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NEW PARADIGMS AND THEIR IMPACT ON THEORIES GOVERNING THE PUBLIC'S RIGHT TO SPECTRUM ACCESS

PATRICK S. RYAN*

* Adjunct Professor, University of Colorado at Boulder School of Law and Interdisciplinary Telecommunications Program and Guest Professor, Katholieke Universiteit Leuven. The author is most grateful to Jos Dumortier for his support to write this while in Leuven at ICRI (www.icri.be). Further, the author is indebted to the following people for feedback and critique: Carolyn Daughters, Hans Graux, Andy Johnson, Wendy McCallum, Peggy Valcke, and Phil Weiser.

I. FROM EXCLUSIVE USE TO PUBLIC RIGHT

Electromagnetic spectrum[1] enables countless variants of personal communication—person-to-person and collective, commercial and non-commercial—across many different media (*e.g.*, computers, telephones, pagers, televisions, PDAs and radios). The phenomenal growth in the Internet, mobile telephones, and many forms of video transmission demonstrates the attraction of communication, in all of its electronic forms, to very broad sectors of society. Enjoyment of the electromagnetic spectrum is now ingrained in our human character. People seek information and entertainment by talking and listening, by watching and learning, and by sending short messages, pictures, and videos to one another.

These communication forms have increasingly become wireless. For the past several decades, lawmakers have considered many options for allocating spectrum and managing wireless products, and thus far they have done so by regulating the electromagnetic spectrum itself. These laws have not been static, however, and over time they have followed—sometimes with long delay—various economic and technological principles that have sharply conflicted with each other. Although spectrum allocation policies ostensibly situate the "public interest" at the forefront, regulation is mired in thousands of pages of rules and statutes that attempt to stipulate in explicit terms what the public *cannot* do.[2] Of course, lawyers are on hand to interpret what the

1. Here, "electromagnetic spectrum" is used as a term for wireless communications, that is, all forms of communication that take place without the aid of a hard physical conduit (*i.e.*, communications that travel through the airwaves). In fact, there has been great debate as to what to call the electromagnetic spectrum and the airwaves. For example, Aristotle called spectrum "the ether." *See* Manfred Lachs, *Thoughts on Science, Technology and World Law*, 86 AM. J. INT'L L. 673, 687 (1992) (describing radio waves using Aristotle's term "ether"). Nobel Prize winning economist Ronald Coase questioned this "ether" paradigm, preferring instead to describe the electromagnetic spectrum as a "tunnel." As he observed, "[t]here is some doubt whether the *ether* exists," further noting that the spectrum's "properties correspond exactly to those of something which does *not* exist, a tunnel without any edges." Ronald Coase, *The Federal Communications Commission*, 2 J.L. & ECON. 1, 33 (1959) [hereinafter Coase, *Federal Communications Commission*]. Kevin Werbach points out that Einstein once compared the spectrum to a "cat" and then immediately removed the cat from the equation. Kevin Werbach, *Supercommons: Toward a Unified Theory of Wireless Communication*, 82 TEX. L. REV. 863, 882 (2004). Werbach quotes Einstein as follows:

> You see, wire telegraph is a kind of a very, very long cat. You pull his tail in New York and his head is meowing in Los Angeles. Do you understand this? And radio operates exactly the same way: you send signals here, they receive them there. The only difference is that there is no cat.

Id.

2. *See* PATRICIA AUFDERHEIDE, COMMUNICATIONS POLICY AND THE PUBLIC INTEREST (1999). The author describes the complexity and vagueness of the "public interest" basis for telecommunications regulation, noting that "[t]he public is endlessly invoked in communications policy, but rarely is it consulted or even defined." *Id.* at 5. She further adds

public *can* do, and they do so by reading and interpreting the thousands of pages of rules that the government has promulgated,[3] by opining on arcane procedures for obtaining licenses to transmit upon the spectrum, and even forming opinions on what can be said and who can say it. Sometimes they are famously wrong.[4] Conflating our ever-changing understanding of technology into a coherent set of regulations has proven

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that "[t]he law [related to 'public interest'] lurched and stumbled into existence, driven forward by a combination of ideological and technological changes to the terms of existing compact between big business and big government . . . government regulation evolved parochially . . . typically with a powerful allegiance to incumbents." *Id.* at 9.

3. There are thousands of pages that are relevant to wireless regulation. For example, Federal Communications Commission (FCC) Part 2 is a massive collection of technical data spawning several hundred pages. It covers international regulations, nomenclature and assignment of frequencies, and the complete table of frequency allocations. FCC Part 68 regulates the connection of terminal equipment to the telephone network. Any device that is regulated under Part 68, which sets the limits for intentional and unintentional radiation, must also comply with the provisions of Part 15. Part 68 is important for future wireless applications, because any change in FCC regulation or policy is likely to affect all of the interrelated FCC compliance regulations simultaneously. Even the most banal wireless applications (such as cordless phones) are regulated under both Part 68 (for their connection to the network) and Part 15 (for their radiation limitations in broadcasting capacity), as well as under Part 2 (for their placement in the frequency allocation zoning map). *See* FCC Frequency Allocations and Radio Treaty Matters; General Rules and Regulations, 47 C.F.R. pt. 2 (2003); FCC Radio Frequency Devices, 47 C.F.R. pt. 15 (2003); FCC Connection of Terminal Equipment to the Telephone Network, 47 C.F.R. pt. 68 (2003).

4. One of the most fascinating areas where the First Amendment clashes with FCC regulations is the legal advice associated with what can and cannot be said over the airwaves. Broadcast networks know that private citizens may bring actions to the FCC. There is an irony between what is legal and what is not, as illustrated by the 2004 Super Bowl controversy that erupted when Justin Timberlake pulled off part of Janet Jackson's bustier and exposed one of her breasts. This somewhat bizarre scene would have been legal in cable format because the signals over cable are not "public." It was perhaps illegal, however, only because it was sent over the public airwaves. While it may seem unwarranted for the FCC to police such incidents, Congress requires it to do so. This responsibility is derived from outmoded regulation that distinguishes the way the airwaves are regulated (*i.e.*, the FCC can regulate airwave content) from the way that wires and cables are regulated (*i.e.*, the FCC is prohibited from regulating wire and cable content to the same degree). In most parts of the United States, there is almost ninety percent penetration in cable or satellite (like cable, satellite content is not regulated in the same way), and most people cannot tell the difference between cable and non-cable stations. For example, when flipping through stations, there is no real way to differentiate between channel 5, an airwave-based FCC station (*e.g.*, ABC), and channel 23, a cable, non-content-regulated station (*e.g.*, MTV). Both stations come through on cable these days in most homes, and the handheld television remote control used to change channels does not differentiate between FCC-regulated material that also is transmitted over the airwaves and less-restrictive cable content. *See Transatlantic Cleavage*, THE ECONOMIST, Feb. 5, 2004, at 52 (describing the Jackson event and noting the FCC inquiry). *See also Hearing on Broadcast Decency Before the Senate Comm. on Commerce Science, and Transp.*, 108th Cong. (2004) (Statement by Kathleen Q. Abernathy, FCC Commissioner), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-243910A1.pdf. Abernathy discusses the FCC's role in broadcasting: "The law holds that broadcasters, because they make licensed use of publicly owned airwaves to provide programming to the general public, have a statutory obligation to make sure that their programming serves the needs and interests of the local audience." *Id.*

to be nearly impossible. It is now time for the government to shift gears and to set up an overarching technology-neutral set of principles that delineate the public's *rights* to use the electromagnetic spectrum. The public already knows—for the most part—what it can not do with the spectrum. But government has never clarified the public's *rights.*

A. Dealing the Cards, and Valuing the Deal

In this article we will see that the regulation of the electromagnetic spectrum has relied upon multiple and conflicting principles that have been *de rigueur* at a given point in time, but which have been replaced by newer theories. Technology is changing so rapidly that regulators and their regulated markets are having great difficulty keeping up. Yet, more and more people want to use wireless; and counter-intuitively, government is fighting a battle of attrition. In spite of increased use of wireless products, exclusive frequencies and licenses are losing value as the world begins to recognize that new technologies shatter the concept of exclusivity. Tellingly, Gregory Staple and Kevin Werbach argue that the spectrum portfolios of incumbent operators (*e.g.*, those who paid billions for exclusive licenses) will be significantly devalued in coming years:

> Incumbent mobile operators and broadcasters will almost certainly face greater competitive pressures from both licensed and unlicensed alternatives. The spectrum portfolios of incumbent operators, especially the large cellular phone companies, may be the first to be devalued. Manufacturers, on the other hand, may see an enormous stimulus from the new spectrum environment. If nothing else, lower entry barriers mean that more service providers will want their equipment. Greater demand, in turn, may stimulate price reductions for devices and other equipment.[5]

So, assuming Staple and Werbach are right, as consumers continue to find new ways to communicate and enjoy the electromagnetic spectrum, markets and consumers will start shifting away from a focus on exclusively licensed spectrum and instead increasingly direct their attention towards new products and new forms of communication. We might, then, expect to see regulation shift from the spectrum resource itself to the devices that use it, because, as we will see, it no longer makes sense to control the resource itself. Thus far, however, the rights of the citizens who use these devices are still not set forth in any widely recognizable, overarching legal doctrine. As a result, policymakers lack

5. Gregory Staple & Kevin Werbach, *The End of Spectrum Scarcity*, IEEE SPECTRUM, Mar. 1, 2004, at 52.

the formal guidance needed to ensure the protection of the rights of the public in this burgeoning technological arena.

The idea of regulating the spectrum at the wireless device level, of course, has already been convincingly argued by many scholars and technologists.[6] As an extension of this idea, some experts even question the more fundamental aspect of whether governmental control of the spectrum may violate the First Amendment of the Constitution.[7] Nonetheless, there is still a fundamental vacuum to be filled, that of a policy or set of rights that would protect citizens' access to use the wireless spectrum. In light of this dilemma, it seems logical that we should pose and then attempt to answer the following question: Should the wireless spectrum (and the public's right to speak freely upon it) simply be protected by the First Amendment, or should it be endowed with a *sui generis* set of rights?[8]

B. Reshuffling the Deck

This article will consider one possible *sui generis* proposition—the Wireless Device Bill of Rights—and in doing so, we will expose several fundamental bases of "command-and-control" spectrum regulation that are hopelessly out of touch with current technology and scientific understanding. We will see that economists, technologists, and lawyers have had an ongoing struggle with many fundamental and conflicting questions of science and policy. For example: should computing be a

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6. *See, e.g.*, Yochai Benkler, *Overcoming Agoraphobia: Building the Commons of the Digitally Networked Environment*, 11 HARV. J.L. & TECH. 287, 347 n.239 (1998) (describing "smart" versus "dumb" devices and the economic tradeoffs associated with each); Durga P. Satapathy & Jon M. Peha, *Performance of Unlicensed Devices with a Spectrum Etiquette*, 1 PROC. OF IEEE GLOBECOM, Nov. 1997, at 414, *available at* http://www.contrib.andrew.cmu.edu/usr/dsaq/globecom97.pdf (describing spectrum etiquette proposals and the role of devices in emerging wireless technologies); LAWRENCE LESSIG, CODE AND OTHER LAWS OF CYBERSPACE 184 (1999). Lessig notes the distinction between "dumb" and "smart" receivers and compares that distinction with protocol recognition in the Internet. Just as different machines have different addresses, the Internet sorts out and receives only those packets intended for a given receiver, thus requiring a network of devices of varying intelligence. *Id.*

7. LESSIG, *supra* note 6, at 182; Yochai Benkler & Lawrence Lessig, *Net Gains*, NEW REPUBLIC, Dec. 14, 1998; Stuart Minor Benjamin, *The Logic of Scarcity: Idle Spectrum as a First Amendment Violation*, 52 DUKE L.J. 1, 18-24 (2002) (offering various examples where government regulation of communication media other than the wireless spectrum—such as printing presses—would be considered unconstitutional).

8. The Bill of Rights consists of the first ten original amendments to the U.S. Constitution, which were passed by Congress on September 25, 1789, and ratified on December 15, 1791. The First Amendment protects free speech and freedom of religion. Specifically, it states that "Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the Government for a redress of grievances."

centralized public utility, or should it be subjected to a free market? Are telephone networks a natural monopoly, and should they be a government-owned public utility? Can telephone lines (and the services sold upon them) be "unbundled"? Can wireless spectrum be traded like property? The answers to most of these questions seem obvious to us today. However, they were not always so evident. Why? Because the answers depend on the evolution of economic thought and the proving of technology to support it. The Wireless Device Bill of Rights, a proposal initiated by technologist Bran Ferren[9] (and later advanced by technologist Kalle Kontson),[10] cuts through this confusing cycle by setting forth Constitutional-esque, technology-neutral protections and rights regarding the use of wireless media. These rights are intended to function irrespective of the economic, technological, or political fad *du jour*. Further, we will investigate whether the automation of the principles from a Wireless Device Bill of Rights could one day be computerized and even replace many of the functions now performed by governmental organizations like the Federal Communications Commission (FCC). As we will see, these ideas may at times seem radical, even though the FCC itself has flirted with them, just as it has begun to question other fundamental matters, such as whether or not spectrum itself is in fact scarce.[11]

If there is presently an over-arching governmental policy regarding wireless spectrum, it is that of "command-and-control."[12] This spectrum

9. *See* FCC TECHNOLOGICAL ADVISORY COUNCIL, REPORT: FIFTH MEETING OF THE FCC TECHNOLOGICAL ADVISORY COUNCIL 11 (Jun. 28, 2000), *available at* http://www.fcc.gov/oet/tac/tac_report000628.pdf [hereinafter TAC, FIFTH REPORT] (noting Bran Ferren's leadership in advancing the "Bill of Rights Initiative" through the FCC's Technological Advisory Council (TAC)).

10. *See* Kalle R. Kontson, Critical Review of the Wireless Device Bill of Rights, Presentation to the Spectrum Management Working Group (Dec. 4, 2002) (transcript available at http://www.fcc.gov/oet/tac/TAC_Examing_Bill_of_Rights_4Dec02.ppt). Many others are invariably involved in the process, mostly through the FCC's TAC, described *infra*.

11. The electromagnetic spectrum is an instantly renewable, non-depletable resource, and new digital ways of using it greatly question the "doctrine of spectrum scarcity," which has been used as a regulatory basis for governmental control of the spectrum for the past ninety years. *See generally* Jonathan Wallace & Michael Green, *Bridging the Analogy Gap: The Internet, the Printing Press and Freedom of Speech*, 20 SEATTLE U. L. REV. 711 (1997) (providing a broad overview of the doctrine of spectrum scarcity and its development under U.S. law); Benjamin, *supra* note 7 (arguing that new technologies may invalidate the scarcity rationale for spectrum management). *See also* Philip J. Weiser, *Regulatory Challenges and Models of Regulation*, 2 J. ON TELECOMM. & HIGH TECH. L. 1, 7 (2003) (describing the FCC's proactive approach to spectrum policymaking and discussing academic literature that questions the notion of scarcity).

12. *See* FCC Chairman Michael K. Powell, Broadband Migration III: New Directions in Wireless Policy, Remarks at the Silicon Flatirons Telecommunications Program, University of Colorado at Boulder (Oct. 30, 2002), *available at* http://www.fcc.gov/Speeches/Powell/2002/spmkp212.html [hereinafter Powell, Broadband Migration III] (describing the "command-and-control" philosophy behind FCC licensing).

management philosophy requires corporate "children" to be entreated by their governmental "parent" for approval of virtually anything that takes place across the spectrum.[13] Accordingly, since control is still maintained at the resource level (*i.e.*, the frequencies themselves) rather than at the device level (*i.e.*, the people and devices that use the spectrum), it is extremely difficult for corporations—or citizens—to implement changes to make better use of unused spectrum.[14] Yet, in spite of this difficulty it has become increasingly clear that "smarter" devices are helping to remedy problems arising from the government's control over the electromagnetic resource.[15]

The extraordinary growth of the kind and number of wireless devices on the marketplace prompts questions about the best way to manage conflicting needs regarding the various uses of these devices (*e.g.*, security, communications, and education). Since the spectrum is a natural and a national resource,[16] it seems fitting that the potential of

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13. *Id.* In his 2002 speech, FCC Chairman Powell describes the governmental parent analogy in the following way:

> While the wireless world has changed rapidly, government spectrum policy continues to be constrained by allocation and licensing systems from a bygone era. *Change is inhibited by the "mother may I" phenomenon*—businesses must go to the FCC for permission before they can modify their spectrum plans to respond to consumer demand.

Id. (emphasis added).

14. For example, today, a television broadcaster in Pueblo, Colorado, who does not use his allocated TV frequencies cannot choose to instead use those frequencies for delivering wireless Internet services to the community. This is the very subject of a Notice of Proposed Rule Making that the FCC has opened, which might allow for "smart" devices to use otherwise idle television frequencies. *See* Unlicensed Operation in the TV Broadcast Bands, *Notice of Proposed Rule Making*, 19 FCC Rcd. 10,018 (2004).

15. One practical example of how "intelligence" at the device level has helped to improve communications is through the proliferation of multi-mode phones. It was once believed that network operators had to make a choice, for example, between TDMA, CDMA, GSM, or other technologies; once this choice was made, consumers were then "locked in" to this chosen technology. However, multi-mode computerized phones, called "tri-band" phones and emerging "quad-band" phones, can now switch quite seamlessly between networks. Thus, the problem with using wireless phones on different standards was not resolved at the core (*i.e.*, the network), but was instead resolved through the use of more powerful, more agile telephones at the edges that are capable of adapting to their environment. *See How The Radio Changed its Spots; Smart Radio*, THE ECONOMIST, Dec. 4, 2003, at 31, *available at* http://www.economist.com/displaystory.cfm?story_id=2246155 (describing the various wireless standards that are available, and noting that software defined radio is helping to remedy the confusion).

16. In the United States, President George W. Bush has declared the electromagnetic spectrum to be "a vital and limited national resource." *See* Press Release, White House, Memorandum on the Spectrum Policy for the 21st Century (June 5, 2003), *available at* http://www.whitehouse.gov/news/releases/2003/06/20030605-4.html. Some international organizations and European countries have made an even more explicit "natural resource" argument. For example, the North Atlantic Treaty Organization (NATO) has proclaimed that "[f]rom the NATO perspective the radio spectrum has always been an extremely valuable finite natural resource of each nation." *See* NATO FREQUENCY MANAGEMENT BRANCH,

that resource should be maximized. In doing so, would it be sensible one day to completely eliminate entire governmental divisions like the FCC, just as free market systems have replaced centralized economic structures (*e.g.*, GOSPLAN, the Soviet state planning commission)[17] that once regulated farm production levels and prescribed the number of cars to be manufactured? As we will discuss in Sections III and IV, creating a mechanism that frees the spectrum from centralized government oversight and control could (and should, perhaps must) involve the assignment of straightforward rules, rights and obligations for spectrum usage—rules that are flexible enough to evolve as technology evolves and that may well require formal documentation. These rules, rights and obligations could be formed in a Wireless Device Bill of Rights.

II. THE REPEAL OF GROSCH'S LAW

In order to appreciate the potential power of Constitution-esque, device-level regulation, we might begin our discussion with a review of the ways in which our perception of computing devices has dramatically changed over the past decades. Such an inquiry will help us appreciate the feasibility of programming principles into miniature devices, as well as help us understand how it may be possible in the near future to enshrine certain principles within small but highly sophisticated computing devices.

RESPONSE TO THE COMMISSION OF THE EUROPEAN COMMUNITIES GREEN PAPER ON RADIO SPECTRUM POLICY, *available at* http://europa.eu.int/information_society/policy/radio_spectrum/docs/green_paper_all/87_nato.pdf (last visited Mar. 22, 2005). Also, the European Parliament has stipulated that the "radio spectrum is a . . . natural resource." *See* EUROPEAN COMMISSION, NEXT STEPS IN RADIO SPECTRUM POLICY - RESULTS OF THE PUBLIC CONSULTATION ON THE GREEN PAPER, (Nov. 10, 1999), *available at* http://europa.eu.int/comm/information_society/policy/spectrum/pdf/radio_en.pdf. The Irish Government has called the wireless spectrum an "international natural resource," and it manages that resource within a department entitled "Communications Marine & Natural Resources." *See* IRELAND STATE DEPARTMENT OF COMMUNICATIONS, SPECTRUM POLICY/STRATEGY FOR THE DEVELOPMENT OF DIGITAL SOUND BROADCASTING AND OTHER SERVICES: A CONSULTATION PAPER (Aug. 17, 2004), *available at* http://www.dcmnr.gov.ie/NR/rdonlyres/5B834F9B-4A9B-400F-A0A5-105C390B0244/0/dab180804.doc. The Czech Republic asserts that the wireless spectrum is a "natural resource that is, according to the Constitution of the Czech Republic, [the] property of the State." *See* CZECH REPUBLIC MINISTRY OF TRANSPORT AND COMMUNICATIONS, SUPPLEMENT TO THE NATIONAL TELECOMMUNICATIONS POLICY OF THE CZECH REPUBLIC 24 (translation from Czech, version Apr. 26, 1999), *available at* http://www.mdcr.cz/text/archiv/NTPang-appendix.doc.

17. GERALD FAULHABER & DAVID FARBER, SPECTRUM MANAGEMENT: PROPERTY RIGHTS, MARKETS, AND THE COMMONS 5 (TPRC Program Paper No. 24, 2002) *available at* http://tprc.org/papers/2002/24/SPECTRUM_MANAGEMENTv51.pdf (comparing the present spectrum regulatory process to centralized planning akin to that of the GOSPLAN era).

The scientific movement towards miniaturization not only has changed the way that we see the world, but it has also altered the important sociopolitical contexts that influence that vision. In order to understand the future of wireless communications, we must reflect on the development of computing technology that promises to change how we use the electromagnetic spectrum in the future. The history of computing is, of course, fascinating, especially considering the incredibly rapid development of computing technology over the past 50 to 60 years.

