2005, <http://global2.factiva.com/ha/defavIt.aspx>.

305. Don Clark, *A New Tech Battle for the Home: As Industries Collide and Gadgets Morph, Consumers Face a Whirl of Choices*, WALL ST. J., Jan. 3, 2005, at B4.

306. See Molly S. Van Houweling, *Communications’ Copyright Policy*, 4 J. TELECOMM. & HIGH TECH. L. (forthcoming 2005) (arguing that the broadcast flag would have salutary effects in promoting innovation).

307. See *Am. Library Ass’n. v. FCC*, 406 F.3d 689, 691 (D.C. Cir. 2005) (“The principal question presented by this case is whether Congress delegated authority to the Federal Communications Commission . . .”).

308. See Tania Panczyk-Collins, *MPPAA To Urge Hill To Reinstate Broadcast Flag*, COMM. DAILY, May 16, 2005.

A close reading of the D.C. Circuit opinion, moreover, belies expansive interpretations of its significance. Judge Edwards, writing for the court, concluded the FCC's ancillary jurisdiction did not cover the broadcast flag for a narrow and technical reason: the flag operates *after* the digital broadcast signal is received, not *during* receipt of the transmission.³⁰⁹ In other words, there was nothing wrong with the FCC's expansive regulation of computer hardware as forms of communications "apparatus." The failing was the particular mechanism of the broadcast flag, which affected redistribution of content rather than its initial receipt over the air. In Judge Edwards's words, "[t]he Commission's general jurisdictional grant under Title I plainly encompasses the regulation of apparatus that can receive television broadcast content, but only while those apparatus are engaged in the process of receiving a television broadcast."³¹⁰

A device that operated while the digital stream was being received would pass muster under this standard. So, for example, the FCC could require all covered demodulators to include a chip disabling video output ports during receipt of digital broadcasts. Or it could require every covered demodulator to broadcast a unique ID that it encodes into the digital broadcast stream as a "digital watermark," allowing unauthorized copies of content to be traced back. Or the FCC could require a chip that encodes tagged digital broadcast streams into an encrypted format simultaneously with the process of decoding and displaying the stream for viewing. The Commission could not directly require other device manufacturers to build in digital rights management capabilities for decoding such encrypted content, because those other devices would not be "engaged in the process of receiving a television broadcast," but it would effectively preclude any device without such capabilities from functioning. Thus, even without congressional action, the FCC's ability to do something quite similar to the broadcast flag remains intact.

3. CALEA

Another example of the FCC's growing involvement with computers to serve public policy goals beyond competition is its implementation of CALEA. CALEA, passed by Congress in 1994, was designed to ensure that law enforcement agencies would retain their ability to intercept phone conversations, subject to legal

309. *See Am. Library Ass'n*, 406 F.3d at 691.

310. *Id.* at 692.

protections such as warrant requirements, in an era of digital communications.³¹¹ The FBI was concerned that digital transmission and encryption would make it more difficult to obtain information useful for law enforcement. CALEA mandated that telephone network operators modify their networks to allow law enforcement wiretapping and established a fund to defray the costs involved.³¹²

CALEA expressly applies only to telecommunications services, not to information services like Internet access.³¹³ The advent of VoIP, however, brings CALEA back into the spotlight. Law enforcement agencies expressed concern that, because VoIP providers had not previously been made subject to CALEA, VoIP calls would not be tappable. The Department of Justice and the FBI lobbied the FCC heavily to extend CALEA to VoIP before launching its comprehensive IP-Enabled Services proceeding in February 2004. In the end, the law enforcement agencies sent a letter strongly urging the FCC to address CALEA implications for VoIP in the near future.³¹⁴

The FCC's CALEA notice of proposed rulemaking, adopted in August 2004, proposed to require VoIP providers to meet the same sorts of wiretapping requirements as traditional telephone carriers.³¹⁵ In August 2005, the Commission issued an order adopting that general proposal, although it provided an eighteen-month transition period and sought further comment on exactly what kinds of companies would be subject to these new obligations.³¹⁶

The FCC's actions raise as many questions as they answer. As previously noted, VoIP services need not involve traditional phone companies in the middle of the network. VoIP capabilities can be built into hardware, software, and computing platforms like Microsoft Windows and Xbox. The FCC attempted to prevent unreasonable extension of CALEA by distinguishing "disintermediated" VoIP,

311. See 47 U.S.C. § 1002 (2000). Earlier statutory provisions required telecommunications carriers to cooperate with lawful intercepts by law enforcement. See 18 U.S.C. § 2518(4). CALEA expanded these requirements in light of the changing technology of the telephone network.

312. See 47 U.S.C. § 1002.

313. *Id.* § 1001(8)(C) (excluding information service providers from CALEA obligations).

314. United States Department of Justice, Federal Bureau of Investigation, and Drug Enforcement Administration, Joint Petition for Expedited Rulemaking, 22, RM-10865 (Mar. 10, 2004), available at <http://www.askcalea.com/docs/20040311.calea.jper.pdf>.

315. See Commc'ns Assistance for Law Enforcement Act and Broadband Access and Servs., 19 F.C.C.R. 15,676, 15,707-10 (2004).

316. See CALEA Order, *supra* note 237, ¶¶ 48-52.

which would not be subject to the requirements.³¹⁷ Purely computer-based applications, like Skype, would not have to comply. Though laudable in intent, this distinction creates yet another regulatory category with uncertain application to new VoIP applications.

The FCC may decide to step back from these proposals in the implementation and further notice of proposed rulemaking phase of the proceeding.³¹⁸ Even if it does, it will not escape the issues for long. Like the battle over digital content protection, the controversy over potential national security risks of the emergent digital information infrastructure will be with us for some time. Computers connected to networks are powerful, potentially dangerous tools. The same capabilities that make them engines of democratization in countries with repressive regimes also allow them to be used to threaten democracy in more open environments.

A decade ago, this fundamental cybersecurity question fed the controversy over U.S. government restrictions on export of strong encryption technology and the proposal for a government-designed “Clipper Chip” giving law enforcement back-door access to encrypted communications.³¹⁹ The locus of that dispute was the White House and national security agencies. Today’s equivalent, CALEA for VoIP, is being decided in the halls of the FCC.

4. *Brand X* and Title I Broadband Regulation

A final example shows how even efforts to limit the FCC’s authority may wind up expanding it. For several years, the Commission has struggled to develop rules governing broadband Internet access services. The difficulty the FCC faces is that the Communications Act prescribes different forms of regulation based on the nature of physical network connections.³²⁰ For example, telephone networks are subject to common carriage and other obligations under Title II of the Act, while cable television networks have a completely different regulatory framework under Title VI of the Act.³²¹ With digital convergence, however, these two networks can support functionally similar services. Both telephone and cable

317. *See id.*

318. The FCC’s willingness to impose traditional telecommunications rules on VoIP applications in the E911 context suggests such restraint is unlikely. *See supra* notes 235–37 and accompanying text.

319. Vandana Pednekar-Magal & Peter Shields, *The State and Telecom Surveillance Policy: The Clipper Chip Initiative*, 8 COMM. L. & POL’Y 429, 430 (2003).

320. *See supra* note 226.

321. *See supra* note 221.

companies now offer broadband Internet access in the form of digital subscriber line (“DSL”) and cable modem offerings. Under the FCC’s existing rules, however, these competing services face very different regulatory obligations. Moreover, broadband Internet access is a very different service and market from either telephone calls or multi-channel video programming for which those regulatory obligations were designed.