Today, we tend to believe that the smaller the technological device, the better.[18] In the past, however, the opposite was held to be true. In fact, by the middle of the 20th century, many prominent scientists thought there would be a natural tendency for computers to evolve into massive centralized units that would control the world's processing power. At the time, this concept was considered an emerging scientific "law," one that was perhaps most famously articulated by scientist Herbert Grosch, who in 1950 postulated that computer power increases by the square of its cost. Consequently, per Grosch's law, computers would *necessarily* be developed into the largest, most costly machines.[19] According to his predictions, the entire world would use fifty-five mainframe supercomputers, and these computers would allocate their processing power among "dumb" terminals and keypunch machines.[20] During the decades it took to disprove this theory,[21] however, respected pundits darkly predicted that a single organization would eventually control all of the world's data, a scenario with autocratic overtones that seemingly had the potential to harm society. Indeed, scientists and

18. Miniaturization is most often associated with the growth of personal computers that took place from the 1970s through the 1980s, and it is most often expressed in terms of "Moore's law." Moore's law, developed by Intel founder Gordon Moore in the 1970s, holds that microprocessor performance will double every eighteen months. *See Caught in the Net*, THE ECONOMIST, Mar. 27, 1997, at S16 (describing Moore's law and indicating that it has so far proven to be correct).

19. Grosch expressed his theory as follows: "I believe that there is a fundamental rule . . . giving added economy only as the square root of the increase in speed—that is to do a calculation ten times as cheaply you must do it one hundred times as fast." This argument has been interpreted to mean that natural technological evolution would lead to "supercomputing" as a norm. *See* Young M. Kang et al., *Comments on "Grosch's Law Re-Visited: CPU Power and the Cost of Computation,"* 29 COMM. ACM. 779 (1986) (subscription req'd).

20. GEORGE GILDER, TELECOSM: HOW INFINITE BANDWIDTH WILL REVOLUTIONIZE OUR WORLD 160 (2000) [hereinafter GILDER, TELECOSM] (describing Grosch's law and Grosch's prediction that only fifty-five mainframes would be required to meet the world's information needs).

21. *See, e.g.*, Kang et al., *supra* note 19, at 789. Taking the then-recent reevaluation of Grosch's law one step further, the authors find evidence of vastly different slopes for different classes of computers—such as PC-type computers—and the utility of an additional variable known then as the "IBM factor" or the "IBM-compatible factor." The analysis indicates that Grosch's law no longer applies to minicomputers and PCs.

journalists wrote volumes of text arguing that government regulation was needed to prevent such a state of affairs.[22] As George Gilder explains:

> Imagine . . . that it is 1971 and you are the chairman of the new Federal Computer Commission. This commission has been established to regulate the *natural monopoly* of computer technology as summed up in Grosch's law . . . the owners of these machines would rule the world of information in an ascendant information age. By the Orwellian dawn of 1984, Big Brother IBM would have established a new digital tyranny, with an elite made up of the data-rich dominating the data-poor.[23]

Fears of a "new digital tyranny" led to very real reservations about the use of this powerful new communications technology.[24] Happily, however, Orwellian predictions regarding mainframe supercomputers owned and managed by a single corporate entity have not come to pass, and Grosch's law has since been "repealed."[25] These days, minicomputers and PCs dominate the computing industry, not mainframe supercomputers. As a result, the computing power of a machine that occupied the entire

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22. In the 1960s and 1970s, Grosch's law was still highly regarded by scientists and policy analysts, and respected papers continued to espouse his centralized computing "law." While some challenged his theories, the scientific community on the whole still had great faith in them. *See e.g.*, Martin B. Solomon, Jr., *Economies of Scale and the IBM System/360*, 9 COMM. ACM 435 (1966) (concluding that larger computers offer the greatest economies of scale and indicating that "Grosch's Law, stated in the 1940s, appears to be prophetic"); A. E. Oldehoft & M. H. Halstead, *Maximum Computing Power and Cost Factors in the Centralization Problem*, 15 COMM. ACM 94 (1972) ("In addition to increases in the level of technology, one can expect for any given level, a return to scale approximated by Grosch's Law"). *But see* Charles W. Adams, *Grosch's Law Repealed*, 8 DATAMATION 38 (1962) (Adams suggests that Grosch's law may not be accurate. Adams' work was part of an early movement that ultimately led to the repeal of Grosch's law.).

23. GILDER, TELECOSM, *supra* note 20, at 160-61.

24. *See* Patrick S. Ryan, *War, Peace or Stalemate: Wargames, Wardialing, Wardriving and the Emerging Market for Hacker Ethics*, 9 VA. J.L. & TECH. 3 (2004), *available at* http://www.vjolt.net (describing the development of personal computing and discussing both the resulting public paranoia regarding computer hacking and the emerging ethical guidelines being developed by users, hackers, and industry since the 1980s).

25. Roger A. Clarke, *Information Technology and Dataveillance*, 31 COMM. ACM 498 (1988), *available at* http://doi.acm.org/10.1145/42411.42413. The author discusses trends away from centralized computing and the subsequent "repeal" of Grosch's law:

> With the repeal of Grosch's law during the 1970s, economies of scale no longer apply to processing power. Other factors that are militating against the old centralist notions are the systems software overheads of large-scale centralized processing; risks associated with single-site activities; standardization of local and site networking standards; fast-growing capabilities of network workstations and servers; decreasing cost and increasing portability and robustness of dense storage. . . . The once-obvious tendency of computers to centralize information, and hence power, is quickly giving way to the looser concepts of networking and dispersion.

Id.

floor of a building in the mid-1940s can be easily surpassed today by the computing power of an inexpensive toy.[26]

At the time that Grosch's law held rein, however, the U.S. government embraced regulatory models that dovetailed conveniently with this flawed hypothesis. As George Gilder describes in the preceding passage, it was at one time a widely-held belief that the computer industry was a "natural monopoly."[27] Furthermore, Gilder reminds us that at one time we thought that competition in that industry would *harm* consumers rather than benefit them. This was because of a bankrupt view that consumers would gain greater benefit from a single company whose economies of scale could produce the massive computing platform considered necessary under Grosch's law.[28] In fact, this rationale was applied to both the telephony industry *and* the computer industry, for in the middle of the 20th century, many saw the two as "public utilities." It was thought that telephony, like computing, required large networks and Grosch-like centralized switching; and further, that private industry could not be trusted with the public nature associated with the size and operation of these inevitably massive, monopolistic structures.[29] Bigger was better, and accordingly, to be big meant that government must impose heavy regulation, lest the consumer would be crushed by monopolistic evils.

The United States was not alone in its acceptance of Grosch's "bigger is better" hypothesis. In point of fact, some countries went a step further and actually built their own computer utilities. For example, the

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26. In 1944, the first large-scale automatic digital computer began operation. Built by IBM and Harvard professor Howard Aiken, the Mark I was fifty-five feet long and eight feet high. THE WORLD ALMANAC AND BOOK OF FACTS (Ken Park ed., 2002).

27. The concept of a "natural monopoly" has been credited to John Stuart Mill. 1 JOHN S. MILL, PRINCIPLES OF POLITICAL ECONOMY 132-54 (W. J. Ashley, ed., Augustus M. Kelly 1961). In his famous work, Mill emphasizes the problem of wasteful duplication of transmission facilities that can occur in certain utility services. French economist Leon Walras, further developed the connection between natural monopoly and regulation, applying the theory to the construction and operation of railroads. *See* LEON WALRAS, ÉTUDES D'ÉCONOMIE SOCIALE: THEORIE DE LA REPARTITION DE LA RICHESSE SOCIALE (1936).

28. *See* Daniel F. Spulber, *Deregulating Telecommunications*, 12 YALE J. ON REG. 25, 31 (1995). Spulber defines a natural monopoly as a situation that exists when "a single firm can supply the market at lower cost than can two or more firms." *Id.* He further notes that a "sufficient condition for the cost function to have the natural monopoly property is for the technology to exhibit economies of scale, which are present if the marginal costs of production are less than the average costs of production over the relevant range of output." *Id.*

29. This idea is covered extensively in GERALD W. BROCK, TELECOMMUNICATION POLICY FOR THE INFORMATION AGE: FROM MONOPOLY TO COMPETITION 170, 172 (1994). The author describes the mindset of the "natural monopoly" and public utility era: "The Department of Justice and Economists viewed the industry in simple terms. There was a well-defined local exchange service that was a natural monopoly. . . . There was not a full debate between rival conceptions of the industry." *Id.*

French government, embracing the principles of Grosch's law, developed a massive, centralized, government owned and operated computer system called the Minitel.[30] The Minitel operated through the public telephone network (also owned by the government), and its databases contained information such as telephone numbers, movie listings, games, horoscopes, news articles and the like, making it much like a primitive Internet.[31] Today, the French Minitel has been replaced in large part by the Internet, and while the system is not entirely defunct, it is safe to say that the concept of a government-run computing system is.[32]

Happily, the U.S. government did not go as far as to create a Minitel-like monopoly in information systems, and in fact, Congress passed laws that forged splits within the computing and telephony industries.[33] Accordingly, once regulators realized that telephone

30. The Minitel, operated by France Télécom, was based on a centralized computing model and offered text-only services to many (then state-run) telecommunications company subscribers. *See* Russel Carlberg, *The Persistence of the Dirigiste Model: Wireless Spectrum Allocation in Europe, á la Française*, 54 FED. COMM. L.J. 129, 136 (2001). Carlberg notes:

> The French invention of the Minitel, a computer terminal connected to the telephone that was widely available in French homes in the 1980s, is a prime example of the dirigiste tradition at work. . . . [T]he Minitel system was a dry run at an internet before the Internet was invented. When the French government introduced it as part of France Telecom's phone services, the Minitel was revolutionary.

Id.

31. *See* Mark Cooper, *Open Communications Platforms: The Physical Infrastructure as the Bedrock of Innovation and Democratic Discourse in the Internet Age*, 2 J. ON TELECOMM. & HIGH TECH. L. 177, 200 (2003). Cooper notes that the Minitel was a failed alternative to the Internet. The author explains: "The design would have been more like the French analogue to the Internet—Minitel. But Minitel is not the Internet. It is a centralized, controlled version of the Internet, and it is notably less successful." *Id.*, at 200 n.94. The failure of the Minitel, however, was not always evident. As late as 1995, there was considerable debate as to whether the Internet (a decentralized system) or the Minitel (a centralized, government-controlled one) would prevail. *See* Carlberg, *supra* note 30, at 136-37 (describing the different theories in the mid-1990s, as well as the various features of the Minitel services).

32. Even though the Minitel has migrated to the Internet, France Télécom, the French national telephone company, no longer makes the same profits that it once did—and at one time, its monopoly position earned it great profits. *See* Pierre Delaroche, *Les Bons Calculs du Minitel*, L'EXPRESS, June 26, 1997, at 71 (reporting that France Télécom made so much profit from the seven million subscribers to its home-grown online service, the Minitel, that the company chose the service over the Internet). *See also* http://www.minitel.com/, which is France's Internet version of the Minitel. Services are still sold, such as the "i-minitel" product, which can be downloaded and installed from the site.

33. Many observers in the 1950s and 1960s anticipated that this interdependence of computers and communications would inevitably result in the creation of "computer utilities." *See* D. F. PARKHILL, THE CHALLENGE OF THE COMPUTER UTILITY 153-55 (1966) (predicting that, in the future, computer utilities will bring the power of a large computer center to homes and offices). The FCC initiated a series of "computer inquiries," analyzing if (1) telephone companies would offer services that would compete with those sold by computer manufacturers and service bureau firms, while (2) these same manufacturers and firms would remain dependent on the telephone company for reasonably priced communication facilities

networks were *not* natural monopolies—a notion that has only been formally been accepted within the past couple decades[34]—competition in the telephony industry was first encouraged and later *enforced* through the government breakup of AT&T.[35]

The U.S. government did not stop with the AT&T breakup. Shortly thereafter, it promoted competition in the computer industry by *prohibiting* corporate telephone monopolies from developing computer services and equipment.[36] One scholar has convincingly argued that the government's action here is responsible for creating the conditions for the present Microsoft monopoly in personal computing operating systems.[37] In most technological markets, however, the "natural monopoly" paradigm has now been replaced by the much more powerful (and sensible) "essential facilities doctrine,"[38] and the telecommunications

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and services. *See generally* Steve Bickerstaff, *Shackles on the Giant: How the Federal Government Created Microsoft, Personal Computers, and the Internet*, 78 TEX. L. REV. 1 (1999).

34. *See* Paul Baran, Visions of the 21st Century Communications: Is the Shortage of Radio Spectrum for Broadband Networks of the Future a Self Made Problem?, Keynote Address at the 8th Annual Conference on Next Generation Networks, Washington, D.C., (November 9, 1994) (transcript available at http://www.dandin.com/pdf/baran1994.pdf) [hereinafter Baran, *Spectrum Shortage*]. Baran explains the difficult transition from a "natural monopoly" model to other models. His observations were prophetic, particularly for 1994, when many of the regulatory "unbundling" experiments had not yet been proven. The author explains:

> When a better technology comes along that allows the feasibility of multiple suppliers, it invalidates the natural monopoly argument. The end of a monopoly is rarely a swift process and it is never painless—particularly if it were well run and highly profitable. After long running anti-trust battles the US telephone monopoly, AT&T, was in part fractured into seven local area monopolies and competition was permitted in the long distance telephone and data communication field. This was an extremely controversial move at the time, and was met by all sorts of Chicken Little sky falling predictions. The sky didn't fall. Instead we saw a major increase in effectiveness in long distance services, fostered by the new competition. And this was perceived as being so successful by other countries, that similar long distance services are being deregulated throughout the world, even by those nations with a long history of sole governmental control.

Id.

35. *See* United States v. Am. Tel. & Tel. Co., 552 F. Supp. 131 (D.D.C. 1982) (judicial approval of the Modified Final Judgment and Consent Decree that broke up the Bell system).

36. The Bell companies were prohibited from manufacturing any Customer Services Equipment. *Id.* at 227-28.

37. Bickerstaff, *supra* note 33, at 6.

38. *See* Jerry A. Hausman & J. Gregory Sidak, *A Consumer-Welfare Approach to the Mandatory Unbundling of Telecommunications Networks*, 109 YALE L.J. 417, 467 (1999). The article describes the scope and purpose of the essential facilities doctrine as follows: "The essential facilities doctrine addresses scenarios in which a company owns a resource that other firms absolutely need to provide their own services. Properly understood, the doctrine is a common-law rule concerning the obligation (if any) of a vertically integrated firm to sell an input to competitors in the downstream market." *Id.* In the United States, the Federal courts first applied the essential facilities doctrine in MCI Communications Corp. v. Am. Tel. &

knot, once thought to be inevitably and permanently tied, has been (or is in the process of being) "unbundled."[39] Indeed, because of this regulatory paradigm shift, consumers have seen the price of a telephone call drop sixty percent from 1984 to 1999, while phone usage has increased almost sixty-eight percent during that same period.[40] Furthermore, studies show that the wide variety of service providers has led to much greater customer satisfaction.[41] Clearly, decentralization has directly translated into many consumer benefits.

Nonetheless, at one time we not only thought that bigger, centralized computing structures were more efficient, but we also thought that the continued growth of such structures was *inevitable.* In addition, prominent scientists like Herbert Grosch convinced us that massive-scale supercomputing was an unavoidable scientific endgame. Perhaps not unexpectedly, then, these centralized paradigms are not so easily dismissed. Even as recently as 1996, some well-respected computer scientists were still basing arguments on related aspects of Grosch's bankrupt hypothesis. For example, Bob Metcalfe, the inventor of Ethernet and the founder of 3Com Corporation, boldly declared that the public Internet could not scale, contending that it would ultimately implode in an immense cyber-collapse.[42] Of course, Metcalfe's forecasted Internet collapse has not transpired. In fact, just the opposite has occurred: Internet capabilities have expanded, and the Internet now even supports distributed computing models.[43] Put another way, the sum

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Tel. Co., 708 F.2d 1081, 1132-33 (7th Cir. 1983). The essential facilities doctrine has also been applied in Europe. *See* Commission Decision on Sea Containers & Stena Sealink, 94/19/EC, 1994 O.J. (L 15/8). *See also* Leonard W. H. Ng, *Access and Interconnection Issues in the Move Towards the Full Liberalization of European Telecommunications*, 23 N.C. J. INT'L L. & COM. REG. 1, 22-28 (1997) (describing the application of the essential facilities doctrine in European telecommunications).

39. *See* Alexander C. Larson & Margarete Z. Starkey, *Unbundling Issues and U.S. Telecommunications Policy*, 6 STAN. L. & POL'Y REV. 83 (1994) (describing unbundling and proposing where and how it should be applied in the telecommunications market).

40. Peter VanDoren & Thomas Firey, *Facts and Fictions about Deregulation*, *in* CATO REVIEW OF BUSINESS AND GOVERNMENT 1 (June 27, 2002).

41. *Id.*

42. Metcalfe thought that the Internet could not scale to the point that it has. He instead predicted its total collapse, noting that "Private TCP/IP networks are avoiding the public Internet in droves . . . . Now the nation's great research universities, the builders and first use of the internet–Harvard among them–are preparing to join the desertion of the sinking ship." Bob Metcalfe, *You Really Think That the Internet Isn't Collapsing? Universities Are Bailing Out*, INFOWORLD, Nov. 11, 1996, at 48.

43. Distributed computing is a programming model in which processing occurs in many different places (or nodes) around a network. Processing can occur wherever it makes the most sense, whether on a server, website, personal computer, handheld device, or other smart device. As early as the mid-1980s, the concept really started to take off. *See* Kenneth Kleinrock, *Distributed Systems*, 28 COMM. ACM 1200 (1985). The author states that the growth of distributed systems had "attained unstoppable momentum," describing the importance of distributed computing and calling for additional research. *Id.* He further notes the relevance

of power at the edges of a network greatly exceeds early predictions about the sum of power of immense, centralized processing "brains."[44] Thus, miniaturization has enabled these computers and devices at the edges to continue to become smaller and, at the same time, more powerful.[45]

Today, the widely supported and quite possibly unshakable theory on the future of computing is that power is derived through mesh networks.[46] Mesh networks increase capacity with each node that they add. In a wireless mesh network, each component itself becomes a wireless "base station."[47] Although centralized server-based computing[48]

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of distributed systems in nature, where there are no centralized supercomputer-like brains and where many small devices work together to perform a common task:

> How did the killer bees find their way up to North America? By what mechanism does a colony of ants carry out its complex tasks? What guides and controls a flock of birds or a school of fish? The answers to these questions involve examples of loosely coupled systems that achieve a common goal with distributed control.

Id. Interestingly, the author also suggests later in the article that Grosch's law may, in fact, not be defunct; however, the law must be thought of in a completely different context if it is to be salvaged. Kleinrock suggests that we consider Grosch's law within the framework of a "family" of computers (not unlike the Borgs seen today on the television series *Star Trek*), contending that, "Each family has a decreasing cost per unit of capacity as capacity is increased. . . once in the family, it pays to purchase the biggest member machine in that family." *Id.* at 1209.

44. One of the more fascinating examples of distributed computing is an experiment that uses thousands of computers to analyze radio waves from other planets to attempt to discover signs of extraterrestrial life. Launched by the University of California at Berkeley, the Search for Extraterrestrial Intelligence (SETI) project uses the computing power of individual users' machines that run a program downloaded from the SETI server. Specifically, SETI runs sophisticated number-crunching algorithms and data analyses when each computer activates its screen saver. Basic information can be found at the SETI website (still hosted by Berkeley). SETI@Home, *at* http://setiathome.ssl.berkeley.edu/ (last visited Mar. 22, 2005). Also, a series of articles published in THE ECONOMIST enthusiastically describes the project and its growth over the past several years. *See Aliens on Your Desktop*, THE ECONOMIST, Apr. 18, 1998, at 78; *Radio Telescopes: Thinking Big*, THE ECONOMIST, Apr. 24, 1999, at 78; *Divide and Conquer*, THE ECONOMIST, Jul. 29, 2000, at 77; *Out of This World*, THE ECONOMIST, Jan. 13, 2001, at 80; *Computing Power on Tap*, THE ECONOMIST, June 23, 2001 at 16; *The Next Big Thing?*, THE ECONOMIST, Jan. 17, 2004, at 57.

45. There are important limits to how small the microchip may become. *See generally Thus Thin and No Thinner?*, THE ECONOMIST, Apr. 8, 1999, at 80 (describing nanoelectronics and the work on electronic components whose dimensions are measured in nanometers).

46. *See* Sebastian Rupley, *Wireless: Mesh Networks*, PC MAG., July 1, 2003, at 104, *available at* http://www.pcmag.com/article2/0,1759,1130864,00.asp (noting that the core characteristic of a mesh network is that there is not a central orchestrating device; instead, each node is outfitted with radio communications gear and acts as a relay point for other nodes).

47. *See* Thomas Krag & Sebastian Büettrich, *Wireless Mesh Networking*, O'REILLY NETWORK MAG., Jan. 22, 2004, *available at* http://www.oreillynet.com/pub/a/wireless/2004/01/22/wirelessmesh.html.

48. In server-based computing, the main applications are based on a centralized server, and system managers need to update only one or two mainframes. The "terminals" can be notebooks, or they can be smaller devices with sufficient processing capacity to connect with the servers. Probably the best way to recognize the advantages of server-based computing is by reviewing the promotional materials provided by the companies that sell the technology. Hewlett Packard is one of the largest of such companies. *See* "HP Server Based Computing -

continues to hold some attraction, processing power continues to grow at the edges even while it is also growing at the core.[49] With this reality in mind, few scientists still believe that large-scale centralized computing makes sense, at least not in the same way that it did in the 1950s. These devices at the edges will take on a fundamental degree of importance in the new spectrum paradigm, especially as we let go of the centralized broadcasting model—as we now have in television and radio, where receivers of information lack a response capability—and instead embrace multiple smaller, intelligent nodes (as we have with digital cellular and Wi-Fi). These digital communications devices at the network's edge are not just passive receivers, they are also miniature computers, and with every passing year these computers can process data more efficiently.

III. THE BARAN PRINCIPLES

A. The Kindergarten Protocol

Proposals that embraced spectrum reform and the use of digital communications received a powerful endorsement in 1994 when Paul Baran, the inventor of packet switching,[50] spoke at the 8th Annual

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Solution Overview," *available at* http://activeanswers.compaq.com/ActiveAnswers/Render/1,1027,4737-6-100-225-1,00.htm (last visited Oct. 18, 2004).

49. There are, of course, important variants in the visions of how future computing systems will develop. For example, Larry Ellison, founder of Oracle Corporation, believes that there will be a continued and growing place for centralized computing—or, better said, centralized *sourcing* of software and data. The major difference between Ellison's and Grosch's ideas is that Ellison believes in increasingly powerful, inexpensive computers at the edges, although it may be more efficient to store the data elsewhere. Ellison explains his idea as follows: "Here's what I want. . . . I want a $500 device that sits on my desk. It has a display and memory but no hard or floppy disk drives. . . . My files are stored on a server somewhere. . . . The data I get from the network is the latest, too, and I pay for it all though my phone bill because that's what the computer really is—an extension of my telephone." ROBERT X. CRINGELY, ACCIDENTAL EMPIRES 358 (Harper Business 1996) (1992) (quoting Larry Ellison). *See also* Leslie Helm, *The Cutting Edge—Oracle's CEO Divines a New Future for Computing*, L.A. TIMES, Mar. 1, 1999, at 1 (discussing Ellison's view that the age of personal computers will soon be replaced by a new age of "[I]nternet computing").

50. Paul Baran has been credited by many as the inventor of packet switching, and he has received many prestigious awards for his efforts. *See, e.g.*, *And the Winners Were . . .*, THE ECONOMIST, Dec. 3, 2003, at T31. The article describes the world's greatest innovators in five technology categories and recognizes Paul Baran for the invention of packet switching and for the impact that his invention has had on modern technology. As the article explains:

> In 1959, Dr. Baran began to think about ways to make America's communications infrastructure resistant to a nuclear attack. He proposed using a system called "distributed adaptive message block switching", known today as packet switching. This involves breaking digital information into small chunks, or packets, and sending them separately over the network, thus doing away with centralised switching centres and enabling the network to work even when partly destroyed. His idea was initially ignored and was only given its first proper test in 1969, when

Conference on Next Generation Networks in Washington, D.C. In his speech, Baran noted that the wireless resource can be used by everyone without government-mandated restrictions on who gets to use what frequency and for what purpose. His point was that digital devices at the edge need to be smart, but they need not be geniuses. Ironically, Baran borrowed from the parent/child model that characterizes "command-and-control" today, and he flipped it on its head. For Baran, an open access policy would not require massive centralized processors, nor centralized control, and in fact it can be implemented so long as the rules that we all learned as children in kindergarten are applied. These seven rules, quoted verbatim as Baran articulated them, are as follows:

> Rule #1. Keep away from the big bullies in the playground. (Avoid the strongest signals.)
>
> Rule #2. Share your toys. (Minimize your transmitted power. Use the shortest hop distances feasible. Minimize average power density per Hertz.)
>
> Rule #3. If you have nothing to say, keep quiet.
>
> Rule #4. Don't pick on the big kids. (Don't step on strong signals. You're going to get clobbered.)
>
> Rule #5. If you feel you absolutely must beat up somebody, be sure to pick someone smaller than yourself. (Now this is a less obvious one, as weak signals represent far away transmissions; so your signals will likely be attenuated the same amount in the reverse direction and probably not cause significant interference.)
>
> Rule #6. Don't get too close to your neighbor. Even the weakest signals are very strong when they are shouted in your ear.
>
> Rule #7. Lastly, don't be a cry baby. (If you insist on using obsolete technology that is highly sensitive to interfering signals, don't expect much sympathy when you complain about interfering signals in a shared band.)[51]

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it was used as the basis for ARPANET, an experimental computer network that later grew into the Internet.

Id.

51. Baran, *Spectrum Shortage*, *supra* note 34.

Of course, metaphors and analogies used to describe wireless communications are sometimes inherently imperfect. Here, we're sharing Baran's seemingly tongue-in-cheek application of childhood aphorisms to the wireless spectrum. Moreover, later in this article we will take these metaphors and analogies a step further in order to argue that the use of computer technology can, in effect, eliminate the need for many functions of the FCC altogether. Needless to say, such contentions certainly stretch the limits of reason. It seems obvious that the application of simple behavioral maxims, the kind conveyed to young children, cannot enable spectrum reform, and the FCC cannot be replaced by a box of wires and computer chips. These ideas clearly seem somewhat extreme or, at the very least, a bit absurd.

Or are they? Let us reflect back on another "radical" concept related to spectrum management.[52] In 1959, economist Ronald Coase devised the idea of trading the wireless spectrum in the same way that all other commodities, such as real estate, are traded. At the time, all frequencies were allocated through centralized planning initiatives, and auctions were seen as an impossibility. Thus, when Coase presented his idea to the FCC, the FCC commissioners had trouble taking him seriously and accused him of making a "big joke." As Coase explains in an article written almost forty years later:

> In 1959 . . . the FCC decided to hold hearings on the future of broadcasting and I was asked to testify. You can imagine what I proposed. When I concluded, the questioning was opened by

52. It should be noted here that the ensuing discussion on R. H. Coase in this section is inspired by Thomas Hazlett's famous historical organization and subsequent recounting of the 1996 conference that he hosted at the Marconi Conference Center in California. The proceedings were published in Volume 41, Issue 2 of the JOURNAL OF LAW & ECONOMICS in 1998. Unfortunately, the conference did little to place the work of Coase and other propertization advocates within the context of simultaneous—but inseparable—developments, such as Paul Baran's packet switching initiatives and other important scientific advances that were already well established by 1998 (*e.g.*, the Internet). The one important exception was a provocative article by Eli Noam—one of nineteen contributors to the conference—who argued that "[i]t will not be long, historically speaking, before spectrum auctions may become technologically obsolete, economically efficient, and legally unconstitutional," further emphasizing that that "now, new digital technologies, available or emerging, make new ways of thinking about spectrum use possible that were not possible in an analog world . . . ." Eli Noam, *Spectrum Auctions: Yesterday's Heresy, Today's Orthodoxy, Tomorrow's Anachronism. Taking the Next Step to Open Spectrum Access*, 41 J.L. & ECON. 765, 765, 769 (1998). Noam highlighted the genius of Paul Baran and the application of packet switching to the Internet, as well as its extension to wireless, in order to alleviate scarcity problems. *Id.* at 769. Noam's article was in large part dismissed by the conference attendees. One participant brushed aside the technological developments that Noam used to support his arguments, asserting that "[t]he bottles of Chateau Coase 1959 remain eminently bold, dry and flavorful, and it is far too early to throw them out of the cellar." Timothy J. Brennan, *The Spectrum as Commons: Tomorrow's Vision, Not Today's Prescription*, 41 J.L. & ECON. 791, 792 (1998).

> Commissioner Philip S. Cross. His first question was: "Are you spoofing us? Is this all a big joke?" I was completely taken aback but I managed to reply: "Is it a joke to believe in the American economic system?"[53]

Shortly after presenting his idea to the FCC, Coase wrote a paper on the same subject upon invitation by the RAND Corporation (America's largest think tank and an important non-governmental policy organization);[54] however, RAND ultimately decided not to publish the paper. Again, in his 1998 retrospective analysis of the initial denunciation of his theories, Coase explains:

> I was invited by some of the economists at the RAND Corporation to come to Santa Monica and to help to prepare a report on Problems of Radio Frequency Allocation. This I did together with two economists at the RAND Corporation, Bill Meckling and Jora Minasian. A draft report was prepared which advocated a market solution. This draft report was circulated within RAND. The comments on it were highly critical and as a result, the report was suppressed.[55]

In the 1998 article, Coase goes on to discuss a memorandum that he received from a senior RAND fellow regarding his open market proposal. In the memorandum, the RAND fellow wrote, "I know of no country on the face of the globe—except for a few corrupt Latin American dictatorships—where the 'sale' of the spectrum could even be seriously proposed."[56] In short, the FCC did not consider Coase's proposal to be feasible, and the largest and most influential think tank in the world dismissed that same proposal as an undemocratic and disreputable scheme. It seemed that Coase's ideas were doomed to failure.

And they were, at least initially. Happily, however, Ronald Coase was able to publish his theorem in 1959-60,[57] and after economists came

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53. Ronald H. Coase, *Comment on Thomas W. Hazlett: Assigning Property Rights to Radio Spectrum Users: Why did FCC License Auctions Take 67 Years?*, 41 J.L.& ECON. 577, 579 (1998) [hereinafter: Coase, *Comment on License Auctions*].

54. RAND is a policy think tank set up after World War II, as the RAND website notes, to "further and promote scientific, educational, and charitable purposes, all for the public welfare and security of the United States of America." *See* THE RAND CORP., HISTORY AND MISSION, *at* http://www.rand.org/about/history/ (last visited Mar. 22, 2005) (discussing RAND's origins and its history). RAND claims to be four times larger than the second-largest think tank, The Brookings Institution. *See* THE RAND CORP., THE PGRS EXPERIENCE, *at* http://www.prgs.edu/experience/ (last visited Mar. 22, 2005).

55. Coase, *Comment on License Auctions*, *supra* note 53, at 579.

56. *Id.*

57. Coase wrote a series of articles, including *The Federal Communications Commission* and *The Problem of Social Cost*, published in 1959 and 1960, respectively, by the University

to embrace his ideas—over a period of several decades—the Swedish Nobel Foundation awarded him the ultimate intellectual revenge against his early skeptics: the 1991 Alfred Nobel Prize in Economics. Today, spectrum trading discussions in the United States and in Europe are heavily influenced by Coase's market theories. Further, his radio spectrum real estate model is the basis for wireless regulation in countries worldwide that auction licenses and that are now considering the implementation of trading rights.[58] (Interestingly, these countries include the United States and many European nations, not just "corrupt Latin American dictatorships.")

B. Does Baran's Protocol Repeal Coase's Theorem?

Returning, then, to our discussion of Paul Baran's "kindergarten rules," let us compare his protocol (which advocates spectrum openness) with Coase's 1959 spectrum-as-property concept (which advocates relatively closed trading rights). Both Baran and Coase had some involvement with RAND at roughly the same time (in the late 1950s), and, as we have seen, both men's theories are somewhat incongruous. Baran's kindergarten rules, which apply to the wireless spectrum the behavioral patterns taught to children, take for granted that the entire spectrum should be freely allocated for public use (just as playground equipment is intended for use by any number of children). Coase's

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of Chicago's JOURNAL OF LAW & ECONOMICS (for which Coase was the editor). The first footnote of Coase's *The Problem of Social Cost* states that "[t]his article . . . arose out of the study of . . . [b]roadcasting which I am now conducting. The argument of the present article was implicit in a previous article dealing with the problem of allocating radio and television frequencies . . . ." Ronald H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1, 1 n.1 (1960) (referring to Coase, *The Federal Communications Commission*, *supra* note 1). Coase again reiterated this point in his short autobiography, which appears on the Nobel Prize website. *Ronald H. Coase, Autobiography*, *in* LES PRIX NOBEL 1991 (Tore Frängsmyr ed. 1992, *available at* http://www.nobel.se/economics/ laureates/1991/coase-autobio.html. He notes that "The main points [of the Coase theorem] were already to be found in *The Federal Communications Commission*." *Id.* He goes on to explain that, "[h]ad it not been for the fact that . . . economists at the University of Chicago thought that I had made an error in my article on *The Federal Communications Commission*, it is probable that *The Problem of Social Cost* would never have been written." *Id.*

58. Within the "trading rights" and "propertization" literature, there is considerable confusion as to what these ostensibly straightforward concepts should mean. In their most liberalized sense, the terms mean that the spectrum can be leased, traded, exchanged, bought, or sold and that the underlying use of the spectrum can be altered. *See* Tommaso M. Valetti, *Spectrum Trading*, 25 TELECOMM. POL'Y 655, 656 (2001). Valetti notes:

> [Spectrum trading] means that individuals or companies should get property rights and be allowed to decide about the use they intend to make of their spectrum band, as long as they pay for it. Another consequence is that the number of licenses would not be determined by the regulator, but would arise endogenously from the working of the market place.

Id.

spectrum trading idea, on the other hand, is based on the much more complicated legal premise that exclusive or semi-exclusive rights can be traded almost as if they were real estate transactions (*e.g.*, sales, leases, and easements).

Not unexpectedly, these proposals reflect the timeframe in which they were created;[59] as such, each man's theories were formed within different technological contexts. In fact, in 1998, Coase himself indicated that he had not reviewed his original spectrum model in light of new technological developments, noting, "I have not made a serious study of the allocation of the use of the radio frequency spectrum since the early 1960s."[60] Although we will not attempt here to entirely discredit Coase's theory—such work is better left for economists—we will include the important disclaimer that Coase proposed his spectrum trading model *prior* to the introduction of digital systems, and his model was a great fit for an analog world. Baran, on the other hand, developed his model in a digital world. Further, Baran, a technology specialist, has demonstrated that he understands the marriage of computing and wireless, whereas there is no evidence that Coase had any understanding of digital technology when he presented his spectrum-as-property theory. This is not surprising, since the very technology at question was only in the early stages of development by Paul Baran.

Thus, although Coase made one of the world's leading economic arguments on transaction costs,[61] there is evidence of a massive crack in

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59. Coase's FCC article was written in 1959. *See* Coase, *The Federal Communications Commission*, *supra* note 1. Although Baran's packet switching articles were first published around roughly the same time, Baran did not actively encourage application of the principles espoused in those articles to wireless telecommunications until the 1980s and 1990s, long after the packet switching concept had been developed and proven.

60. Coase, *Comment on License Auctions*, *supra* note 53, at 577.

61. Coase's 1959 article, *The Federal Communications Commission*, *supra* note 1, argued that the government's policy of giving spectrum away for free could instead be replaced by auctions, and expanding on this study, Coase's 1960 article, *The Problem of Social Cost*, *supra* note 57, argued that economists should consider transaction costs in their theoretical modeling of pricing. Coase has told us repeatedly that *both* articles are based on the same study on broadcasting, even though the 1960 article does not discuss broadcasting directly. Specifically, the first footnote in *The Problem of Social Cost* states that the premise of the article arises "out of the study of . . . [b]roadcasting which I am now conducting. The argument of the present article was implicit in a previous article dealing with the problem of allocating radio and television frequencies . . . ." Coase, *supra* note 57, at 1 n.1. Recall that Coase again reiterated this point in his short autobiography which appears on the Nobel Prize Website (see discussion *supra* note 57). Yet, in spite of the connections that Coase has made in his work to broadcasting, the Nobel Prize did *not* mention the broadcasting piece it when they awarded the prize to him. Instead, they specifically said that the Nobel Prize in Economics was "for his discovery and clarification of the *significance of transaction costs* and property rights for the institutional structure and functioning of the economy" (emphasis added). See Press Release, Kungl Vetenskapsakademien, The Royal Swedish Academy of Sciences, The Sveriges Riksbank (Bank of Sweden) Prize in Economic Sciences in Memory of Alfred Nobel 1991 (Oct. 15, 1991), *available at* http://nobelprize.org/economics/

the Coasian spectrum theory. Would Coase endorse a spectrum property regime in 2004, a world where "overlay"[62] and "underlay"[63] technologies exist? These technologies allow wireless users to commingle and coexist in ways that technology of the 1960s never imagined.[64] If one believes that intelligence at the edges is the future, it is worth serious pause to consider whether Coase's spectrum property model is still valid; for Coase could not have considered his theory in light of packet switching (and its extension to wireless), because packet switching and intelligence at the edges had not yet been empirically proven by Paul Baran. So, it is not a stretch to propose that Coasian spectrum markets might be an outmoded relic of the era in which they were conceived, just as Grosch's theory of centralized computing is today.

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laureates/1991/press.html. Further, the Royal Swedish Academy of Sciences went out of its way to cite many of Coase's contributions as the basis for the prize, and they did *not* cite *The Federal Communications Commission* as one of them. *See id.*

62. Software-Defined Radio, for example, is called an "overlay" technology because operates in specific frequencies, at specific times, at varying levels, but in "overlay" fashion on top of existing uses. It is a "smart" product made so by software that controls it and steers through the spectrum. *See* Dan Sweeney, *Shape Changer: Software Defined Radio and the Indefinite Future*, AM. NETWORK, Dec. 1, 2000, at 75 (discussing the general concept of SDR and its "cognitive" characteristics). Former FCC Chairman William Kennard expressed enthusiasm for the technology in his published statement at the opening of a Notice of Inquiry for Software Defined Radio:

> Software defined radios are smart devices that can make good use of underused spectrum. They can operate as a cell phone one minute, a PCS phone the next, a taxi dispatch radio later on and a two-way pager after that. They can literally bridge the gaps created by differences in frequency and transmission standards. In this way, they can make all spectrum users from average consumers to police, fire, and EMS workers who need to talk to each other more productive and efficient.

Press Release, The Federal Communications Commission, Statement of FCC Chairman William E. Kennard Notice of Inquiry on Software Defined Radio (Mar. 17, 2000), *available at* http://ftp.fcc.gov/Speeches/Kennard/ Statements/2000/stwek020.html.

63. Ultra Wideband technology is often called an "underlay" technology because it broadcasts at extremely high capacity, at very low power, and across all frequency bands. It does so at the "noise floor" where it does not interfere with concurrent transmitters, and proponents of UWB technology claim that it can eliminate wireless airwave congestion, reduce power consumption requirements to a minimum, and commingle with other operators without interfering them. *See Cutting the Ties That Bind*, THE ECONOMIST, Sept. 21, 2002, at 6 (discussing UWB technology and the chipsets that are under development by various companies). *Also see* David G. Leeper, *Wireless Data Buster*, SCI. AM., May 2002, at 64 (providing an excellent overview of the history of radio and development history of UWB).

64. Ultra Wideband and Software Defined Radio, for example are two powerful "underlay" and "overlay" technologies that can potentially use the spectrum as a commons, changing the way wireless works and making electromagnetic spectrum like an ocean that is so vast that it does not need to be parceled out into individual properties. *See Freeing the Airwaves*, THE ECONOMIST, May 31, 2003, at 26 (discussing the property vs. commons debate and noting that technologies such as UWB and SDR make powerful arguments that the spectrum should be treated as a commons).

C. Packet Switching Overview

We will not write the epitaph for the Coasian spectrum trading theory here, although hopefully we will plant the seeds for a rough draft of it. Our purpose is to emphasize that it is axiomatic that the future of wireless communications is digital, not analog. Coase only knew analog, period. Moving along, before we explore the more radical idea that the FCC can be replaced by a box of electronics (or by multiple, "meshed" boxes of electronics),[65] we will first consider the principles of Paul Baran's famous packet switching invention and the ways in which those principles may be extended in the future. As we will see, his idea has been applied in many areas, and packet switching concepts have already been deployed in other wireless technologies developed within the past decade. Further, at a very high level, Baran's ideas underscore the fact that old paradigms of computing have since been replaced by new ones. Accordingly, when Baran joined the RAND Corporation in 1959, he began to outline a vision for a network of unattended—electronic, and *possibly* computerized[66]—nodes that would act as automated switches, which would route information from one node to another until that information reached its final destination. The automated nodes would use a scheme Baran called "hot-potato routing,"[67] also known as "distributed communications" (and now called "packet switching").[68] A RAND Corporation tutorial explains Baran's theory in the following simple terms:

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65. Under "mesh networking" theory, each device operates as a router for other traffic; for example, a user's Wi-Fi computer that accesses a network also acts as a router (or a "repeater") for other nearby users who would like to access data. In fact, wireless-enabled laptops can already be manually configured to act as routers to some extent. *See* Rupley, *supra* note 46 (describing mesh networking).

66. We use the term "possibly computerized" because transistors and other computer technologies were still in their infancy in the late 1950s and early 1960s.

67. *See* SHARLA P. BOEHM & PAUL BARAN, ON DISTRIBUTED COMMUNICATIONS: DIGITAL SIMULATION OF HOT-POTATO ROUTING IN A BROADBAND DISTRIBUTED COMMUNICATIONS NETWORK (The RAND Corp., Memorandum No. RM-3103-PR, Aug. 1964), *available at* http://www.rand.org/publications/RM/RM3103/. Baran's "hot-potato routing" scheme was one of the earliest (and simplest) concepts for moving data from one location to another. The idea was not complicated: a "node" (a switch) would simply pass the package on to the first free node. In other words, the node passed the "hot potato" on to any other node that was ready to accept it (any system with an empty wait queue), regardless whether that node was actually closer to the final destination. Baran's hot-potato scheme was simple and fast, but it had one obvious flaw: there was no guarantee that the package would ever arrive at its destination (unless the network was very small). Thus, Baran had to perform additional studies on packet switching and associated networks in order to revise his scheme to ensure that packets would eventually arrive at their destination.

68. *See* PAUL BARAN, ON DISTRIBUTED COMMUNICATIONS (The RAND Corp., Memorandum No. RM-3767-PR, Aug.1964), *available at* http://www.rand.org/publications/RM/RM3767/.