Recognizing these difficulties, the FCC under Chairman Powell embarked on an effort to create a new regulatory framework for broadband. Based on a belief that deregulation would create beneficial investment incentives, the Commission attempted, in separate proceedings, to reclassify both cable modem and DSL services as unregulated “information services.”³²² A significant consequence of the Commission’s treatment of cable modem service was that cable operators were not required to open their networks to independent Internet service providers, and telephone companies have been obligated to do for their DSL offerings. In 2003, the Ninth Circuit overturned the FCC’s cable modem classification. In *Brand X Internet Services v. FCC*,³²³ the court held that a decision in an earlier Ninth Circuit case obligated the FCC to treat cable modem offerings as “telecommunications services.”³²⁴

In June 2005, the Supreme Court reversed the *Brand X* decision.³²⁵ Writing for the Court, Justice Thomas applied the familiar *Chevron*³²⁶ deference standard for reviewing agency decisions to the FCC’s cable modem classification.³²⁷ He determined that the

322. Appropriate Framework for Broadband Access to the Internet over Wireline Facilities, 67 Fed. Reg. 9232 (proposed Feb. 28, 2002) (to be codified at 47 C.F.R. pt. 51) (concerning DSL service); Notice of Proposed Rulemaking, 17 F.C.C.R. 3019, 3024 (Feb. 14, 2002) (concerning DSL service); Inquiry Concerning High-Speed Access to the Internet over Cable and Other Facilities; Internet Over Cable Declaratory Ruling, 67 Fed. Reg. 18907 (Apr. 17, 2002); Appropriate Regulatory Treatment for Broadband Access to the Internet Over Cable Facilities, 67 Fed. Reg. 18848 (proposed Apr. 17, 2002) (to be codified at 47 C.F.R. pt. 76) (concerning cable modem services); Declaratory Ruling and Notice of Proposed Rulemaking, 17 F.C.C.R. 4798, 50 (Mar. 14, 2002) (concerning cable modem service). See generally Kevin Werbach, *Breaking the Ice: Rethinking Telecommunications Law for the Digital Age*, 4 J. TELECOMM. & HIGH TECH. L. (forthcoming 2005) (analyzing the FCC’s attempt to create a new broadband regulatory framework).

323. 345 F.3d 1120 (9th Cir. 2003), *rev’d sub nom.*, Nat’l Cable & Telecomms. Ass’n v. Brand X Internet Servs., 125 S. Ct. 2688 (2005).

324. *Id.* at 1132.

325. Nat’l Cable & Telecomms. Ass’n v. Brand X Internet Servs., 125 S. Ct. 2688, 2695 (2005).

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

327. *Nat’l Cable*, 125 S. Ct. at 2645.

Communications Act was ambiguous as to whether cable modem service constituted “offering” telecommunications functionality, which would require cable companies to provide unbundled access to their networks. Given this ambiguity, the majority concluded, the FCC permissibly decided to treat cable modem service as an unregulated information service.

For present purposes, this determination was not the most significant conclusion of the Supreme Court’s *Brand X* decision. Justice Thomas noted that the FCC had sought comment on whether, if cable modem and/or DSL services were not subject to Title II’s telecommunications regulation, the agency might be free to fashion a different set of rules under its Title I authority.³²⁸ “[T]he Commission remains free to impose special regulatory duties on facilities-based ISPs under its Title I ancillary jurisdiction,” he concluded.³²⁹ Just what those “special regulatory duties” might entail remains to be seen. Title I itself contains few, if any, limits. The restriction on which the broadcast flag case turned—that the FCC’s rules may only apply while communication by wire or radio is taking place—is no constraint at all for Internet-based networks, applications, and services, which are by definition engaged in such transmission.

Dissenting in *Brand X*, Justice Scalia, joined by Justices Souter and Ginsburg, pointed out the capacious hole that such Title I authority could create. The FCC could, he pointed out, apply the same kind of unbundling obligations it disclaimed under Title II through the alternate channel of Title I. “This is a wonderful illustration of how an experienced agency can (with some assistance from credulous courts) turn statutory constraints into bureaucratic discretions,” the dissent concluded.³³⁰

The FCC quickly responded to the opening created by *Brand X*. It adopted an order in early August 2005 effectively classifying DSL service offered by incumbent telephone companies as an information service, no longer subject to Title II unbundling requirements.³³¹ FCC actions to police anticompetitive behavior by the owners of last-mile

328. *Id.* at 2698.

329. *Id.* at 2708.

330. *Id.* at 2718 (Scalia, J., dissenting).

331. Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities, Report and Order and Notice of Proposed Rulemaking, 17 F.C.C.R. 3019 (2002) [hereinafter Appropriate Framework].

broadband networks will therefore have to arise, if anywhere, out of the mists of the Commission's general Title I authority.³³²

In that vein, simultaneously with its decision to eliminate unbundling obligations on DSL providers, the Commission issued a policy statement declaring its desire to "preserve and promote the open and interconnected nature of the public Internet."³³³ The policy statement lists four principles that the Commission will incorporate "into its ongoing policymaking activities."³³⁴ It is not entirely clear what this will mean in practice, since the Commission expressly declined to adopt rules to enforce these principles. However, given the reclassification of DSL as an information service, the only real way such principles could be the basis of an FCC decision is through an exercise of the Commission's Title I authority.

If, as now seems likely, the FCC continues down the Title I path, classification as an "information service" will mean different FCC regulation, not deregulation.³³⁵ To reiterate yet again, such FCC intervention may well produce possible beneficial policy outcomes in terms of economic efficiency or public interest criteria. It must be appreciated, though, that the FCC's direction following *Brand X* trades statutorily constrained regulation of a limited set of networks and services for discretionary regulation of a much broader range of computer-based activities. Virtually every end-user service associated with the Internet is, under the *Brand X* decision, an "information service."

IV. EVALUATING COMPUTER REGULATION

The problem with the FCC's computer regulation is not that it takes place. It is that there are no standards to guide FCC decisions about when and how to engage in such regulation. The Federal Computer Commission exists in the shadows of communications policy, its very existence routinely denied. As a result, there is no

332. The Commission acknowledged that, if it were to address anticompetitive behavior by broadband providers, it would do so by exercising its ancillary jurisdiction. *See id.* at n.287.

333. *See* Appropriate Framework, *supra* note 331.

334. *Id.* ("(1) [C]onsumers are entitled to access the lawful Internet content of their choice; (2) consumers are entitled to run applications and services of their choice, subject to the needs of law enforcement; (3) consumers are entitled to connect their choice of legal devices that do not harm the network; and (4) consumers are entitled to competition among network providers, application and service providers, and content providers.").

335. *See generally* Phillip J. Weiser, *Toward a Next Generation Regulatory Strategy*, 35 *LOY. U. CHI. L.J.* 41, 55 (2004) (discussing the debate over using Title I as the basis for a new broadband regulatory framework).

critical examination of the FCC's decisionmaking process. A closer look sheds light both on the perils of such unconstrained "mission creep" and on potential mechanisms to cabin FCC engagement with the computer world.

In many cases, the FCC had no choice but to include computers in its rules. Regulation of network interfaces in the telephone network necessarily implies regulation of the end-user devices connected to those interfaces. Regulation of wireless communication, though labeled "spectrum policy," is necessarily regulation of radio hardware. In other cases, FCC policy initiatives directed primarily at communications networks spill over to digital devices as with the broadcast flag and CALEA. The FCC is not consciously trying to regulate computers. That is, however, precisely what it is doing.

We should get over our hang-ups about the big, bad FCC killing the goose that laid the golden technology industry. After acknowledging that the FCC does regulate computer hardware and applications, the next step will be to identify patterns and common concerns running through the Federal Computer Commission's actions. There may not be a grand theory that incorporates all past and future decisions. Existing communications policy scholarship is as relevant to FCC actions governing the computer industry as any other rules. If, in fact, FCC computer regulation continues to grow in importance, it will eventually *become* communications policy.