> Baran . . . developed the concept of dividing information into "message blocks" before sending them out across the network. Each block would be sent separately and rejoined into a whole when they were received at their destination. A British man named Donald Davies independently devised a very similar system, but he called the message blocks "packets," a term that was eventually adopted instead of Baran's message blocks. . . . This method of "packet switching" is a rapid store-and-forward design. When a node receives a packet it stores it, determines the best route to its destination, and sends it to the next node on that path. If there was a problem with a node (or if it had been destroyed) packets would simply be routed around it.[69]

Thus, rather than relying upon a central node that broadcasts all information, the idea of "routing" and "switching" blocks of information was born. In fact, the Internet originated out of this very concept. Figure 1—adapted from the RAND tutorials—provides a graphical depiction of distributed communications, or packet switching:

FIGURE 1

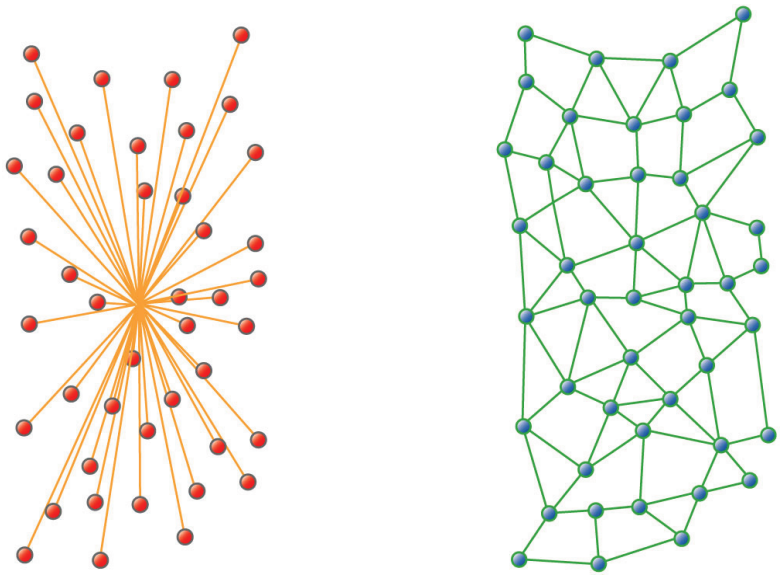

Figure 1: The figure on the left shows the traditional method of transferring data before Paul Baran introduced his theories. As shown in the figure, one centralized node sends, or broadcasts, data directly to its destination. The figure on the right shows how packet

69. THE RAND CORP., PAUL BARAN AND THE ORIGINS OF THE INTERNET, *at* http://www.rand.org/about/history/baran.html (last modified Jan. 13, 2004).

> switching works. Rather than broadcasting data from a single point of origin, that data can be broken into blocks, or packets, and sent individually from one node within a "mesh" to another node. The routes that these packets of data take will vary. This mesh configuration is now used as a basis for the functioning of the Internet, and Baran and others have suggested that it can also be applied to wireless communications.

Below, we will elaborate upon this distinction between traditional centralized computing and contemporary packet switching.

1. The Old Centralized Computing Model and Broadcasting

The traditional data transfer method, depicted on the left side of Figure 1, involves the broadcast of a signal at high power for many to receive. A similar method is used for broadcast radio communications and under this model listeners do not (and often cannot) respond to the broadcaster.[70] Furthermore, recall that Grosch's centralized computing concept, which is also based on this depiction, is now defunct.[71] Nonetheless, this data transfer methodology persists in radio, television, and dispatch, where broadcasters send out signals that can only be received (and that cannot be responded to) by the recipients. These remnants of the old paradigm are unquestionably based on a broadcasting notion that depends on a single, large, high-power transmitter rather than on a mesh network of lower power devices that communicate with each other. Even so, this one-to-many broadcast technology shows no sign of disappearing soon.

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70. In high-power broadcasts, the receiver is a low-power, passive device. As such, it does not have the power to send signals back to the sender. Consider that a television broadcast tower can be several hundred feet tall in height and operates at several thousand watts of power. A television set, on the other hand, has an antenna that is only one or two feet in height and only passive transmission power. This differential can exist because televisions do not need to send data back to the source, they must only receive it. *See* Rob Howard, *Astute Antennas*, COMM. SYS. DESIGN, May 1, 2003, *available at* http://tinyurl.com/4srkl (subscription req'd) (describing the principles of link budgets).

71. *See* Adams, *supra* note 22, at 39.

2. Distributed Computing, Packet Switching, and Mesh Networks

On the right side of Figure 1, the "distributed" graphic depicts the way in which the Internet operates today. In fact, Internet functionality is heavily influenced by Paul Baran's ideas from the 1950s and 1960s.[72] In this mesh (or "distributed") diagram, information travels from one node to another in packets, and the path that a given packet can take will vary depending on different factors, such as congestion and processing power. For example, when a user sends an email message via the Internet, that message can take any one of many possible routes to reach its destination and can travel at a number of different speeds. All of this routing occurs in split-second intervals without the need for humans to direct traffic. Of course, humans must set up guidelines and define protocols, but once the "rules of the road" are defined, we let the computers do the rest. These computers, then, operate in a "mesh" with different servers, routers, and other computers acting as nodes to direct traffic.

When Baran suggested in 1994 that wireless devices could apply "kindergarten rules," he likely meant that wireless devices can operate in much the same way that the Internet does now. Each device can become a node and can thus be used to receive, analyze, and transfer information to other users, just as Baran's packet switching invention does today. In the wireless world, different devices must follow different rules. For example, larger devices could be required to receive wireless transmissions and to retransmit the received data (much like servers do in computing). Furthermore, smaller consumer devices will need to ensure that they enter this wireless world without disturbing the mesh. Therefore, these small devices would either need to pass data along as part of a larger system or need to operate within the system without disturbing its functionality. According to Baran, these rules can be programmed into different wireless devices, just as they have been programmed into the millions of computers, servers, switches, and routers that now constitute the Internet and the terminals that connect to it.

72. *See And the Winners Were . . .*, *supra* note 50 (describing Baran's invention and the manner in which it was applied to ARPANET, the early version of the Internet).

IV. CAN TECHNOLOGICAL RULES BE ENCODED IN CONSTITUTIONAL PRINCIPLES?

A. The Wireless Device Bill of Rights

The Wireless Device Bill of Rights is a proposal initiated by technologist Bran Ferren and later championed by technologist Kalle Kontson.[73] As its name indicates, the Wireless Device Bill of Rights endows a Constitutional character to wireless communications, shifting both rights and obligations to the devices that access the electromagnetic spectrum. According to the theory upon which this document is based, algorithms can be uploaded to devices in order to enable those devices to function cognitively in their environment. Moreover, in many cases the addition of devices can improve the functioning of the system by processing data and passing it along, just as the addition of servers and nodes increases capacity on the Internet.

The proposed Wireless Device Bill of Rights has not changed significantly since its original publication (with the exception of the addition of titles and a preamble).[74] It reads as follows:

> ARTICLE 1: THE RIGHT TO SPECTRUM ACCESS
> Any intelligent wireless device may, on a non-interference basis, use any frequency, frequencies or bandwidth, at any time, to perform its function.
>
> > *Tenet 1: Mental Competence and Moral Character*
> > To exercise rights under this Article, intelligent devices must be mentally competent to accurately determine the possibility of interference that may result from their use of the spectrum, and have the moral character to not do so if that possibility might infringe on the rights of other users.
> >
> > *Tenet 2: Good Citizenship*
> > To exercise rights under this Article, intelligent devices must actively use the wireless spectrum within the minimum time, spatial and bandwidth constraints necessary to accomplish the function. Squatting on spectrum is strictly prohibited.

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73. *See* Kevin Werbach, *Here's a Cure for Bandwidth Blues*, ZDNET.COM (Nov. 28, 2001), *at* http://zdnet.com.com/2100-1107-531165.html (describing the Wireless Device Bill of Rights and crediting Bran Ferren with its authorship). Note that the Washington D.C.-based New America Foundation has also held workshops to promote and advance some of the principles of the Wireless Device Bill of Rights. *See* NEW AMERICA FOUNDATION, INTELLIGENT DEVICE BILL OF RIGHTS (June 20, 2003) *at* http://tinyurl.com/4jz3o.

74. Note that one aspect that has changed since the original publication is the addition of titles for the articles and tenets. *See* the *infra* note 91 and accompanying text.

> ARTICLE 2: THE RIGHT TO PROTECTION
> All users of the spectrum shall have the right to operate without harmful electromagnetic interference from other users.
>
> > *Tenet 1: Priority of Rights*
> > Priority of rights under this Article may be determined by the proper authorities only in cases of National emergency, safety of life or situations of extreme public interest.
> >
> > *Tenet 2: Limit of Rights*
> > Rights under this Article may be exercised only when the systems exercising the rights are designed, as determined by the state of the practice, to be reasonably resistant in interference.
>
> ARTICLE 3: SUPREMACY CLAUSE
> All licensing, auctioning, selling or otherwise disposition of the rights to frequencies and spectrum usage shall be subordinate to, and controlled by Articles 1 and 2, above.[75]

Like the Bill of Rights in the U.S. Constitution, the Wireless Device Bill of Rights embraces personal freedoms and records rights and responsibilities—here, the personal freedom of communications. The Wireless Device Bill of Rights then aspires to ascribe these rights and responsibilities to technical devices. The details of the document clearly need to be developed, and discussions regarding these details are underway at the FCC (at a group called the Technological Advisory Council, described in the following subsection) and at think tanks.[76] Below, we will briefly review the meaning and the import of the right to spectrum access and the right to protection, as well as the rationale behind the Supremacy Clause.

Article 1, the right to spectrum access, guarantees the rights of intelligent wireless devices to use the spectrum on a "non-interference basis," but it also requires that the devices not "infringe on the rights of other users" (Tenet 1) and that those devices use the spectrum "within the minimum time, spatial and bandwidth constraints" needed to function (Tenet 2). In short, this Article attempts to set forth the principles of cognitive radio, as well as the "listen before talking" qualities of the Ethernet. However, it does not set any restrictions on the

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75. *See* Kontson, *supra* note 10.

76. The New America Foundation, a Washington D.C.-based think tank, held a conference that discussed the matter in the summer of 2003 and has addressed the topic in one of its publications. *See* KEVIN WERBACH, RADIO REVOLUTION: THE COMING OF AGE OF UNLICENSED WIRELESS (2003), *available at* http://www.newamerica.net/Download_Docs/pdfs/Pub_File_1427_1.pdf.

technologies to be used. Thus, by setting the *principles* underlying spectrum use rather than the *means* by which the spectrum will be used, the document, like the original Bill of Rights, may avoid becoming superannuated. Because the technologies that we use today may change over time, the principles in the Wireless Device Bill of Rights refrain from locking in the use of a particular technology that may become obsolete within the next few years. Said another way, the Wireless Device Bill of Rights simply protects one's right to access the spectrum resource so long as one follows general principles of good citizenship and behavior.

Article 2, the right to protection, guarantees the rights of those who already use the spectrum and prioritizes different uses of the spectrum. For example, the Article explicitly states that "National emergency, safety of life or situations of extreme public interest" may take precedence over other uses of the spectrum, as determined by "the proper authorities" (Tenet 1). It also would require the devices to be able to be rendered inoperative in order to ensure sufficient spectrum is available for emergency communications. Accordingly, just as automobiles are required by law to pull over to the side of the road to allow ambulances to move through traffic, so too electronic devices would have to be programmed to be automatically disabled in emergency situations in order to give national interest communications a first right of passage through the spectrum. Furthermore, this Article requires devices to have both an intelligent transmission capability and an intelligent reception capability. As FCC Chairman Michael Powell emphasized at the University of Colorado's Silicon Flatirons conference in 2002, one of the principle problems with receivers is that they are "dumb," meaning that they are unable to distinguish between different transmission sources.[77] Thus, regulations would need to cover receivers in addition to transmission-only devices.

Finally, Article 3, the supremacy clause, indirectly addresses the Coasian free market spectrum model by mentioning the "licensing, auctioning, selling or otherwise disposition of the rights to frequencies and spectrum usage." This Article seems to intimate that Ronald Coase's spectrum-as-property theory and Paul Baran's spectrum-as-commons theory *may*, in fact, be able to work together in spite of their seeming inconsistencies. In theory, then, a broadcasting company (*e.g.*, NBC, ABC, or CBS) could continue to "own" (or have an exclusive license to use) the airwaves to broadcast television on one or more particular channels. This right to exclusive use, however, would be subordinate to the rights of individuals to access the airwaves (Article 1) and to the

77. Powell, Broadband Migration III, *supra* note 12.

rights of others who already use the airwaves (Article 2). In other words, this Article suggests that, subject to other rights, limited property rights may be exerted over areas of the spectrum. As a point of comparison, it is like saying that a person may own the beach that connects to his or her house, but that the use of that beach by others may not be prohibited so long as designated rules are followed.[78]

B. The FCC in a Box

The discussion regarding Paul Baran's "kindergarten rules" and Bran Ferren's/Kalle Kontson's Wireless Device Bill of Rights has begun to gather steam (at least in the United States). Further, this discussion has led—perhaps indirectly—to technology lawyer James Johnston's contention that the functions performed by the FCC can instead be performed by computers. Johnston makes this argument in a 2003 piece entitled *The Federal Communications Commission in a Box*,[79] and although he does not directly mention either the "kindergarten rules" or the Wireless Device Bill of Rights, it is evident that he tacitly draws from both sources.

In the article, Johnston points out that Wi-Fi devices are based on a simple "listen before talking" principle. For this reason, he notes, sixteen million Wi-Fi devices are operational at the same time in the United States, even though there are only 1,714 television stations.[80] If as many television stations were operational as Wi-Fi devices, he argues, interference would abound, and the "cacophony of competing voices" would prevent anyone from using their televisions. However, the design of Wi-Fi ensures that this cacophony does not occur. In a statement reminiscent of Paul Baran's "kindergarten rules," Johnston reminds us that "Wi-Fi transmitters don't talk if they hear another device transmitting. It takes children about four years to learn such good manners. It has taken radio 109 years."[81]

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78. See 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 (2004), *available at* http://www.mttlr.org/volten-two/Ryan.pdf (arguing that the public trust doctrine and other principles of natural resource management could be applied to the electromagnetic spectrum to protect the public's overlay and underlay rights, just as they have been used to protect similar rights in real property).

79. James H. Johnston, *The Federal Communications Commission in a Box*, 26 LEGAL TIMES, Dec. 8, 2003, at 16.

80. *Id.*

81. *Id.* In the early days of radio communications, there was competition among broadcasters, who consistently increased their transmission signal power in order to "drown out" the competition (similar to shouting louder than someone else in order to make sure that you are heard). This competition led to now famous "cacophony of competing voices" that forms the legal principle for the regulation of spectrum. Red Lion Broad. Co. v. FCC, 395 U.S. 367, 375-77 (1969). As noted in the case proceedings:

Furthermore, Johnston appears to borrow ideas advanced in the Wireless Device Bill of Rights. For example, he notes that cognitive radio technologies can do what the FCC does today—assign frequencies—and he explains that "[d]ynamic frequency selection . . . allows devices to transmit on whichever frequency is available at the moment. Thus, the FCC doesn't need to micromanage the allocation of frequencies; computer-controlled transmitters can do that."[82] In his conclusion, as the title of the article suggests, Johnston contends that the FCC could be replaced by "a box of electronics," (*i.e.*, computerized systems and associated cooperative algorithms), and he maintains that the application of computing technology to the wireless spectrum could "empower the individual, giving him the right to use the ether however he wants."[83] This conclusion is no different than that offered in Baran's 1994 proposal, nor is it any more progressive than the suggestions made by the FCC's Technological Advisory Council (TAC) in 2000, as we will see momentarily. However, spectrum stakeholders (*e.g.*, consumers, regulators, and broadcasters) have become so accustomed to the regulation and allocation of the wireless spectrum by a centralized agency that many will continue to require hard evidence in order to determine if and how a bureaucracy staffed by humans can be replaced by computer algorithms.

C. The Bill of Rights and the Technological Advisory Council

In order to investigate whether or not Johnston's *Federal Communications Commission in a Box* principles could become part of our regulatory paradigm, in 1998 the FCC created a separate group of advisors called the TAC, which comprises members of industry who provide the FCC with guidance on a wide variety of technical issues.[84]

> [B]efore 1927, the allocation of frequencies was left entirely to the private sector, and the result was chaos. It quickly became apparent that broadcast frequencies constituted a scarce resource whose use could be regulated and rationalized only by the Government. Without government control, the medium would be of little use because of the cacophony of competing voices, none of which could be clearly and predictably heard.

Id.

82. Johnston, *supra* note 79.

83. *Id.* To be fair, Johnston is asserting the position of the "open spectrum movement" as a whole.

84. *See* TAC Charter (Dec. 11, 1998), *available at* http://www.fcc.gov/oet/tac/TACCharter_112502.pdf (last visited Mar. 22, 2005). The purpose of the TAC is explained in Paragraph B (2) of the Charter, as follows:

> The purpose of the TAC is to provide technical advice to the Federal Communications Commission and to make recommendations on the issues and questions presented to it by the FCC. The TAC will address questions referred to it by the FCC Chairman, by the FCC Chief Office of Engineering and Technology

The TAC has been divided into three sessions: TAC I (1998-2001), TAC II (2001-03), and TAC III (2003 to the present). Many of the TAC's recommendations have later led to FCC rulemaking and have influenced FCC policies.[85] In 2000, TAC I suggested that Bran Ferren's proposed Wireless Device Bill of Rights be considered for further development:

> As we move into an era of software defined everything, an era where complexity and interaction are beyond the grasp of most people, we need to construct operating principles that are derived from a somewhat higher point of view than we have been considering up until now. By analogy to the Federal Constitution which provides a timeless and robust framework upon which all other laws can be tested, we need a "Bill of Rights" that would be the permanent basis for the governance of all intelligent devices. It would guide the responsibilities, obligations, rights and behavior of such devices so as to provide for both freedom of action and respect for the rights of humans and of other like devices. We need a set of high-level, overarching principles that describe how sophisticated equipment in conjunction with their human or mechanical users should behave so as to achieve the freedom and the equality of rights we desire. . . . The intent is to keep the thinking at a very high level and to use the real Bill of Rights and how people interact in real life as models.[86]

By comparing the Wireless Device Bill of Rights with the U.S. Constitution and suggesting that we take into consideration the way in which "people interact in real life," the TAC's conclusions thus take into account some of the underlying principles of Paul Baran's "kindergarten rules." After all, these rules are an extrapolation of the principles that guide the manner in which real people interact (or should interact) in the real world. The very fact that the TAC has entered into a discussion regarding these concepts seems to indicate that this bill of rights movement holds a great deal of promise.

Comments similar to those included above were reiterated at TAC II in 2001[87] and at subsequent meetings. Unexpectedly, however, a

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> or by the TAC Designated Federal Officer. The questions referred to the TAC will be directed to technological and technical issues in the field of communications.

Id.

85. For example, the FCC initiated a special inquiry to change rules in order to accommodate software defined radio based on studies performed by the TAC. *See* FCC Press Release, FCC Begins Inquiry Regarding Software Defined Radio (Mar. 17, 2000), *available at* http://www.fcc.gov/Bureaus/Engineering_Technology/News_Releases/2000/nret0004.html (describing the work of the TAC in relation to the software defined radio inquiry).

86. TAC, FIFTH REPORT, *supra* note 9, at 12-13.

87. *See* TAC, REPORT: SECOND MEETING OF THE FCC TECHNOLOGICAL ADVISORY COUNCIL II (Nov. 5, 2001), *available at* http://www.fcc.gov/oet/tac/TACII-

review of the minutes of these meetings indicates that the debate has not advanced much (at least in the TAC forum) since about 2002. However, at the December 2002 meeting, TAC II did publish the 2000 draft of the Wireless Device Bill of Rights through an FCC portal.[88] Since that time, the discussion has shifted from the TAC to other areas, such as the New America Foundation. At a June 2003 conference, the New America Foundation published the latest version of the document.[89] This version is generally unchanged from the first draft (published by TAC I), although it now contains a preamble (a Statement of Principles),[90] and the tenets have been given titles (which we saw earlier).[91]

Most importantly, however, the New America Foundation's conference included an important presentation by the Defense Advanced Research Projects Agency (DARPA), the research and development arm of the U.S. Department of Defense. This presentation showed that the kinds of wireless devices described in the Wireless Device Bill of Rights are already being developed by the U.S. government.[92] In fact, DARPA has undertaken a new communications program called neXt Generation (XG), which is building adaptive telephone technology that can operate using different frequencies in different parts of the world without causing

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Report2.pdf (proposing that the TAC continue to discuss the development of the Wireless Devices Bill of Rights under its mandate to develop new ways to manage the spectrum).

88. *See* Kontson, *supra* note 10.

89. *See* KALLE R. KONTSON, NEW AMERICA FOUNDATION, INTELLIGENT WIRELESS DEVICE BILL OF RIGHTS (June 20, 2003), *available at* http://www.newamerica.net/Download_Docs/pdfs/ Doc_File_186_1.pdf.

90. *Id.* The Statement of Principles reads as follows:

> Wireless devices are increasingly becoming the vehicle of human communication and an extension of our senses. As these devices become more intelligent, they become capable of automatically coordinating their behaviors and interactions with other such devices, just as humans would do in orderly verbal communications. To fully leverage such future technology, it may be necessary to define a universal set of rights and responsibilities for such devices. This "Intelligent Wireless Device Bill of Rights", designed for the emerging era of smart radios, takes one important step in this direction. It treats smart radios as proxies for human speech and thus subject to similar First Amendment Rights. It defines the expected behaviors, rights and responsibilities for wireless devices operating in a free environment, restricted only by the responsibility to respect the rights of others. It is technically possible to implement, as illustrated by the DoD XG program. It also supports an emerging economic model in telecommunication: one driven by unlicensed consumer products and information content, not by licensed subscriber services.

Id.

91. *Id.* The titles assign to these devices characteristics usually applied to humans. For example, Art. 1, Tenet 1, is titled "Mental Competence and Moral Character," and Art. 1, Tenet 2, is titled "Good Citizenship."

92. Preston Marshall, Beyond the Outer Limits, XG Next Generation Communications, DARPA Presentation (June 20, 2003), *available at* http://www.darpa.mil/ato/programs/xg/ index.htm (describing the DARPA XG system).

interference.[93] Since the program is being developed by the military, little information about it has been made available to the public. Nonetheless, those who support the Wireless Device Bill of Rights have cited the program as an example that demonstrates (1) that adaptive products are viable and are in the process of being developed and (2) that these products will require a different type of legal mechanism that sets forth principles that tell us not only what we cannot do, but also what we *can* do (as the Constitutional Bill of Rights does).

CONCLUSION

Over the past few decades, many paradigm shifts have changed our view of the interrelationship of science and law. Two of the more notable paradigm shifts in the computer industry have been (1) the supplantation of "Grosch's law" (a centralized mainframe and dumb terminals) by Moore's law (increasingly smaller, more powerful terminals);[94] and (2) the gradually recognized supplantation of Grosch's law by both Moore's Law and Paul Baran's principles of distributed computing (the interconnection of computers in a mesh configuration). The future promises that devices will continue to become simultaneously less expensive and more powerful.[95] As distributed mesh theories are being applied to wireless communications, we should endeavor to develop proposals that endow users of the new wireless devices with technology-neutral rights and obligations. The Wireless Device Bill of Rights is a great start.