Nonetheless, it is possible to make some initial normative comments about the Federal Computer Commission. One key issue concerns the scope of FCC authority. Because the FCC has disclaimed any interest in overseeing the computer industry, it has never had to consider how much involvement in that industry is too much. The risk is that a narrow decision will open the door to confusion and mischief in the future. The broadcast flag proceeding in particular shows the dangers of regulating computers indirectly. A second important question is how the Federal Computer Commission will fare in light of the current reevaluation of basic tenets of communications policy. The "layered model" for reconceptualizing communications regulation in the digital age provides a hospitable framework for considering future computer regulation.³³⁶

336. The layered model analyzes communications policy issues based on distinct "layers" of network-based functionality. See Werbach, *supra* note 226, at 57-67.

A. *“Instrumentalities, Facilities, Apparatus, and Services”*

The FCC's recent decisions open the door to significantly more unconstrained involvement in the computer industry. This is because the Commission is forced to call upon its most capacious statutory authority to justify its decisions. And that authority may be quite capacious indeed. In the future, the Commission and those it affects may find it difficult to pull back and distinguish appropriate from inappropriate interventions.

Buried deep within the Communications Act are three seemingly innocuous provisions that potentially give the FCC legal authority to regulate computers in virtually any way it chooses. First, the end of the definitions section includes a provision clarifying the scope of “all interstate and foreign communication by wire or radio” subject to FCC jurisdiction.³³⁷ Second, under 47 U.S.C. § 153(33), the FCC's authority includes all incidental “instrumentalities, facilities, apparatus, and services” used for the “receipt, forwarding and delivery of communications.”³³⁸ That provision has been interpreted as giving the FCC “ancillary jurisdiction” over matters not expressly defined in the statute, but “reasonably ancillary to the effective performance of [its] various responsibilities.”³³⁹ Finally, 47 U.S.C. § 154(i) is a broad catch-all clause allowing the FCC to make any rules necessary for execution of its functions, so long as they are not inconsistent with the remainder of the statute.³⁴⁰

Read together, these are strikingly broad provisions. The Commission can adopt any “necessary” rule “reasonably ancillary” to a responsibility involving “instrumentalities, facilities, apparatus, and services” associated with “communication by wire or radio.” Every computer with a network connection would seem to be included. At first glance, ancillary jurisdiction might seem to apply only where the nexus between the explicit statutory authority and the intended action was clear. However, the Commission used that language to justify original regulation of cable television in the 1960s, well before Congress passed a law governing cable.³⁴¹ Even though cable was

337. See 47 U.S.C. § 152(a) (2000).

338. *Id.* § 153(33). It is worth noting that, Judge Edwards's opinion in the broadcast flag case notwithstanding, this language concerns not just the initial receipt of the transmission but also subsequent forwarding and delivery, which the broadcast flag was designed to limit.

339. *United States v. Sw. Cable Co.*, 392 U.S. 157, 178 (1968).

340. 47 U.S.C. § 154(i) (“The Commission may perform any and all acts, make such rules and regulations, and issue such orders, not inconsistent with this chapter, as may be necessary in the execution of its functions.”).

341. *Sw. Cable*, 392 U.S. at 181.

neither a telephone service covered under Title II of the Communications Act nor a wireless broadcast service under Title III, the Supreme Court upheld the FCC's authority to regulate it in *United States v. Southwestern Cable Co.*³⁴²

The Court's logic in *Southwestern Cable* was that an unregulated cable industry would undermine the FCC's existing regulatory structure for broadcasting. Given the rapid convergence of computing and communications, the same argument can be made for a wide range of computer-based services. Unregulated VoIP might undermine the regulatory structure for basic telephone service. Unregulated copying of digital broadcast programming could undermine the regulatory structure for digital television. Unregulated use of peer-to-peer file sharing software on a Media Center PC could have exactly the same effect. Unregulated implementation of protocol in Microsoft's new version of Windows, which will be used for various communications functions, could undermine FCC rules as well. It is difficult to see where the slippery slope ends.