The advantage of the proposed Wireless Device Bill of Rights is that it delineates what users of the wireless spectrum *can do* rather than what they *cannot do*. It purports to be technology neutral, and it allows users to access the spectrum so long as they abide by simple rules (rules so logical and clear cut that we learned them in kindergarten, according to Paul Baran). Others, including James Johnston, have further suggested that we can program these devices with algorithms and

93. *Id.* *See also* DARPA, NEXT GENERATION COMMUNICATIONS PROJECT, *at* http://www.darpa.mil/ato/programs/xg/index.htm (last visited Mar.. 22, 2005).

94. *See Caught in the Net*, *supra* note 18, at S16.

95. Even if Moore's law may reach its limits, nanotechnology promises molecular-level processing and anticipates that computers will continue to shrink beyond that which is presently available by silicon chips. *See* Jack Robertson, *Nanotechnology Expected to Extend Moore's Law*, EE TIMES U.K., Sept. 12, 2002, *at* http://www.electronicstimes.com/tech/news/OEG20020912S0039 (describing chip maker Intel's work on nanotechnology and quotes Sunlin Chou, an executive at Intel: "[t]he people who think Moore's Law will end assume that materials and structures won't change. They are constantly changing and will keep Moore's Law going for a lot longer"). *See also Small Wonders*, THE ECONOMIST, Sept. 14, 2002, at 76 (describing the limits of silicon chips and the developments of nanotechnology and molecular processing that continue the trend towards increased power and computer miniaturization).

ultimately replace the functions performed by the FCC with a set of computerized conventions that are similar to the protocols that form the basis for the way the Internet works today. Finally, the greatest strengths of the Wireless Device Bill of Rights lie in the fact that it empowers access and in the fact that, like the Constitutional Bill of Rights, it is timeless. Instead of advocating one technology over another, it instead deems as acceptable any technology that fits within its designated parameters.

The disadvantage of the Wireless Device Bill of Rights is that it is in the very early stages of development, which means that its articles and tenets still require considerable clarification. It is premature to expect that a one-page document can replace the thousands of pages of FCC wireless spectrum regulations. Further, although the Bill of Rights proposes the philosophical cohabitation of "open spectrum" theories and Coasian property rights principles, the details require a great deal of fine-tuning. Since we are only just now beginning to test property rights theories in practice, it is unlikely that these efforts will be aborted in favor of so ambitious a set of rules and principles, at least within the next few years. Finally, as rights are further developed and clarified, scholars will invariably need to turn to enforcement.[96]

For now, however, we still need a rights-based mechanism. Even though wireless communications did not exist when the U.S. Constitution was penned, since World War II the protection of such communications has become a cornerstone of European governments through the European Convention on Human Rights.[97] Furthermore, some newly democratized Central European governments have taken the opportunity within the past ten years to explicitly articulate the public's right to use the radio frequency spectrum under the umbrella of

96. *See* Ellen P. Goodman, *Spectrum Rights in the Telecosm To Come*, 41 SAN DIEGO L. REV. 269 (2004) (discussing the emerging commons model and advocating a regulatory strategy to facilitate the effective use of commons spectrum); *also see* PHILIP J. WEISER AND DALE N. HATFIELD, POLICING THE SPECTRUM COMMONS (TPRC Program Paper No. 300, Aug. 2004), *available at* http://web.si.umich.edu/tprc/papers/2004/300/policing%20spectrum%20commons.pdf (noting that the question of enforcement in a commons regime has been underaddressed in the academic literature and proposing some models).

97. The European Convention on Human Rights was adopted in 1950. Article 10 provides the right to freedom of expression, as follows: "Everyone has the right to freedom of expression. This right shall include freedom to hold opinions and to receive and impart information and ideas without interference by public authority and regardless of frontiers. This article shall not prevent States from requiring the licensing of broadcasting, television or cinema enterprises." Convention for the Protection of Human Rights and Fundamental Freedoms, Nov. 4, 1950, art. 10, 213 U.N.T.S. 221, 230 [hereinafter European Convention on Human Rights].

constitutional free speech protections.[98] Thus, in the twenty-first century, traditional free speech principles are frequently being applied to wireless media communications, and the rights and freedoms entrenched in the U.S. Constitution now pervade democracies worldwide.

Along these lines, the Wireless Device Bill of Rights and the "FCC in a box" concept are by no means extreme, impractical ideas; on the contrary, the validity of these ideas has, to some extent, already been proven through the viability of wired devices (*e.g.*, the Internet) and of the new unlicensed wireless devices that access the Internet (*e.g.*, Wi-Fi). Broadcasters, public safety officials, and others will undoubtedly require these new technologies and the aforementioned theories to be tested for many years before these individuals are willing to forgo traditional views regarding spectrum management. That said, the Wireless Device Bill of Rights will facilitate the evolution of this discussion in coming years, and the healthy debate as to how to apply its principles should continue.

98. *See e.g.*, Bulgarian Constitution, ch. I (Fundamental Principles), art. 18, which sets forth the principle that the radio frequency spectrum belongs to the public, as do other natural resources: "The state shall enjoy exclusive ownership rights over the nether of the earth; the coastal beaches; the national thoroughfares, as well as over waters, forests and parks of national importance," (Para. 1), and "The state shall exercise sovereign rights with respect to radio frequencies and the geostationary orbital positions," (Para. 3). The Bulgarian Constitution protects freedom of speech. *Id.* at ch. II, art. 39. Also note that the 1950 European Convention on Human Rights allows for the licensing of radio frequencies, although it covers only "broadcast" media and was passed before two-way communications such as mobile telephony were widely used or even thought to be possible. European Convention on Human Rights, *supra* note 97.

ARE "DUMB PIPE" MANDATES SMART PUBLIC POLICY?

VERTICAL INTEGRATION, NET NEUTRALITY, AND THE NETWORK LAYERS MODEL

ADAM THIERER*

ABSTRACT

Many academics and some public policymakers are increasingly advocating the adoption of regulations mandating "open" or "dumb" broadband networks over "closed" or proprietary systems. While such an "open-vs.-closed" distinction grossly over-simplifies the issue, it would be a mistake for lawmakers to implement regulations choosing network architectures. Such regulatory proposals are based on the mistaken belief that vertical integration between the "layers" of the Internet is inefficient or at least discriminates against firms or consumers operating in other layers. To the contrary, vertical integration can play a vital role in ensuring the development of a more robust broadband marketplace and offering consumers a wider array of service options. "Dumb pipe" mandates might also have a discouraging effect on competition in the creation of entirely new networks and services if these regulations formally prohibit vertical integration between network layers.

* Adam Thierer, Senior Fellow and Director, Center for Media Freedom, Progress & Freedom Foundation, Washington, D.C. (www.pff.org) and the author or editor of four books on technology policy. The author wishes to thank Andrew Odlyzko, Bruce Owen, Philip Weiser, Tim Wu, Jeffrey Eisenach, and Daniel Brenner for their comments and suggestions, and Thomas Pearson for his tireless research assistance.

INTRODUCTION

We hear a lot of talk these days about "open" versus "closed" systems in the field of high-technology and Internet policy. Examples include: "open spectrum" versus privately-held wireless properties; "open source" versus proprietary software; and mandatory "open access" versus private (contractual) carriage for telecom or broadband networks. Oftentimes, this debate is also cast in terms of "dumb pipes" versus "intelligent networks." A purely dumb pipe, for example, would be a broadband network without any proprietary code, applications, or software included. An intelligent network, by contrast, would integrate some or all of those things into the system.

One problem with this open-versus-closed or dumb-versus-smart system dichotomy is that it greatly oversimplifies matters. "Open" or "dumb" systems are almost never completely open or stupid; "closed" or "smart" systems are almost never completely closed or perfectly intelligent. Nonetheless, an important question raised by these debates is whether as a matter of public policy lawmakers should be mandating one type of business arrangement or system architecture over another. More specifically, debates over open versus closed systems raise the question of

whether vertical integration within the communications and broadband marketplace is to be feared or welcomed.

That question is receiving increasing attention in Internet policy circles today as numerous scholars begin to conceptualize this market in terms of layers. Most of these "network layers" models divide our increasingly packet-based Internet world into at least four distinct layers: (1) Content Layer; (2) Applications Layer; (3) Logical/Code Layer; and, (4) Physical/Infrastructure Layer. The layers model is an important analytical tool that could help lawmakers rethink and eventually eliminate the increasingly outmoded policy paradigms of the past, which pigeonholed technologies and providers into discrete industrial regulatory categories. But should the layers model be taken a step further and be formally enshrined as a new regulatory regime? And should a layer-breaker be considered a law-breaker? Some scholars and policymakers appear to be moving in that direction with their advocacy of dumb pipe mandates that insist that providers essentially stay put in their primary layer of operation.

For example, fearing the supposed ill effects of greater vertical integration in the broadband marketplace, some scholars and policymakers are advocating "Net neutrality" mandates that would limit efforts by physical infrastructure owners to integrate into other layers, especially content. Net neutrality proposals illustrate how the layers model could be used to restrict vertical integration in this sector by transforming the concept into a set of regulatory firewalls between physical infrastructure, code or applications, and content. You can offer service in one layer, but not another.

Variations on this theme have already been seen in the debate over Microsoft's integration of a web browser or media player into its Windows operating system and in the AOL-Time Warner merger. In both cases, fears about vertical integration into adjoining layers drove numerous open access regulatory proposals. Had the proposed Comcast-Disney merger moved forward, similar arguments likely would have been raised since the combined entity would have been a major player in the physical infrastructure, applications, and content layers.[1] Undoubtedly, however, the proposed deal foreshadows similar combinations to come that will raise such policy issues. And recent rumblings about treating search engine provider Google as a public utility as it grows larger provides another example of how layer-jumping could result in a regulatory response.

This article argues that far from being antithetical to innovation and competition, however, vertical integration can play a vital role in ensuring

1. Michael Feazel and Brigitte Greenberg, *Comcast Bids $66 Billion for Disney, 'Huge' Political Reaction Seen*, COMM. DAILY, Feb. 12, 2004, at 2 (subscription req'd).

the development of a more robust broadband marketplace and should not be restricted through an overly rigid application of the network layers model or Net neutrality mandates. As broadband service providers (BSPs) and other Internet service and applications providers seek to expand and diversify their range of consumer offerings by integrating into other network layers, policymakers should not proscribe such layer-jumping. Rather, they should be agnostic with regard to the intelligence of broadband networks in general. Moreover, while the dumb pipe approach may have great merit as a business model and eventually become the approach many BSPs adopt over time, it should not be enshrined into law as a replacement regulatory regime. Added network "intelligence" in the form of bundled applications and services can provide the public with an expanded array of choices that make their Internet experience more user-friendly. More importantly, dumb pipe mandates might have a discouraging effect on competition in the creation of entirely new networks and services if these mandates come to be a formal prohibition on vertical integration between layers. For these reasons, a dumb pipe mandate would be quite dumb indeed.

This article begins, in Section I, by laying out dumb pipe theory and the many variations on the network layers model. Section II attempts to draw a linkage between the network layers model, dumb pipe theory and emerging Net neutrality regulatory proposals. After outlining these theories and proposals, the article shifts gears and critiques efforts to enshrine these principles into law. Section III discusses the potential disincentives to innovate and create entirely new broadband platforms that might accompany the adoption of dumb pipe mandates or Net neutrality regulations. Section IV argues that if there is anything to dumb pipe theory, "openness" and (semi-) dumb pipes will likely prevail naturally in the marketplace, making government regulation a risky proposition. In particular, Section V warns that if past history is any guide, the potential for regulatory capture is quite real and worth considering before adopting such mandates. Questions are also raised regarding the applicability of property rights concepts within the field of broadband networks. Section VI discusses the importance of pricing flexibility and warns that if dumb pipe/Net neutrality regulation prohibits pricing freedom, innovative business models and pricing methods may be preempted. Section VII discusses concerns about market power in the broadband marketplace and argues that the increasing contestability of communications markets make *Carterfone*-like regulatory mandates unnecessary. Section VIII concludes by discussing some short-term developments worth watching that should help us gauge how policymakers might apply network layers models or dumb pipe mandates in the future.

The article concludes that a dumb pipe mandate—whether applied though a network layers law or Net neutrality mandates—would not constitute smart public policy. Such legal mandates are not needed to deter supposed "discrimination" or preserve the Net's "openness."

I. THE NETWORK LAYERS MODEL AND DUMB PIPE THEORY

Officials with MCI have been aggressively pushing a new study around Washington entitled, *A Horizontal Leap Forward: Formulating a New Public Policy Framework Based on the Network Layers Model*.[2] MCI's white paper is the most succinct articulation to date of the Internet protocol-based "layering concept" previously sketched out by academics Lawrence Lessig,[3] Lawrence Solum and Minn Chung,[4] Kevin Werbach,[5] Philip J. Weiser,[6] and Douglas Sicker[7] among others.

Although there is some disagreement within this literature about how many layers can be identified, as the MCI white paper notes, most of these models divide our increasingly packet-based Internet world into at least four distinct layers:

(1) *Content Layer*: speech, communications, text, music, video, music

(2) *Applications Layer*: e-mail, word processors, Voice-Over Internet Protocol (VoIP), web browsers

(3) *Logical / Code Layer*: TCP / IP, HTTP, FTP

(4) *Physical / Infrastructure Layer*: DSL, cable, satellite, Wi-Fi, fiber optics

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2. RICHARD S. WHITT, MCI PUBLIC POLICY PAPER, A HORIZONTAL LEAP FORWARD: FORMULATING A NEW PUBLIC POLICY FRAMEWORK BASED ON THE NETWORK LAYERS MODEL (Mar. 2004), *available at* http://global.mci.com/about/publicpolicy/presentations/ horizontallayerswhitepaper.pdf.

3. *See* Lawrence Lessig, *The Architecture of Innovation*, 51 DUKE L.J. 1783 (2002), *available at* http://www.lessig.org/content/archives/architectureofinnovation.pdf; LAWRENCE LESSIG, THE FUTURE OF IDEAS: THE FATE OF THE COMMONS IN A CONNECTED WORLD 19-25 (Random House 2001); Mark A. Lemley & Lawrence Lessig, *The End of End-to-End: Preserving the Architecture of the Internet in the Broadband Era*, 48 UCLA L. REV. 925 (2001).

4. LAWRENCE B. SOLUM & MINN CHUNG, THE LAYERS PRINCIPLE: INTERNET ARCHITECTURE AND THE LAW (Univ. of San Diego Pub. Law and Legal Theory Research Paper No. 55, June 2003), *available at* http://papers.ssrn.com/sol3/Delivery.cfm/SSRN_ID416263_code030616630.pdf?abstractid=416263.

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

6. Philip J. Weiser, *Regulatory Challenges and Models of Regulation*, 2 J. ON TELECOMM. & HIGH TECH. L. 1 (2003).

7. Douglas C. Sicker & Joshua L. Mindel, *Refinements of a Layered Model for Telecommunications Policy*, 1 J. ON TELECOMM. & HIGH TECH. L. 69 (2002).

These layering models are important because they challenge traditional technological, legal, and regulatory assumptions about the way the communications marketplace operates. The traditional vertical "silo" model of communications industry regulation views each industry sector as a distinct set of entities that do not interact and which should be regulated under different principles. For example, telephone companies are governed under Title II of the Communications Act as common carriers. Wireless providers and broadcasters fall under Title III and receive licenses to operate "in the public interest;" while cable providers operate under Title VI and face neither common carrier obligations nor licensing requirements but are governed by local franchising boards.

Despite the rapid convergence of these formerly distinctive industry sectors, discrete regulatory regimes and policies continue to exist that are at odds with emerging technological realities. In particular, the rise of the packet-based Internet and high-speed broadband networks challenge traditional assumptions about the vertical silo model of regulation. In other words, although the communications/broadband marketplace is becoming one giant fruit salad of services and providers, regulators are still separating out the apples, oranges, and bananas and regulating them differently.

The layers model is an important analytical tool that could help public policymakers rethink and eventually eliminate these increasingly outmoded regulatory paradigms. But should it remain merely an analytical framework, or should it be enshrined into law as the new regulatory paradigm for the communications marketplace? And more importantly, in replacing vertical silos with horizontal layers, will vertical integration between the layers become verboten?

Recently, MCI issued a follow-up paper also authored by Richard Whitt, entitled, *Codifying the Network Layers Model*, which begins to answer some of these questions.[8] In this latest piece, Whitt criticizes the Federal Communications Commission (FCC) for its recent push to classify broadband services provided by telephone and cable companies as "information services," effectively exempting them from traditional telecom/common carrier regulations.[9] He proposes that cable and telco BSPs instead: (1) be required to make their networks available to rivals on a wholesale basis or, (2) not be allowed to vertically integrate into other layers.

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8. RICHARD S. WHITT, MCI PUBLIC POLICY PAPER, CODIFYING THE NETWORK LAYERS MODEL: MCI'S PROPOSAL FOR NEW FEDERAL LEGISLATION REFORMING U.S. COMMUNICATIONS LAW (Mar. 2004), *available at* http://global.mci.com/about/publicpolicy/ presentations/layersmodelfederallegislation.pdf.

9. Appropriate Framework for Broadband Access to the Internet over Wireline Facilities, 67 Fed. Reg. 9232-9242 (proposed Feb. 28, 2002) (to be codified at 47 C.F.R pt. 51).

> In this specific context of entities possessing the ability to leverage market power into otherwise competitive markets, policymakers generally have two choices: restrict (quarantine) the upstream dominant firm, or regulate that firm to some degree (which requires regulation of wholesale price and quality of access). While a restriction on vertical integration would more directly address the market dominance concerns, appropriate regulation designed to facilitate nondiscriminatory access at various layers appears sufficient in most cases to largely negate those concerns. Many forms of vertical integration can and do bring efficiency benefits to consumers, and a relatively small likelihood of harming competition. At the same time, layers analysis helps reveal those notable instances where powerful firms at one level should not be allowed to leverage that power unfairly into adjacent levels, causing significant damage to competition and innovation. Broadband transport provided by the incumbent LECs is one such instance meriting careful regulatory scrutiny.[10]

This clearly raises the prospect of the layering model becoming a series of formal regulatory firewalls or quarantines to encourage or even mandate a "dumb pipe" approach to the provision of communications and broadband services in the future. Layering proponents, like Lessig, often argue that "a dumb pipe is critical," meaning that it would be best for BSPs not to provide any integrated content or applications over the lines they own for fear of discrimination against independent suppliers.[11] Lessig and most other proponents of layering models also stress that their models build on, and in some cases seek to protect, the "end-to-end" network design principle that has governed the Internet for so long. The end-to-end principle was first articulated by Jerome Saltzer, David P. Reed, & David D. Clark in 1984.[12] As Lessig summarizes:

> The end-to-end argument says that rather than locating intelligence within the network, intelligence should be placed at the ends: computers within the network should perform only very simple functions that are needed by lots of different applications, while functions that are needed by only some applications should be

10. WHITT, *supra* note 8, at 6, 7.

11. Teri Rucker, *Coalition Urges FCC to Craft Rule on Broadband Access*, NAT'L J. TECH. DAILY (PM ED.), Apr. 24, 2003, *available at* http://nationaljournal.com/pubs/techdaily/ (quoting Lawrence Lessig). *See also* Simson Garfinkel, *The End of End-to-End?*, MIT TECH. REV (July/Aug. 2003), *at* http://www.technologyreview.com/articles/03/07/garfinkel0703.asp?p=1.

12. Jerome H. Saltzer, David P. Reed, & David D. Clark, *End-to-End Arguments in System Design*, 2 ACM TRANSACTIONS ON COMPUTER SYS. 277 (1984).

> performed at the edge. Thus complexity and intelligence in the network are pushed away from the network itself.[13]

Thus, the relationship between the layers model, the end-to-end principle, and "dumb pipe" or "stupid network" mandates becomes evident. As Solum and Chung note, "The layers concept is implicit in the end-to-end argument," and from the two usually flows a series of assumptions about the wisdom of integrating additional intelligence into the core of the network.[14]

Until recently, however, the "dumb pipe" or "stupid network" thesis did not really have any clear public policy implications. It functioned more as an ideal to which the industry should aspire. For example, throughout the 1990s, technology guru and *Telecosm* author George Gilder repeatedly stressed the importance of dumb pipes, "dark fiber," and "stupid storage." In fact, one of Gilder's "20 Laws of the Telecosm" was "The Law of Conduits and Content":

> This law comes in the form of a commandment to *divorce content from conduit.* The less content a network owns the more content flows through it. If you are a content company, you want your content to travel on all networks, not just your own. If you are a conduit company, you want to carry everyone's content, not restrict yourself to your own. Companies that violate this rule . . . tear themselves apart. The dumber the network the more intelligence it can carry.[15]

More recently this perspective was echoed by Don Tapscott, a management consultant and author of *Digital Capital: Harnessing the Power of Business Webs*, when he argued in a *Wall Street Journal* column that, "[T]he rule is that content wants all the distribution it can get. And distribution wants all the content it can get."[16] Similarly, former AT&T engineer David Isenberg was advancing this same thesis as far back as 1997 in a now-famous essay on the *Rise of the Stupid Network*:

> A new network "philosophy and architecture" is replacing the vision of an Intelligent Network. The vision is one in which the public communications network would be engineered for "always-on" use, not intermittence and scarcity. It would be engineered for intelligence at the end-user's device, not in the network. And the

13. Lessig, *supra* note 3, at 34.
14. SOLUM & CHUNG, *supra* note 4, at 19.
15. GEORGE GILDER, TELECOSM: HOW INFINITE BANDWIDTH WILL REVOLUTIONIZE OUR WORLD 269 (2000).
16. Don Tapscott, *The Magic Kingdom as Content*, WALL ST. J., Mar. 30, 2004, at B2.

> network would be engineered simply to "Deliver the Bits, Stupid," not for fancy network routing or "smart" number translation. *Fundamentally, it would be a Stupid Network.* In the Stupid Network, the data would tell the network where it needs to go. (In contrast, in a circuit network, the network tells the data where to go.) In a Stupid Network, the data on it would be the boss.[17]

But Gilder, Tapscott, and Isenberg were generally making the case for why dumb pipes and "stupid networks" made sense from an engineering or business perspective. Again, the question left unanswered was whether the dumb pipe approach was merely a conceptual tool and a business model, or whether it should become the central animating principle for future regulation of the entire broadband/Internet marketplace. As we turn to the debate over so-called "Net neutrality," or "digital discrimination" regulation, we see that the latter may soon be the case.

II. DUMB PIPES LITE: THE NET NEUTRALITY PROPOSAL

Since the implementation of the Telecommunications Act of 1996, federal and state policymakers have been fixated with the question of how much access should be provided to the platforms owned by wireline telecom companies and cable operators.[18] While incumbent local exchange carriers have faced an extensive array of infrastructure sharing mandates, cable operators have thus far escaped similar mandates to share their networks with rivals at regulated rates. In fact, federal regulators have essentially crafted an asymmetrical industrial policy that has quarantined cable operators from forced access regulations in order to ensure they become formidable rivals to the Baby Bells. As a result of this regulatory forbearance, the cable industry has made significant investments in network upgrades to develop a high-speed, two-way pipe to the home. Eighty-four billion dollars has been invested by the industry since 1996 to upgrade infrastructure,[19] and the cable industry now controls 64 percent of the high-speed broadband market.[20]

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17. David Isenberg, *Rise of the Stupid Network*, COMPUTER TELEPHONY, Aug. 1997 (emphasis in original), *available at* http://www.rageboy.com/stupidnet.html.

18. *See generally* ADAM THIERER & CLYDE WAYNE CREWS, JR., WHAT'S YOURS IS MINE: OPEN ACCESS AND THE RISE OF INFRASTRUCTURE SOCIALISM (2003).

19. NATIONAL CABLE AND TELECOMMUNICATIONS ASSOCIATION, 2004 MID-END INDUSTRY OVERVIEW 2 (2004), *available at* http://www.ncta.com/pdf_files/Overview.pdf; Adam Thierer, *Cable Rates and Consumer Value*, 53 TECHKNOWLEDGE (July 25, 2003), *at* http://www.cato.org/tech/tk/030725-tk.html.

20. Alex Salkever, *Will Naked DSL Chill the Cable Guys?*, BUS. WK. ONLINE (Feb. 27, 2004), *at* http://www.businessweek.com/technology/content/feb2004/tc20040227_8296_tc047.htm.

But despite ongoing pleas by some policymakers and regulatory advocates for the application of structural open access mandates to both telco and cable operators, there are signs that the days of full-blown structural access may be numbered. On the cable side, federal regulators still show little interest in imposing such infrastructure sharing mandates, and no municipal government has thus far been able to gain the legal right to do so. Meanwhile, while still shackled with a host of unbundling and resale mandates, telco operators chalked up an important victory in March 2004 when the U.S. Court of Appeals for the District of Columbia handed down a blistering decision vacating most of the FCC's latest revision of the rules.[21] The Bush Administration did not seek a Supreme Court review of the rules meaning many of the unbundling mandates may gradually disappear and be replaced by voluntary access and carriage agreements.

But while these *structural* access regulations may be withering away, a new push is underway to impose *behavioral* access regulations on both telco and cable network operators. These Net neutrality/digital non-discrimination mandates have recently been advanced by several major software and e-commerce firms who have formed the Coalition of Broadband Users and Innovators (CBUI). CBUI petitioned the FCC to adopt rules ensuring that cable and telephone industry BSPs will not use their control of high-speed networks to disrupt consumer access to Web sites or other services.

In the name of preserving end-to-end openness on the Net, CBUI members argue the FCC must adopt preemptive "non-discrimination safeguards" to ensure Net users open and unfettered access to online content and services in the future. CBUI members claim such regulations are necessary because the current market is characterized by a cable-telco "broadband duopoly" that will "define the Internet for some time, and [allow] network operators to infringe or encumber the relationships among their customers or between their customers and destinations on the Internet."[22]

Consequently, CBUI members have proposed the FCC adopt what they regard as a "simple rule" to safeguard against online discrimination by BSPs. In a March 28, 2003, presentation before the agency, CBUI argued that, "The FCC can and should be proactive and act in anticipation of future harm by taking simple, non-intrusive, measured

21. United States Telecom Ass'n. v. FCC, 359 F.3d 554 (D.C. Cir. 2004).

22. *Ex parte* Filing of the Coalition of Broadband Users and Innovators, Appropriate Framework for Broadband Access to the Internet over Cable Facilities, *Declaratory Ruling & Notice of Proposed Rulemaking*, (F.C.C. filed Jan. 8, 2003) (CS Docket 02-52), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513401671.

steps."[23] What exactly is the supposedly "simple rule" or "measured steps" that Net neutrality proponents would have the FCC (or potentially even state regulators) adopt for BSPs? In a January 8, 2003, filing to the FCC, CBUI requested that the FCC adopt regulations that guarantee Net users the ability to:

> 1. lawfully roam over the Internet;
> 2. run the applications they want using the equipment they choose;
> 3. gather, create, and share information;
> 4. connect to websites absent interference by network operators.[24]

While the FCC has so far taken no action on the CBUI proposal, there are several proceedings pending at the agency to which a Net neutrality proposal could be attached.[25] In addition, Net neutrality mandates could be imposed as a condition of merger approval in the future by either the FCC or antitrust officials at the Department of Justice.

Meanwhile, state regulators have already outlined what they think a Net neutrality rule should look like. On November 12, 2002, the National Association of Regulatory Utility Commissioners (NARUC), which represents state regulatory agencies and officials, adopted a *Resolution Regarding Citizen Access to Internet Content* that claimed, "Providers of broadband services or facilities have the technical capability to create a 'walled garden' or 'fenced prairie,' that is designed to attract customers to preferred content but that also could keep consumers from reaching content other than those of the providers' choosing."[26] Moreover, the NARUC resolution continued, "It is conceivable that some providers of broadband service or facilities may have an incentive to

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23. Coalition of Broadband Users and Innovators, Discrimination on the Broadband Network: Why the FCC Should Adopt Connectivity Principles to Ensure Unfettered Consumer's Access to the Internet, Presentation to the FCC's Local & State Governments Advisory Committee 8 (Mar. 28, 2003) (transcript on file with author).

24. Filing of the Coalition of Broadband Users and Innovators, *supra* note 22, at 3-4.

25. These FCC proceedings include: Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities, (GN Docket 00-185); *Appropriate Framework for Broadband Access to the Internet over Cable Facilities* (CS Docket 02-52); *Appropriate Framework for Broadband Access to the Internet over Wireline Facilities* (CC Docket No. 02-33); *Review of Regulatory Requirements for Incumbent LEC Broadband Telecommunications Services*, (CC Docket 01-337); *Computer III Further Remand Proceedings*, CC Dockets 95-20 & 98-10).

26. NAT'L ASS'N OF REG. UTIL. COMM'RS, RESOLUTION REGARDING CITIZEN ACCESS TO INTERNET CONTENT (2002), *available at* http://www.naruc.org/ associations/1773/ files/citizen_access.pdf.

restrict Internet access to favored news sources, and if they chose to do so, it could significantly harm free and open information exchange in the marketplace of ideas."[27] Therefore, NARUC resolved that broadband wireline and cable modem users should:

> 1) Have a right to access to the Internet that is unrestricted as to viewpoint and that is provided without unreasonable discrimination as to lawful choice of content (including software applications); and,
>
> 2) Receive meaningful information regarding the technical limitations of their broadband service.[28]

More succinctly, Tim Wu of the University of Virginia Law School has articulated the following general Net neutrality principle or rule: "[A]bsent evidence of harm to the local network or the interests of other users, broadband carriers should not discriminate in how they treat traffic on their broadband network on the basis of inter-network criteria."[29] Although Wu admits that, "the newness of [the Net neutrality] concept means much unavoidable vagueness as to its operation," he argues that regulators will be able to enforce the rule by examining the positive versus negative externalities associated with carrier restrictions.[30] Wu argues that carriers should be left free to impose restrictions on network use if those restrictions generate positive externalities (or benefits) for subscribers.[31] For example, a BSP prohibition on the release of viruses on its network would generate positive externalities for almost all users and, therefore, in Wu's opinion, be allowed.[32]

But in Wu's construction of a Net neutrality rule, BSP restrictions that impose negative externalities or costs on users should be forbidden.[33] For example, a ban on Wi-Fi attachments by BSPs should be forbidden according to Wu since it would impose unnecessary burdens or costs on most network users.[34] Of course, defining positive versus negative externalities is open to its own set of disputes which regulators would have to resolve, probably over the course of numerous rulemakings. And which "costs" are under consideration here? As noted below, it seems as if many Net neutrality supporters are only concerned with the costs

27. *Id.*
28. *Id.*
29. Tim Wu, *Network Neutrality, Broadband Discrimination*, 2 J. ON TELECOMM. & HIGH TECH. L. 141, 168 (2003).
30. *Id.* at 172.
31. *Id.* at 150-51.
32. *Id.*
33. *Id.* at 150-51.
34. *Id.* at 143.

borne by users at the "edge" of the network, not the costs imposed on network owners or potential new entrants into the platform-building industry.

In essence, the CBUI and academics that support Net neutrality regulation are asking the FCC to mandate a "dumb pipe-lite" approach to the provision of broadband services. In other words, as a matter of public policy, BSPs should be discouraged from bundling new services and software into their broadband pipes. Much like the antitrust battle over which applications Microsoft should be allowed to bundle into its Windows operating system, regulatory proponents in this case are asking for restrictions on the vertical integration of content, applications, and conduit by BSPs. In the Microsoft skirmish, regulatory proponents sought the equivalent of a "dumb browser;" in the Net neutrality battle, they seek a dumb pipe.

But would a dumb pipe mandate constitute smart public policy? Is such a mandate really needed to deter supposed "discrimination" and to preserve the Net's "openness"? There are good reasons to question the assumption that such regulations are needed, even in cases where incumbent providers have significant market power at present.

III. DISINCENTIVES TO INNOVATE AND CREATE ENTIRELY NEW PLATFORMS

Do we just want one big dumb pipe, or many competing dumb *and* smart pipes? The Net neutrality proposal will force policymakers to put that question front and center. It would be highly unfortunate, and somewhat ironic, if the net result of a Net neutrality mandate is to discourage the development of alternative, competing network infrastructures. But that is exactly what it might accomplish. As Christopher Yoo, associate professor of law at Vanderbilt Law School, argues:

> [I]mposing network neutrality could actually frustrate the emergence of platform competition in the last mile. Put another way, protocol standardization tends to commodify network services. By focusing competition solely on price, it tends to accentuate the pricing advantages created by declining average costs, which in turn reinforces the market's tendency towards concentration. Conversely, increasing the dimensions along which networks can compete by

> allowing them to deploy a broader range of architectures may make it easier for multiple last-mile providers to co-exist.[35]

If a Net neutrality/dumb pipe mandate is put in place, carriers might struggle to find ways to recoup their significant fixed costs of doing business and be discouraged from further innovating. Andrew Odlyzko of the University of Minnesota's Digital Technology Center frames the question as follows: "That is the real dilemma for telecom service providers. Can they extract enough money from their customers to pay for broadband, if broadband is just a pipe?"[36]

Some argue that there may indeed be good reasons to believe that a dumb pipe *business model* has great merit and would allow adequate cost recovery by BSPs. Anton Wahlman and Brian Coyne of the equity research firm Needham & Company argue that, contrary to popular opinion, the real value in broadband networks is the bandwidth itself, not the content that flows over it.[37] High-speed connectivity, in their opinion, turns out to be the real "killer app," not content or applications.

Arguing that consumers derive the most value out of a simple, high-speed on-ramp to the Net and other data networks, they come to the conclusion that "the dumb pipe is the only money pipe." That is, broadband operators who become fixated with adding numerous bells and whistles to their broadband package will ultimately miss the real value proposition consumers care about: a speedy and reliable Internet connection. Many years ago George Gilder labeled this approach *The Law of Wasted Bandwidth*, and argued that, "The governing abundance of the information age is bandwidth: communications capacity. This law is a commandment to *waste bandwidth*. The companies that exploit bandwidth recklessly will profit by it."[38] Similarly, Odlyzko has long argued that, "[C]ontent is not king . . . . [T]here is far more money in providing basic connectivity. That is what people have always valued more, and have been prepared to pay more for."[39]

It may very well be the case that it makes good business sense for BSPs to just stick to providing a fast, dumb pipe to consumers. But,

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35. 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, 63 (2004).

36. Andrew Odlyzko, Pricing and Architecture of the Internet: Historical Perspectives from Telecommunications and Transportation 6 (last revised Aug. 29, 2004) (unpublished manuscript, on file with the University of Minnesota Digital Technology Center), *available at* http://www.dtc.umn.edu/~odlyzko/doc/pricing.architecture.pdf.

37. ANTON WAHLMAN & BRIAN COYNE, NEEDHAM, EQUITY RESEARCH NOTE: THE DUMB PIPE IS THE ONLY MONEY PIPE, 2-3 (Dec. 15, 2003), *available at* http://www.vonage.com/media/pdf/res_12_15_03.pdf.

38. GILDER, *supra* note 15, at 267.

39. Odlyzko, *supra* note 36, at 27-28.

again, as a matter of public policy, should dumb pipes be mandated as the law of the land? Should it be illegal for BSPs to provide integrated intelligence or affiliated content and applications if they so choose? This could be the upshot of a Net neutrality/dumb pipe mandate after all.

As the following section discusses, there are good reasons to allow competition in network architectures between dumb and smart systems to see which consumers truly prefer. But the most important reason to reject dumb pipe mandates lies in the investment disincentives for both existing and potential infrastructure operators. A dumb pipe regulatory mandate would essentially tell infrastructure operators and potential future operators of high-speed networks *your networks are yours in name only and the larger community of Internet users—through the FCC or other regulatory bodies—will be free to set the parameters of how your infrastructure will be used in the future*. Hearing that message, it is fair to ask why a network operator or potential operator would ever want to invest another penny of risk capital in a sector that was essentially governed as a monolithic commons or public good. As Stanford University economists Bruce Owen and Gregory Rosston argue:

> The difficulty is that if we assign property rights in access to users rather than suppliers, resulting in an efficient price of access (zero), there will be no long run supply of Internet services. A zero price yields zero revenues—a lesson many dotcoms learned too late. While the benefits of the Internet can be made available to a *particular* user at zero cost, they cannot be made available to *all* users at zero cost.[40]

Thus, they continue, "If providing Internet service is costly and there are no revenues, or revenues are less than costs, obviously there will be no Internet. Having no Internet is worse than having an inefficiently small or exclusive Internet."[41] They conclude, therefore, that:

> The commons approach simply ignores supply-side problems that arise because the demand for transmission is dependent on the supply of content, and vice versa, and because one kind of content may increase or decrease the demand for other content, or for transmission. These effects can often be taken into account by pricing, but sometimes require internalization by a single supplier. Net neutrality would ban both of these solutions.[42]

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40. BRUCE M. OWEN & GREGORY L. ROSSTON, LOCAL BROADBAND ACCESS: PRIMUM NON NOCERE OR PRIMUM PROCESSI? A PROPERTY RIGHTS APPROACH 24-25 (Stanford Inst. for Econ. Policy Research, Discussion Paper No. 02-37, 2003) (emphasis in original), *available at* http://siepr.stanford.edu/papers/pdf/02-37.pdf.

41. *Id.*

42. *Id.*

The core of the problem here is that Net neutrality regulation—like all other open access proposals before it—falls into what might most appropriately be called the "assume a platform" school of thinking. That is, proponents of forced access regulation seem to ignore market evolution and the potential for sudden technological change by adopting a static mindset preoccupied with micro-managing an existing platform regardless of the implications for the development of future networks. They see an existing platform—a railroad system, an electrical grid, a telephone network, a cable system—and they imagine that is the only network society can ever hope to have at its disposal. But what about other platforms? Is one platform enough? Can't we expect other platforms to be built? Should regulators merely regulate the most popular existing platform(s) to ensure consumers get as much out of them as possible?

This static, zero-sum mentality dominates much of the thinking over Net neutrality regulation and explains why commons proponents are preoccupied with demand side concerns and blithely assume away supply side concerns. Professors Lessig and Wu presented a perfect example of this sort of demand-side, assume-a-platform reasoning in a joint filing to the FCC, where they advanced the following justification for pre-emptive Net neutrality regulation:

> The question an innovator, or venture capitalist, asks when deciding whether to develop some new Internet application is not just whether discrimination is occurring today, but whether restrictions might be imposed when the innovation is deployed. If the innovation is likely to excite an incentive to discrimination, and such discrimination could occur, then the mere potential *imposes a burden on innovation today* whether or not there is discrimination now. The possibility of discrimination in the future dampens the incentives to invest today.[43]

Lessig and Wu obviously feel quite passionately about the question of innovation at the edge of the network. But where is the concern for innovation at the core of the network, or the innovation and investment needed to bring about entirely new network infrastructures? Apparently content with the networks of the present, Lessig and Wu seeming feel comfortable imposing regulations on existing BSPs to ensure that innovation is maximized at the edge of those existing systems.

But is such pessimism about future technological development or entirely new networks warranted? History and common sense suggest

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43. *Ex parte* Letter of Tim Wu & Lawrence Lessig 24-25, Appropriate Framework for Broadband Access to the Internet over Cable Facilities, *Declaratory Ruling & Notice of Proposed Rulemaking* (F.C.C. filed Aug. 22, 2003) (CS Docket 02-52) (emphasis in original), *available at* http://faculty.virginia.edu/timwu/wu_lessig_fcc.pdf.

the opposite is the case. Ours is an innovative culture. New technologies and industry sectors have developed in the past, and will be developed in the future, but only if creators: (1) believe they can reap the fruits of their labor and, (2) are not directly or indirectly prohibited by government from entering new markets or providing new services.

Still, skeptics will claim that the fixed costs associated with network development and deployment are substantial, so much so that it is foolish to assume rivals will rise up to offer truly competitive alternatives. Apparently, the best we can hope for once a network has been built is for its owners to share those facilities with other rivals, or at least allow the government to establish a set of regulatory standards for consumer use of that network. Genuine facilities-based competition is assumed to be an impossibility given the prohibitively expensive upfront costs of offering service.

This logic explains why CBUI members and other Net neutrality proponents premise their call for preemptive regulation on the notion of a "broadband duopoly" that will "define the Internet for some time."[44] But, as discussed in Section VII, this static thinking ignores the amazing strides that have already been made by many companies and technologies in this nascent market. Furthermore, it pretends that consumers have little more to look forward to in the broadband future. Such a conclusion seems particularly unwarranted given the fact that most consumers had not even heard of the Internet just ten years ago. No one knows what networks and technologies consumers will be using even five years from now, especially with wireless technologies now in the broadband mix.

Instead of becoming preoccupied with merely maximizing consumer welfare within the confines of existing systems, Net neutrality proponents—especially the impressive list of well-heeled companies that are part of CBUI—need to put more thought and energy into the question of how the networks of the future are going to get funded and built. The principle that CBUI members and dumb pipe proponents seem to ignore is that *competition in the creation of networks is as important as competition in the goods and services that get sold over existing networks*. Net neutrality mandates are at cross-purposes with that goal. As Ken Ferree, chief of the FCC's Media Bureau, concludes:

> [T]he effect of the regulatory overlay that the proponents of government-mandated openness seek would be to shift subtly the balance of power—hence the economic power—from the owners of distribution to the so-called fringe. That will not be without ramifications. Most importantly from my perspective is that investment will shift along with it away from platform development.

44. Filing of the Coalition of Broadband Users and Innovators, *supra* note 22.

> It is a regulatory thumb on the scales, and—at this point at least—I think the wrong side of the scales.[45]

IV. OPENNESS AND (SEMI-) DUMB PIPES WILL LIKELY PREVAIL NATURALLY

What is the optimal configuration for the high-speed networks of the future? Net neutrality proponents seem to think they know the answer to that question and want the government to take steps to preserve their preferred model well into the future. But instead of boxing this sector into today's favored approaches, isn't there something to be said for competition in network architectures? Stated differently, is today's Internet the only one we will ever know? Is it unthinkable to envision a world with multiple Internets, or "Splinternets"?[46] Although "layers" offer a fitting way of thinking about today's world, just as vertical silos made sense in the past, it could be the case that horizontal layers will not accurately describe the Internet, or Internet*s*, of the future. For this reason, Solum and Chung, leading proponents of the layers model, have argued it might be a mistake to codify the layers principle as a formal regulatory paradigm:

> Why shouldn't the layers principle be treated as a rule rather than a presumption? . . . The layers principle is supported by sound considerations of network engineering. But there is no reason to believe that these principles of network design are written in stone for all time. As the Internet evolves, it is possible that superior architectures may be conceived. Moreover, just as the Internet changed the total electronic communications system, there may be similar revolutionary innovations in the future. An absolute rule (especially a constitutional rule) would be based on the assumption that the general facts on which the argument for the layers principle relies are eternal facts, but we have no reason to believe that this is the case.[47]

Proposals to formally codify the layers model, adopt Net neutrality regulations, or impose dumb pipe mandates would largely ignore this logic and instead force a rigid new regulatory regime upon this sector in the name of preserving "openness" on today's existing systems. "[T]o give the phrase 'code is law' literal rather than figurative meaning," argues

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45. W. Kenneth Ferree, Speech at the Progress & Freedom Foundation Conference on Net Neutrality 2 (June 27, 2003) (transcript available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-235879A1.pdf).

46. Clyde Wayne Crews, *Pick Your Net*, FORBES, Apr. 2, 2001, *available at* http://www.forbes.com/forbes/2001/0402/036.html.