Similarly, the "instrumentalities" clause of § 152(33) might be limited to actual communications equipment, such as broadcast transmission towers. The Commission, however, took a broader view in the broadcast flag proceeding.³⁴³ The FCC and Department of Justice's brief in support of that decision asserted that the instrumentalities clause gave the FCC jurisdiction over any hardware "associated with the overall circuit of messages sent and received" via communications.³⁴⁴ It is notable that, before the broadcast flag decision, the FCC never directly regulated a class of end-user consumer electronics hardware without an express statutory direction. The D.C. Circuit's decision limited the Commission's ability to regulate such devices, but did not preclude such regulation so long as it is contemporaneous with the receipt of communications streams.

B. Hardware Regulation in a Layered World

Communications regulation was traditionally built around a series of service-based vertical silos. Telecommunications was subject to one regulatory regime, broadcasting to another, cable TV to yet

342. *Id.* at 181.

343. Broadcast Flag Order, *supra* note 35, at n.74 (relying on the "instrumentalities" provision of the Communications Act for authority).

344. Brief for Respondents at 17, *Am. Library Ass'n v. FCC*, 406 F.3d 689 (D.C. Cir. 2005) (No. 04-1037).

another, and so forth. This stovepipe approach to regulation made sense in the days when each service was tied to its own type of network. With the digital migration, however, applications are no longer linked to networks. They can compete against similar applications delivered over different infrastructures.

In this environment, the old vertical categories become an impediment to sound decisionmaking. The FCC is forced to regulate based on service classifications, which imply a laundry list of obligations, even if many are not appropriate. Meanwhile, a single offering such as broadband Internet access is subject to very different regulatory treatment depending on the company that provides it. Critical “interface regulation” questions, such as whether to require “network neutrality” for broadband access providers, are difficult to fit into this vertical paradigm.³⁴⁵

An alternative approach is to frame regulation based on the way networks actually operate. Engineers describe data networks in terms of layers: elements of functionality that stack on top of one another.³⁴⁶ Instead of vertically integrated silos, data networks operate through open interfaces that connect different levels of functionality. Regulators can similarly think in terms of horizontal layers. By assigning functionality to layers such as physical (basic transport infrastructure), logical (routing and addressing), applications (software functionality for end-users), and content (information going in and out of those applications), regulators can move beyond artificial distinctions based on legacy environments. This “layered model” has become a leading proposal for reforming communications policy.³⁴⁷

The layered model is a framework; it need not dictate specific policies or outcomes.³⁴⁸ Where it does help is in distinguishing different types of questions and highlighting issues that would otherwise be overlooked. In the case of FCC computer regulation,

345. See Wu, *supra* note 58, at 149; McCullagh, *supra* note 58 (examining the debate over the openness of Internet access, addressing concerns expressed to the FCC about proposed regulation of Internet services).

346. Werbach, *supra* note 226, at 58–59.

347. See *id.* Robert Frieden, *Adjusting the Horizontal and Vertical in Telecommunications Regulation: A Comparison of the Traditional and a New Layered Approach*, 55 FED. COMM. L.J. 207, 214 (2003); Douglas C. Sicker & Joshua L. Mindel, *Refinements of a Layered Model for Telecommunications Policy*, 1 J. TELECOMM. & HIGH TECH L. 69, 69–70 (2002); Werbach, *supra* note 226, at 64–65; Richard S. Whitt, *A Horizontal Leap Forward: Formulating a New Communications Public Policy Framework Based on the Network Layers Model*, 56 FED. COMM. L.J. 587, 594 (2004).

348. See *supra* note 336 and accompanying text.

the layered model offers at least two benefits. It separates out regulation of physical infrastructure, software applications, and content, even when all three are elements of the “computer industry” or “the Internet.” And it emphasizes the importance of interfaces between layers as a critical competitive choke point.

One reason for the dread over a Federal Computer Commission is the assumption that it would apply the kind of heavy-handed pricing and content regulation to which telephone companies and broadcasters have traditionally been subjected. Computers are either outside the FCC’s regulatory ambit, in which case they are totally free from communications regulation, or they are subject to a panoply of stifling obligations. This all-or-nothing dynamic is a direct consequence of the vertical silo approach.

With a layered model, regulatory obligations can be targeted to functionality at specific layers. Concerns about, say, whether VoIP providers will interconnect so that any user can reach any other, are different from questions about physical networks or content. If there is a desire to require computers capable of receiving television programming to support digital rights management capabilities, that should not raise the possibility that those computers will be subject to unrelated FCC rules or charges.

C. Living with the FCC

Thoughtful regulation can facilitate private market activity, rather than thwarting it. For this to happen, though, market actors must have a good understanding of where and how government will act. Nothing is more disruptive to a well-functioning competitive market than a surprise change in government policy, frustrating investment-backed expectations.

The FCC and the private interests that seek to influence its decisions should cease pretending that computers are magically immune from the business and social policy issues that brought the FCC into being. Regulators are right to be wary about quashing dynamic, competitive markets. At some point though, willful neglect of the implications of convergence will do more harm than good. Computers are communications devices, and communications devices are computers. There is no magic line that keeps FCC rules away from one side of that equation.

The challenge, therefore, is to evaluate how and why the Federal Computer Commission does its job. Regulators should try to apply the right tools to the right problems. They should not ignore situations where computer-based innovations justify explicit

exemptions or temporary reprieves from existing rules or those where new technology justifies removal of old rules from all market participants. No one wants to see a scenario in which Microsoft or Google have to jump through the same hoops to offer new services that regulated communications carriers did for decades. However, if those companies and their compatriots in the technology industry do not engage the regulatory process, the outcome may be even worse.

In the end, computers are as much the solution as the problem for the FCC. Precisely because they are so flexible, they can adapt to address policy concerns in a more nuanced way than traditional communications service providers. VoIP providers, for example, are developing various mechanisms to provide emergency services access that is comparable to or better than the 911 functionality of the traditional telephone network.³⁴⁹ Online services such as AOL provide parental content blocking tools that are more effective and widely used than the hardware-based V-Chips in televisions.³⁵⁰ Software-defined radios and other unlicensed devices will squeeze more capacity out of the airwaves. VoIP and IPTV, if allowed to flourish, will create healthy competitive pressure on incumbents in the phone and television industries.

The best way for the FCC to reduce the burdens its regulatory oversight imposes may therefore be to broaden, rather than curtail, its computer-oriented activities. It can only do so, however, through honest recognition that there is no magic line dividing the regulated communications world from the unregulated computer world.

CONCLUSION

Like it or not, the Federal Computer Commission is an established reality. And there are many reasons to like it. Far from being a dangerous adventure into uncharted territory, the FCC's engagement with the computer industry has been, by and large, a natural outgrowth of its traditional mission. Without the Federal Computer Commission, the Internet may have been smothered by

349. See News Release, Fed. Comm'ns Comm'n, FCC Internet Policy Working Group to Hold First "Solutions Summit" on Thursday, March 18, 2004, (Feb. 12, 2004) (announcing FCC industry summit on E911 solution for VoIP); Matt Hines, *Net Phone Company's Answer to 911*, CNET NEWS.COM, May 27, 2004, http://www.news.com.com/2102-7352_3-5221705.html?tag=st.util.print.

350. See Jay Munro, *At Home: AOL Parental Controls*, PC MAG., Sept. 25, 2001, available at <http://www.pcmag.com/article2/0,1895,26620,00.asp>; Parental Controls, <http://www.aol.com/info/parentcontrol.html> (last visited Nov. 16, 2005).

monopolistic telephone companies, and exciting wireless data technologies might not have seen the light of day.

There is certainly room to argue that current or future FCC decisions go too far in shaping the computer industry. Convergence provides not just freedom from old constraints in communications policy but also an opportunity to learn from old mistakes. It is no longer controversial that well-functioning, competitive markets are superior to heavy-handed government allocation of resources in virtually every respect. The right approach to many of the policy questions described herein—computer-oriented or otherwise—may be a less intrusive, smaller regulator, or one that relies more on private negotiations or general purpose antitrust review to achieve its goals.

Just stop pretending that FCC can never stand for Federal Computer Commission.