47. SOLUM & CHUNG, *supra* note 4, at 42.

Yoo, would, "sanction greater governmental control over the architecture of the Internet."[48]

Open systems do have many advantages over closed systems, and if that is how markets naturally evolve, so be it. Other times, however, closed systems make all the sense in the world. But policymakers should not dictate the outcome of this standards battle one way or another. They should remain fundamentally agnostic with regard to network architecture. In the end, the Internet—or whatever future interactive platforms develop—will probably be a mix of open and closed systems, and that is probably how it should be. As Owen and Rosston argue:

> While 'end-to-end' architecture has benefits, those benefits standing alone do not prove that the architecture was or will continue to be optimal. The benefits must be put onto the scales with the costs, most of which may involve the loss of services that never came into existence, as the relative prices and functionality of processors, storage, and communication links have evolved.[49]

BSPs would be committing economic suicide if they attempted to foreclose all of the network connections or opportunities that their users desired. It is in the best interests of network operators to ensure that a great degree of "openness" remains intact if they hope to retain their customers and expand their networks. As Wahlman and Coyne argue: "Consumers will gravitate to pipe providers that do not restrict their activities . . . . Any pipe provider who tries to restrict uses of the pipe to favored services (voice, video or data) in a 'walled garden' will likely be at a severe or impossible disadvantage, with consumers leaving for other pipes."[50]

Because broadband communications networks exhibit strong network externalities and "bandwagon effects,"[51] this is almost certainly likely to be the case. That is, because the value of a network tends to grow in proportion to the number of individuals using that network, the more users the better since greater interconnectedness generates substantial benefits for all users of the network *and* the network provider.[52] If BSPs were to interfere with the routine activities in which web surfers engaged, it would likely discourage network utilization and

48. Yoo, *supra* note 35, at 47.

49. OWEN & ROSSTON, *supra* note 40, at 21-22.

50. WAHLMAN & COYNE, *supra* note 37, at 5.

51. JEFFREY H. ROHLFS, BANDWAGON EFFECTS IN HIGH-TECHNOLOGY INDUSTRIES 30-31 (2001).

52. *Id.* at 29 (Another variant of this theory is known as "Metcalfe's Law," after Bob Metcalfe, the inventor of Ethernet and the founder of 3Com. Specifically, "Metcalfe's Law" states that the value of a network goes up as a square of the number of its users, which not exactly the same thing as saying that value is directly proportional to network size.).

expansion, thus sacrificing future profits. Such meddling would be bad for business and generate negative publicity. Moreover, such meddling would send a powerful signal to rival BSPs that an opportunity existed to enter that market and offer consumers a more open web surfing experience.

It is in the best interests of broadband providers to carry as much traffic as possible and even allow other firms to lease capacity from them and resell service on their own. From the incumbent's perspective, it will often make more sense to encourage a competitor to serve the public over the incumbent's existing wires rather than encouraging them to build new platforms and offering consumers a way to bypass the incumbent's network altogether. Incumbents will want to set the wholesale rate just high enough to recoup their fixed costs without charging so much as to drive rivals off their network entirely. Debates over mandatory open access regulation often overlook this point.

To summarize, network restrictions or bundling efforts may not always yield beneficial results for BSPs. As Odlyzko argues, "Open networks are likely to win because they can attract more revenues from users."[53] Gilder agrees: "In a broadband world . . . the most open network will flourish and proprietary networks will wither. Content providers will naturally want to put their programming on everyone's conduits, and conduit owners will want to carry everyone's content."[54]

For example, recognizing the potential value of this business approach, Qwest announced in early 2004 that it would offer consumers "naked DSL" service that did not include bundled phone service. "Customers are telling us that they want greater flexibility when it comes to selecting communications services, which is why we decided to offer DSL with no phone service," said Qwest Chairman and CEO Richard Notebaert in announcing the plan.[55] "We're in a competitive situation in all our markets," Qwest spokesman Tyler Gronbach told *Forbes*, noting that Qwest is losing local phone line sales as customers substitute wireless or Internet telephone services for traditional wireless access. "If we can keep a customer by giving them a broadband service that's what it's all about," he said.[56]

Business Week also reported that consumers and analysts can "Expect other Baby Bells to follow suit as the Qwest offer will likely prove contagious. More important, Notebaert's move underscores the growing realization by telecomm providers that broadband hookups will

53. Odlyzko, *supra* note 36, at 28.
54. GILDER, *supra* note 15, at 172.
55. Salkever, *supra* note 20 (quoting Qwest Chairman and CEO Richard Notebaret).
56. Reuters, *Qwest to Offer DSL Without Voice, National Mobile*, FORBES (Feb. 25, 2004), *available at* http://www.forbes.com/markets/newswire/2004/02/25/rtr1274740.html.

become a bigger revenue source sooner rather than later. This will be made possible as more and more households sign up for a fat pipe while cutting their landline or opting for cheaper Net telephony service from their cable companies."[57] Indeed, in the summer of 2004, Verizon announced plans for "naked DSL" offerings in 12 states to remain competitive with cable.[58]

Nonetheless, it would be unwise for regulators to adopt a rule mandating BSPs provide consumers with a completely "dumb pipe" since policymakers have no way of knowing what the optimal arrangement might be. Again, some BSPs may experiment with varying degrees of vertical integration and layer-jumping in an attempt to provide a bundle of services that is profitable for the company and useful for consumers. And, importantly, many broadband customers will *not* want a purely dumb pipe. The addition of certain integrated services and applications may enrich the web-surfing experience for entry-level broadband subscribers, or at least make it easier for them to get started.

It is easy for highly-skilled Internet engineers and academic digerati to imagine that they speak for the hoi polloi when it comes to dumb pipe mandates. They presume that their personal preferences would make sense for the broader universe of Internet users. In reality, they speak only for that segment of our society who has more extensive experience with high-speed networks, Internet technologies and online services.

Early adopters and technology mavens are not representative of the broader population of average or first-time Internet users. For the relatively unskilled or inexperienced Net surfer, just figuring out how to turn on their computer can sometimes be a challenge. It is hard to imagine how these consumers would be well-served by a purely dumb pipe approach that prohibited a BSP from integrating any intelligence whatsoever into their networks. As Odlyzko notes, "The 'stupid network' is only stupid in the core, and imposes huge burdens on end users. Many of those users might be willing to sacrifice some of the openness and flexibility in order to be relieved of the frustrating chore of being their own network administrators."[59] This might explain the continued popularity of America Online's "guided tour" approach to Web surfing. If consumers really wanted a pure dumb Net connection, then why does AOL's walled garden have over 30 million subscribers worldwide while charging $23.90 per month?[60]

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57. Salkever, *supra* note 20.

58. Marguerite Reardon, *Verizon to Offer 'Naked' DSL*, CNET NEWS.COM (May 26, 2004), *at* http://news.zdnet.com/2100-9584_22-5221095.html.

59. Odlyzko, *supra* note 36, at 23.

60. AMERICAN ONLINE, WHO WE ARE, *at* http://corp.aol.com/whoweare/index.shtml (last visited Mar. 22, 2005).

Moreover, there are other reasons why BSPs might need to configure network architectures differently or even restrict certain online activities. As they already do today, carriers may adjust the speed traffic flows to provide faster downloads than uploads. Similarly, to ensure steady traffic flows and network integrity, network operators may seek to curb excessive bandwidth usage by some users, or at least price discriminate to encourage bandwidth conservation. Concerned about theft of service, some carriers may also take steps to restrict network sharing through wireless devices. Again, price discrimination may be utilized to solve that problem without directly prohibiting certain activities. Finally, many subscribers will expect their carriers to take steps to prevent viruses or block excessive Spam. While all these actions would technically violate the "end-to-end" principle and "Net neutrality," in general there are strong incentives for policymakers to permit such practices.

Finally, more sophisticated web surfers who prefer the pure dumb-pipe approach will probably be able to largely achieve it on their own anyway, and they are already capable of doing so today. If they don't like seeing the BSP's default website when they first get online, they will almost certainly be able to switch to another. And even integrated applications and devices that BSPs designate for use on their networks will probably be fairly easy to evade if consumers do not find them useful or interesting.

If evading those integrated applications or services proves impossible, however, that is still no reason for regulators to adopt a preemptive non-discrimination rule. BSPs should remain free to configure their networks however they wish. Moreover, excessive meddling or micro-management of the web surfing experience is likely to result in a consumer backlash over time and drive users to other alternatives. And those alternatives will likely develop even more rapidly if existing carriers attempt to over-zealously restrict online activities. As Odlyzko concludes, "We are likely to end up with a system like the multi-modal transportation system of today, which is rife with discriminatory practices (just think of the variation in prices by household moving companies), but where such practices are limited to a tolerable degree."[61]

61. Odlyzko, *supra* note 36, at 25.

V. WHAT ABOUT REGULATORY CAPTURE AND PROPERTY RIGHTS?

Surprisingly, the literature on Net neutrality and dumb pipe theory has very little to say about these two issues. Given the long and lamentable history of telecommunications regulation being captured by various interests for their own ends, it seems unusual that this point would be ignored.[62] As Judge Richard Posner has argued:

> Because regulatory commissions are of necessity intimately involved in the affairs of a particular industry, the regulators and their staffs are exposed to strong interest group pressures. Their susceptibility to pressures that may distort economically sound judgments is enhanced by the tradition of regarding regulatory commissions as "arms of the legislature," where interest-group pressures naturally play a vitally important role.[63]

Today, it is hardly remarkable to think of regulation in such terms, as news reports are replete with tales of how various special interest groups attempt to "game" the regulatory process in their favor. The debate over Net neutrality regulation is certainly not immune from such pressures or tendencies. Indeed, the motivations of some CBUI members may be less than pure in calling for seemingly innocuous rules for online networks.

It is perhaps less surprising that the literature has had little to say regarding property rights. Many economists simply ignore the question of what rights broadband service providers have in their networks, or even assume that such networks should be treated as public goods or natural monopolies and regulated at will. But this view cannot stand for long. Cable and telephone companies have genuine property rights in the networks they develop and own, and courts are increasingly beginning to acknowledge this fact.

Some critics argue that these companies do not and should not possess the same sort of property rights held by other industries or businesses given their highly regulated histories. In this sense, critics of a property rights regime for broadband networks claim that open access regulation serves as a reparations policy that can help right the wrongs of the (regulatory) past. That is, it will help provide restitution for the fact

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62. *See generally*, George Stigler, *The Theory of Economic Regulation*, 2 BELL J. ECON. & MGMT. SCI. (1971), *reprinted in* THE ESSENCE OF STIGLER 243 (Kurt R. Leube & Thomas Gale Moore eds., 1986); *see also* Sam Peltzman, *Toward a More General Theory of Regulation*, 19 J.L. & ECON. 211 (1976).

63. RICHARD A. POSNER, NATURAL MONOPOLY AND ITS REGULATION 92 (Cato Institute, 30th ed. 1999).

that some companies were given an unfair advantage through years of protected franchise monopolies and guaranteed rate-of-return regulation.

But this is a weak rationale for rejecting property rights in formerly regulated network industries. Telephone companies, cable operators, and other broadband service providers are all private, shareholder-owned entities. The risks inherent in the massive ongoing investments being made by these companies now fall squarely on the shoulders of these firms and their investors. While some of the underlying infrastructure of the regulated era of the past remains in place, it is increasingly becoming obsolete and is gradually being replaced. Billions of dollars of new investment is made every year by many of today's network providers without the assumption that the government and captive ratepayers will be there to bail them out in the future. A forced access mentality, however, argues for a return to the methods of the past as costs are spread more widely throughout the industry, and networks are shared as natural monopolies or essential facilities. This represents a step backward and entails constant regulatory oversight and intervention in the Internet sector.

The reason it is important to keep property rights in mind is because Net neutrality mandates or a rigid application of the network layers model might be viewed by some judges in the future as an unconstitutional taking of a network owner's property rights. While such a position would not likely have been adopted in the regulated monopoly era of the past, it is increasingly likely that judges will take such regulatory takings claims more seriously in an era of contestable, competitive markets.[64]

VI. THE IMPORTANCE OF PRICING FLEXIBILITY

Often overlooked in discussions about Net neutrality mandates is the role of pricing, and pricing flexibility in particular. CBUI members such as Disney, Amazon, Yahoo!, eBay and others cannot really be concerned that their websites or services are at risk of ever being completely blocked by network operators. After all, if BSPs shut off consumer access to one of these popular providers, Internet denizens would be outraged and likely mount a mini-revolt. Cable and telco firms are not about to make these content providers into the darlings of the digital world.

But while outright blocking of such websites seems extremely unlikely, what may have Disney, eBay, Amazon, and others so concerned is the potential reworking of Internet access pricing schemes in the near

64. *See* Daniel F. Spulber & Christopher S. Yoo, *Access to Networks: Economic and Constitutional Connections*, 88 CORNELL L. REV. 885, 933-95, (2003).

future. One of the most interesting debates behind the scenes in recent years involves the question of how broadband access should be priced. Would a per-minute or per-bit pricing scheme help conserve pipe space, avoid congestion, and recover costs and enable BSPs to plow the savings into new capacity? Possibly, but nothing much has come of this debate, and no carrier has acted on such a plan for two reasons. First, broadband operators are probably concerned that such a move would bring about unwanted regulatory attention. Second, and more importantly, cable and telco firms are keenly aware of the fact that the web-surfing public has come to view "all you can eat" buffet-style, flat-rate pricing as a virtual inalienable right.[65] Broadband operators probably don't want to rock the boat too soon with more creative pricing schemes, but someday they may have to as bandwidth-intensive web sites start to eat up more and more pipe capacity. As Gilder has noted, "Everyone wants to charge different customers differentially for different services. Everyone wants guarantees. Everyone wants to escape simple and flat pricing. Forget it."[66]

While simple and flat pricing seems like the sensible approach, it remains highly likely that some BSPs will eventually attempt to craft tiered or metered pricing schemes. While some consumers will cry foul, a number of bandwidth-intensive Internet vendors and website operators will likely be absolutely apoplectic over such a move, and some may even run to regulators seeking redress. This raises the important question of whether or not broadband operators should have the right to price network access in this manner. And, would a dumb pipe mandate or Net neutrality rule prohibit such innovative pricing schemes from being employed in the first place?

The answer remains uncertain, but clearly, if some form of network non-discrimination rule is on the books, some website operators and content providers may push to invoke it against a BSP that suddenly announces a new metered pricing scheme for bandwidth-intensive web offerings. It would be very unfortunate if this scenario came to pass, since such creative pricing schemes may be part of the long-run solution to relieving Internet congestion and allowing carriers to accurately assess user charges for Web activities. Supply and demand could be better calibrated under such pricing schemes and broadband operators may be

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65. Odlyzko, *supra* note 36, at 29.

> Perhaps the most potent limitation on the proposed new architectures for the Internet, and the associated discriminatory practices, is posed by a range of factors deriving ultimately from behavioral economics. People react extremely negatively to price discrimination. They also dislike the bother of fine-grained pricing, and are willing to pay extra for simple prices, especially flat-rate ones.

Id.

66. GILDER, *supra* note 15, at 206.

better able to recoup sunk costs and make new investments in future infrastructure capacity or network services. As Odlyzko argues:

> Thus even if it is not optimal from a global point of view, it might be necessary to introduce complexity in order to be able to construct and operate the telecom infrastructure, especially the residential broadband networks that are so eagerly awaited by government and industry leaders. That might mean allowing carriers to charge differently for movie downloads than for Web surfing. That, in turn, might require a new network architecture. Such a move would not be unprecedented. The key (although seldom mentioned) factor behind the push for new network architectures appears to be the incentive to price discriminate. It is an incentive that has been operating since the beginnings of commerce.[67]

The bottom line is that it should be left to markets, not regulators, to determine what pricing schemes are utilized in the future to allocate scarce space on broadband pipes. The broadband marketplace is still in an early developmental stage, having only existed for a few years. What business model will prevail or make network activities profitable in the future? Pay-per-view? Advertising? Metered pricing schemes? Some hybrid of these and other systems? No one knows for sure, but policymakers need to allow network operators the freedom to innovate and employ creative pricing and service schemes so that market experimentation can answer that question.

VII. MARKET POWER, CONTESTABILITY AND *CARTERPHONE*

Vertical integration of broadband services by a network owner can have significant consumer benefits. Even if one assumes that this industry is characterized by a duopoly structure, it does not necessarily follow that cable and DSL providers will restrict output in terms of digital services. If current BSPs have significant market power, they still have a strong incentive to carry *more* content and websites to maximize consumer utility and get them to spend more money for access to the service. If a carrier attempted to greatly curtail or limit certain types of web services, it might discourage subscribership and thus reduce profits.

In his now famous 1969 *Stanford Law Review* article entitled, *Natural Monopoly and Its Regulation*, Richard Posner provocatively argued "It is not clear that an unregulated monopolist will normally charge a price that greatly exceeds what a non-monopolist would charge for the same service; nor is it clear that society should be deeply

67. Odlyzko, *supra* note 36, at 3.

concerned if a natural monopolist does charge an excessive price."[68] Even if returns did run higher than normal for a given firm considered to possess a monopoly, Posner points out that this may act as a pro-competitive stimulus for innovation and market entry. "In the long run, a persistently very large spread between price and cost may spur entrepreneurs to devise ingenious methods of challenging or supplanting the monopolist."[69] Therefore, short-run intervention is likely to be counter-productive and delay or prohibit the optimal long-run situation policymakers desire.[70]

But the good news is that the current broadband marketplace is growing increasingly competitive with each passing month.[71] The picture will only get rosier as wireless alternatives become more ubiquitous and other wireline providers (especially electric utility companies) start jumping into the broadband market.[72] It is very unlikely that whatever market power incumbent firms continue to have can be effectively leveraged over into the broadband service market.[73] Still, Net neutrality/dumb pipe proponents will persist in their argument that legislators or regulators need to implement a preemptive standard of regulatory review or consumer protection. For example, many CBUI filings stress the benefits of FCC enforcement of the device attachment standards found in the famous *Hush-a-Phone* case[74] and the FCC's *Carterfone* decision,[75] which laid out some basic guidelines for how consumers could attach certain devices to the monopolistic phone network of the time. Net neutrality proponents suggest that these

68. POSNER, *supra* note 63, at 7.

69. *Id.* at 14.

70. For a more extensive discussion and critique of the "Chicago School" literature on antitrust theory, see Joseph Farrell & Philip J. Weiser, *Modularity, Vertical Integration, and Open Access: Towards a Convergence of Antitrust and Regulation in the Internet Age*, 17 HARV. J.L. & TECH. 85 (2003).

71. RICHARD O. LEVINE ET AL, PROGRESS & FREEDOM FOUNDATION, SPECIAL REPORT: TRENDS IN THE COMPETITIVENESS OF TELECOMMUNICATIONS MARKETS: IMPLICATIONS FOR DEREGULATION OF RETAIL LOCAL SERVICES (Dec. 2003), *at* http://www.pff.org/publications/ communications/121103specialreportcontestability.pdf.

72. Barry M. Aarons, Don't Call—Just Send Me an E-mail: The New Competition for Traditional Telecom (Inst. for Pol'y Innovation Rep. No. 175, Dec. 2003), *at* http://www.ipi.org/ipi%5CIPIPublications.nsf/0/24F9D284374552FF86256E82006DFA1F/$File/QS-TelecomCompetition-1.pdf?OpenElement.

73. Robert W. Crandall et al, *The Empirical Case Against Asymmetric Regulation of Broadband Internet Access*, 17 BERKELEY TECH. L.J. 953 (2002).

74. Hush-A-Phone v. United States, 238 F.2d 266, 269 (D.C. Cir. 1956). In the *Hush-a-Phone* decision, the D.C. Circuit held that a telephone subscriber had the "right reasonably to use his telephone in ways which are privately beneficial without being publicly detrimental." The FCC then translated this principle into a specific regulatory edict that ordered AT&T to allow telephone customers to attach devices that did not injure AT&T or impair the operation of the telephone system.

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

regulations should be modified and applied to modern networks and carriers in a similar fashion.

But for the many other reasons discussed above, a preemptive regulatory regime would be counter-productive since it might allow others to "game" the regulatory system, or would discourage BSPs from building new network infrastructure in the first place. Moreover, regarding the *Hush-a-Phone* and *Carterfone* standards and corresponding FCC interconnection/attachment mandates, it is important to remember that those decisions and rules were handed down in an era of government-protected monopoly for telecommunications. There are no longer any protected monopolies in this marketplace. Rules structured for an environment of government-sanctioned monopoly are unnecessary in an environment characterized by open markets, competition, property rights, and freedom of contract. For example, there are no such "device attachment" regulations for the automotive industry or even the computer software sector. In those and countless other industries, market negotiations, contracts and the common law—not preemptive government regulations—are left to sort out difficult controversies when they arise.

In an environment of government created and protected monopoly, special rules must obviously apply. But in an environment free of government restraints on entry and characterized by a degree of contestability that was almost unimaginable in past decades, there is no need for *Carterphone*-like mandates. *Carterphone* rules were thought to be necessary only because competition was thought to be impossible. In today's modern marketplace, constant technological change and the threat of new entry provides the most important safeguards against the threat of consumer abuse.

VIII. WHAT TO WATCH FOR NEXT

It remains uncertain where the debate over Net neutrality and dumb pipes will turn next, but recent developments foreshadow the likely incorporation of these concepts into future public policy initiatives. In a February 2004 speech, FCC Chairman Michael Powell endorsed a list of CBUI-like principles as general guidelines, or "best practices," for industry to follow.[76] FCC Commissioner Michael Copps has gone much further and suggested the Net neutrality principles be converted into clear regulatory standards. In an October 2003 address entitled *The Beginning of the End of the Internet?*, Copps argued that the "Internet may be dying" and only immediate action by regulators can reverse the

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

situation. Employing some fairly apocalyptic rhetoric, Copps went on to argue that:

> I think we are teetering on a precipice . . . we could be on the cusp of inflicting terrible damage on the Internet. If we embrace closed networks, if we turn a blind eye to discrimination, if we abandon the end-to-end principle and decide to empower only a few, we will have inflicted upon one of history's most dynamic and potentially liberating technologies shackles that make a mockery of all the good things that might have been.[77]

Such rhetoric seems wildly out of touch with reality, but it nonetheless foreshadows the continued push we can expect for Net neutrality mandates by some federal or state regulatory officials.

Meanwhile, unending turmoil in the telecom marketplace and regulatory arena has led to renewed calls for Congress to reopen the Telecommunications Act of 1996.[78] If the Act is revisited, it is almost certain that lawmakers will be forced to grapple with the increasingly illogical regulatory classification schemes that continue to govern this industry. This opens the door for the layering model to become the replacement regulatory paradigm for communications and broadband.

A few marketplace developments also bear watching since they each have the potential to raise similar concerns about vertical integration and layer-hopping:

A. Comcast-Disney (or whatever follows)

Although the deal has already been abandoned, Comcast's proposed merger with Disney generated a great deal of hand-wringing in public policy circles, especially since it came on the heels of a bitter debate in Washington over the relaxation of media ownership regulations.[79] Much like the earlier conduit-content marriage between Time Warner and AOL and the News Corp. and DirecTV deal, approval of the Comcast-Disney combination would have almost certainly been conditioned by numerous pipe *and* program access requirements. Of course, this deal could be resuscitated in the future, and other combinations along these

77. Michael Copps, The Beginning of the End of the Internet? Discrimination, Closed Networks, and The Future of Cyberspace, Remarks at the New America Foundation (Oct. 9, 2003) (transcript at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-239800A1.pdf).

78. Alan Breznick, *Powell Stresses Need for Total Telecom Act Overhaul*, COMM. DAILY, Mar. 8, 2004, at 1; Teri Rucker, *Sen. Stevens Seens Need for Rewrite of Telecom Law*, NAT'L J. TECH. DAILY (PM ED.), Jan. 26, 2004.

79. Farhad Manjoo, *One Cable Company to Rule Them All*, SALON, Mar. 17, 2004, *at* http://archive.salon.com/tech/feature/2004/03/17/comcast/index_np.html; Dan Fost, *Fewer Moguls, Bigger Empires Congress Wrestles With Media Ownership*, S. F. CHRON., Feb. 12, 2004, at B1, *available at* 2004 WL 7620863.

lines can be expected which raise layer-crossing concerns.[80] Ironically, while a great deal of Chicken Little rhetoric accompanied the AOL-Time Warner announcement, few headlines are being written about the deal today as it gradually unravels. And putting the merger with AOL aside, rumors have always persisted about in-house fighting among the different content providers within Time Warner.[81] Given the recent troubles the company has experienced, it may be the case that the AOL-Time Warner deal serves as vindication for the thesis put forward by Gilder and others that a dumb pipe *business model* will eventually show itself to be the more sensible path to follow. But it remains to be seen if the company undertakes the sort of voluntary divestiture of content and conduit that Wahlman and Coyne advocate.[82]

B. Telco Entry Into Video Marketplace

At various times over the past decade, telephone companies have expressed interest in expanding into the video programming business to compete head-to-head against cable and satellite multi-channel video providers.[83] Most trials never got out of the testing stage, however, due to financing considerations, questionable consumer demand, doubts about access to high-quality programming, and the inherent capacity limitations of existing telephone networks. Expanding fiber investment and deployment alleviates at least the last of those concerns. It also encourages the telecom operators to expand into the video programming marketplace to offer customers new services over those massive pipes and help recoup the cost of their initial investments. Following this logic, *Business Week* reported in May 2004 that Verizon was planning to seek cable-TV franchises in parts of Texas and eight other states to square off against cable and satellite competitors.[84] And in June of 2004, SBC Communications announced plans to invest between $4 to $6 billion in new "fiber to the curb" networks to do the same.[85]

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80. Marc Gunther, *The Bid's Dead, but Don't Say Adieu Yet*, FORTUNE, May 17, 2004, at 34.

81. Matt Welch, *The 'Big Brother' Who Never Was: AOL Time Warner Was Never as Dangerous as Some Critics Suggested*, NAT'L POST, July 27, 2002, *available at* http://mattwelch.com/NatPostSave/AOL.htm.

82. *See generally* WAHLMAN & COYNE, *supra* note 37.

83. Thomas W. Hazlett, *Should Telephone Companies Provide Cable TV?*, 13 REG. 1, (1990), *available at* https://www.cato.org/pubs/regulation/regv13n1/reg13n1-hazlett.html.

84. Steve Rosenbush et al, *Verizon: Take That, Cable*, BUS. WK. ONLINE (May 24, 2004), *at* http://www.businessweek.com/magazine/content/04_21/b3884113_mz063.htm; Julie Creswell, *Is the Most Powerful Man in Telecom Pulling a Megabluff?* FORTUNE, May 31, 2004, at 120, *available at* http://www.fortune.com/fortune/technology/articles/0,15114,638374,00.html.

85. Reinhardt Krause, *SBC Will Square Off Against Cable Rivals in Video, TV Services*, INVESTOR'S BUS. DAILY, Jun. 23, 2004, at A4.

But while fiber rollout solves the capacity concerns, it will be more interesting to see how the telcos go about filling up their new high-speed pipes with value-added services and video programming in particular. Will they merely seek to cut deals with independent programmers, or even those networks already owned by other media companies? Will cable providers be forced to provide the telcos access to channels they own or carry? Or will telcos instead seek to enter the video marketplace as a full-fledged, integrated media providers by buying up content providers or developing their own proprietary in-house studios? In essence, this is nothing more than a classic "make-vs.-buy" decision. This will provide one of the most interesting dumb pipe case studies in coming years since it could be a make-or-break business model decision for telecom operators. Importantly, if they chose to provide their own content (or purchase others who could provide it immediately for them), policymakers might disallow such a proprietary business model citing common carriage precedents. And under a strict construction of the network layers model, such content-conduit integration might be prohibited even though it already exists through much of the rest of the video programming marketplace. (Think AOL-Time Warner or News Corp.-DirecTV.)

C. Wireless Broadband

The rise of licensed and unlicensed wireless broadband experiments has garnered much attention as of late, and deservedly so. Wi-Fi, Wi-Max and other types of wireless broadband infrastructures could potentially offer millions of consumers a very credible alternative to hard-wired cable or telco broadband service. But if Net neutrality/dumb pipe regulations are eventually applied to wireline broadband offerings, will they also be extended to their wireless counterparts? Cellular providers currently face no such regulations and already offer some integrated, proprietary services alongside their basic bundle of voice minutes. If this proprietary model is extended as wireless broadband develops, many licensed carriers will likely seek to offer at least *some* integrated services along with their new service bundle. It remains to be seen how policymakers will greet such a move.

D. Microsoft

The ongoing Microsoft antitrust saga will continue to provide a number of test cases for the layers model. The question of vertical integration and layer jumping has been at the very core of both the U.S. and E.U. cases against the firm. The next flashpoint will likely be the integration of VoIP (Voice over Internet Protocol) functionality into

future versions of Microsoft's operating systems.[86] Many smaller Internet telephony providers will likely decry such a move and look to use the antitrust process to limit Microsoft's ability to innovate in this fashion.

Ironically, Microsoft was one of the original and most vociferous members of the CBUI coalition as it feared physical infrastructure owners might discriminate against their products or services. But Microsoft has recently backed off and largely abandoned its support for CBUI, perhaps after realizing that its support of Net neutrality mandates was hypocritical or could even come back to haunt them in the future.[87] Perhaps the firm realized that Net neutrality regulations could eventually come to apply to the services they offer over their Xbox video game platform, which could become "the world's ultimate broadband appliance."[88] Cynthia Brumfield, president of Broadband Intelligence, states: "There are a lot of people with the view that the Xbox will be a Trojan horse into the home. Once you get it into the home, you have a base from which to deliver a whole host of telecom services. [Microsoft] wants to be the ubiquitous provider of data services."[89] Meanwhile, Microsoft is aggressively marketing its new Media Center PC suite of services, which seek to integrate television, DVD, music player, and photo viewing capabilities into one device, all powered by Microsoft's XP Media Center Edition operating system. Stephen H. Wildstrom of *Business Week* notes:

> Microsoft has long lusted after your living room. Facing a saturated market for PCs, the company sees the convergence of computing and entertainment as an opportunity to reignite its growth. The software maker has achieved some success with the Xbox game console, but the big prize is music, movies, and television.[90]

This clearly raises the prospect of Microsoft becoming a "layer-breaker" on many different levels.

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86. Dugie Standeford, *Microsoft Wants Courts to Determine How It Handles Future Innovation*, COMM. DAILY, Mar. 22, 2004, at 4-6.

87. Ben Silverman, *Gates Halts Big 'Neutrality' Push*, N.Y. POST, Dec. 15, 2003.

88. Kevin Fitchard, *Microsoft's X-Box as Broadband Trojan Horse*, TELEPHONY ONLINE (Nov. 12, 2001), *at* http://telephonyonline.com/mag/telecom_microsofts_xbox_broadband.

89. *Id.*

90. Stephen H. Wildstrom, *Microsoft's New Gig for PCs: Entertainer*, BUS. WK., Sep. 23, 2002, at 24, *available at* http://www.businessweek.com/magazine/content/02_38/b3800039.htm.

E. Google

Finally, the continuing meteoric rise of Google as a major player in the applications layer also poses some interesting questions for the layers model. *Can a Big Google Be Trustworthy?* asked the title of a recent *Associated Press* story.[91] Needless to say, that's the question many layer advocates might be asking regulators to consider as the company grows larger or allies with service providers in different layers. A recent *Wired* magazine cover story entitled *Googlemania!* presented "4 Scenarios for the Future of Google," and imagined a world in which "Googlesoft" becomes a dominant player in many different markets, including operating systems.[92] Thus, while it is dumb pipes and dumb browsers today, tomorrow it may be dumb search engines.[93] In fact, websites are already popping up worldwide that propose regulating Google as a public utility.[94]

CONCLUSION

To summarize, this paper has argued that:

- Layer breakers should not be considered lawbreakers. There can be efficiencies associated with vertical integration of broadband services, applications, and content that should not be precluded via government regulation, whether it be through network layers regulation or Net neutrality mandates.

- The goal of public policy in this matter should not be to simply optimize outcomes within existing network architectures but to encourage the development of entirely

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91. Associated Press, *Can a Big Google Be Trustworthy* (Mar. 22, 2004), *available at* http://www.rockymountainnews.com/drmn/technology/article/0,1299,DRMN_49_2747812,00.html.

92. Tom McNichol, *4 Scenarios for the Future of Google*, WIRED, Mar. 2004, at 118, *available at* http://www.wired.com/wired/archive/12.03/google.html?pg=6.

93. There are good reasons to question the wisdom of locking in Google as a public utility when search engine technology is evolving so rapidly. *See generally* Kevin Maney, *Future Search Efforts Will Make Google Look Like 8-Tracks*, USA TODAY, Mar. 31, 2004, at 4B, *available at* http://www.usatoday.com/tech/columnist/kevinmaney/2004-03-30-search_x.htm; Adam Thierer & Clyde Wayne Crews, *Google as a Public Utility? No Results in This Search for Monopoly*, TECHKNOWLEDGE No. 65, (Cato Inst., Wash. D.C.), Nov. 14, 2003, *available at* http://www.cato.org/tech/tk/031114-tk.html.

94. *See* Google Watch Web page at: http://www.google-watch.org/ (last visited May 23, 2004). *See also* Simon English, *Google Float May Make It a Target of Net Activists*, DAILY TELEGRAPH (UK), Oct. 25, 2003, *at* http://www.money.telegraph.co.uk/money/main.jhtml?xml=/money/2003/10/25/cngoogl25.xml&menuId=242&sSheet=/money/2003/10/25/ixfrontcity.html.

new network architectures, platforms, and providers. Net neutrality mandates would sacrifice long-term innovation for minimal short-term gains. Instead of being so preoccupied with merely maximizing consumer welfare within the confines of existing systems, proponents of Net neutrality need to put more thought and energy into the question of how the networks of the future are going to be funded and built.

- Policymakers should practice agnosticism with regard to the technological choice between open and closed systems, or dumb versus smart networks. There is value in allowing experimentation in terms of broadband architectures and pricing schemes, even when such experimentation conflicts with the "end-to-end" principle.

- It should not be forgotten that Net neutrality mandates could open the door to a great deal of potential "gaming" of the regulatory system and allow firms to use the regulatory system to hobble competitors. Worse yet, it will encourage more FCC regulation of the Internet and broadband markets in general.

To end where we began, it is worth reiterating how the open-versus-closed or dumb-versus-smart system dichotomy greatly oversimplifies matters. Today's Internet and the networks of the future will probably need to be a little bit of both. As Odlyzko aptly concludes:

> While the Internet should appear as a simple network, it will need sophisticated technical controls . . . as well as the right economic incentives. Thus it will require much intelligence inside, just as today's game consoles, although they appear simple to the user, often have more computing power inside than the Cray-1 supercomputer. The future of the Internet will be a competition between simplicity and novelty, and while simplicity will be essential to enable novelty, it is never likely to win completely. The blame for this belongs to us, the users, as we allow our requirements to grow.[95]

95. Andrew Odlyzko, The Stupid Network: Essential Yet Unattainable (Sep. 15, 1999) (unpublished manuscript, on file with the University of Minnesota Digital Technology Center), *available at* http://www.dtc.umn.edu/%7Eodlyzko/doc/stupid.unattainable.txt.

RIGHTS MANAGEMENT IN DIGITAL MEDIA CONTENT:

A CASE FOR FCC INTERVENTION IN THE STANDARDIZATION PROCESS*

BY JOHN M. WILLIAMSON**

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** Mr. Williamson currently practices intellectual property law as an associate in the Washington, D.C. office of Finnegan, Henderson, Farabow, Garrett, and Dunner, LLP. Mr. Williamson holds a B.A. (Economics), an M.S. (Telecommunications), and a J.D., all from the University of Colorado at Boulder. The views expressed in this article are the author's alone.

INTRODUCTION

Government mandates dictating the course of technological progress inspire great controversy. In environments where inventors and investors forge innovative businesses at a breakneck pace, such mandates are rightly viewed with particular disdain. "[I]f a programmer or an engineer with a bright idea has to go to Washington, hat in hand and lawyers in tow, to request permission to sell a better product . . . we are on our way to suffocating innovation in this country."[1]

But perspectives change when those bright ideas and better products tend to enable criminal behavior and threaten the foundation of entire industries. Technological progress must pause under such circumstances. Often, government must intervene to inspire compromises, weigh options, reconsider values, and strike new balances.

Such a situation has arisen in the digital media environment. New and developing technologies allow pirates to illegally access and distribute digital media content on a global scale. These technologies hold the potential to irreversibly erode important legal rights in media content.

Although the media industry's content is theoretically protected from such piracy by copyright law, the enforcement of that law has proven challenging if not impossible. Instead, copyright owners seek to fight infringement-enabling technology with technology of their own. Specifically, copyright owners are pursuing technological self-help in the form of digital rights management (DRM) technologies. Generally speaking, these technologies centralize control, track content, and enforce restrictions of use.

1. Rob Pegoraro, *TiVo vs. the Broadcast Flag Wavers*, WASH. POST, Aug. 1, 2004, at F6.

This self-help initiative poses several interesting challenges. First, given that these new DRM technologies restrict consumer freedom *vis-à-vis* current technologies, the consumer perceives DRM as technological regress. The consumer also remains wary of DRM as most consumers either (1) do not respect the media industry copyright at all, or (2) more sympathetically, believe that DRM technologies will encroach upon their fair use of media content. In short, consumer acceptance of DRM technologies poses an enormous challenge. Consumers will be more likely to accept a DRM standard if they are given the opportunity to voice their concerns, and if the resulting standard accounts for some degree of flexibility and fair use. Government processes allow for such public participation, and government oversight can ensure a standard with an appropriate level of flexibility and fair use.

Second, in order to competently address all digital media piracy threats, a true, comprehensive DRM system requires standardization, and importantly, requires the participation of consumer electronics companies. Such participation remains unlikely. Indeed, the DRM rift between copyright owners and consumer electronics companies has been likened to a "civil war" between Hollywood and Silicon Valley.[2] Government has brokered agreements from similar warring interests in the past, and despite the current hard feelings, government can strong-arm negotiations and compromises from these opposed industries.

Third, assuming that Hollywood and Silicon Valley could agree on a DRM standard on their own (one that is acceptable to the majority of consumers), market pressures would make enforcement of that standard extremely difficult. Pirates would still create an attractive market for technologies that did not comply with the standard. Absent a legal ban on non-complaint devices, consumer electronics companies would continue to supply this non-compliant market. Only government could curtail this activity by vesting the standard with the force of law to ensure the effective administration and enforcement of the standard. The Federal Communications Commission (FCC or Commission) has already begun such intervention in the limited area of digital television. Specifically, throughout the FCC's recent Broadcast Flag and Plug-and-Play proceedings, the FCC has exhibited its competence and experience when handling targeted DRM standardization.

This paper demonstrates that against the particular challenges associated with comprehensive DRM standardization, government intervention stands as the most appropriate course of action. The paper also concedes that presently the FCC lacks the legal authority to engage

2. Drew Clark & Bara Vaida, *Digital Divide*, NAT'L J., Sept. 6, 2002 [hereinafter *Copyright Issues*]; Lawrence Lessig, *Hollywood v. Silicon Valley: Make Code, Not War*, EWEEK (June 17, 2002), *at* http://www.eweek.com/article2/0,1759,1238773,00.asp.

in such intervention. The rising importance of DRM, combined with the FCC's current lack of authority, has inspired numerous legislative proposals and debates regarding the appropriate nature and scope of FCC intervention. This paper provides an evaluation of these proposals and debates, which further highlights the importance of government intervention in the DRM standardization process.

The paper proceeds in four parts. Section I establishes the need for a comprehensive, standardized DRM system by tracing relevant contextual and historical developments in the media industry. Section II presents four detailed case studies representing four different standardization processes. Against the factual and theoretical backdrop of these first two sections, Section III argues that the government intervention, particularly through FCC action, is not only the most appropriate procedural course of action, but also the only procedural course of action capable of producing a successful DRM standard. Finally, Section IV addresses FCC authority generally, and the specific legislative action needed for FCC intervention.

I. BACKGROUND: THE INDUSTRY'S NEED FOR A DRM STANDARD

Many interests in the DRM debate oppose a DRM standard for political or business reasons.[3] Even some proponents of general DRM systems might argue that a comprehensive DRM standard, as a technical matter, is simply unnecessary. This section addresses such arguments by highlighting the importance of DRM generally, as well as the need for a DRM standard. Specifically, this section outlines certain historical developments in the media market, exposing the key legal contexts that bear upon the DRM debate.

A. Profits and Protection of Media Content

As an initial matter, it should be noted that the contemporary retail music market consists of $15 billion in annual sales.[4] Likewise, 2004 United States box office revenues are estimated at $9.4 billion.[5] The production of such successful media content relies upon large capital

3. Neil Weinstock Netanel, *Impose a Noncommercial Use Levy to Allow Free Peer-to-Peer File Sharing*, 17 HARV. J.L. & TECH. 1, 14 (2003) (Consumer electronics manufacturers have resisted copyright industry efforts to adopt uniform DRM technical standards. Although the manufacturers espouse a commitment to protecting intellectual property, they oppose the degradation of device capability, drag on innovation, and risk of government official interference that technology mandates would entail.).

4. Press Release, Federal Trade Comm'n, Record Companies Settle FTC Charges of Restraining Competition in CD Music Market (May 10, 2000) *at* http://www.ftc.gov/opa/2000/05/cdpres.htm.

5. Reuters, *Hollywood '04 Box Office Take Poised to Hit Record* (Dec. 22, 2004), *at* http://movies.yahoo.com/news/va/20041222/110376464000p.html.

investment.[6] For example, the average cost to produce, advertise, and market a major studio film in 1999 approached $80 million.[7] Such high levels of capital investment also entail high levels of risk. Only one in ten films covers its costs from domestic theatrical exhibition, and four out of every ten films fail to ever cover their costs even after realizing revenues from the international and after markets.[8] Similar cost structures and failure rates apply to the production of music as well.[9]

Two notable consequences derive from this combination of large investment and risky failure rates. First, the profit margins for successful media content often must be grossly out of proportion to the costs. As rationalized by the media production industry, disproportionate profits from successes are needed to subsidize the costs of the many failures suffered during each generation of content production.[10] Second, the content production industries are saddled with a responsibility and incentive to protect their investment from competitors and free riders. The media industry turns to copyright law for such protection.

B. Copyright

The nature and scope of the media industry's copyright protections is the most important and difficult issue involved in the development and deployment of DRM technologies. This is because copyright serves as the core right and foundation upon which all media related business models are built, and copyright law shapes both producers' and consumers' understandings of their respective rights in media content.

Numerous complexities, judgment calls, and finely cut distinctions arise when determining if, and to what extent, a work is protected under copyright law. Many of these issues are beyond the scope of this paper, as are some of the issues captured in the contemporary debate concerning whether the current Copyright Act remains relevant in today's digital economy.[11] Critical to the topics in this paper, however, is a general

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6. Doris Estelle Long, *First, "Let's Kill all the Intellectual Property Lawyers!": Musings on the Decline and Fall of the Intellectual Property Empire*, 34 J. MARSHALL L. REV. 851, 869-70 (2001).

7. JACK VALENTI, MOTION PICTURE ASS'N OF AM, COPYRIGHT & CREATIVITY - THE JEWEL IN AMERICA'S TRADE CROWN (Jan. 22, 2001) *at* http://www.mpaa.org/jack/2001/ 01_01_22b.htm [hereinafter COPYRIGHT & CREATIVITY].

8. *Id.*

9. Press Release, Recording Industry Ass'n of Am., Cost of a CD (2003), *at* www.riaa.com/news/marketingdata/cost.asp [hereinafter RIAA, *Cost of a CD*].

10. *Id.*

11. Robert S. Boynton, *The Tyranny of Copyright*, N. Y. TIMES MAG., Jan. 25, 2004; Raymond Shih Ray Ku, *The Creative Destruction of Copyright: Napster and the New Economics of Digital Technology*, 69 U. CHI. L. REV. 263 (2002); Jessica Litman, *Revising Copyright Law for the Information Age*, *in* COPY FIGHTS 125, (Adam Thierer et al. eds., 2002).

understanding of the core rights conferred by copyright law, the primary exceptions to those rights, the practical realities of enforcing those rights, and most importantly, the manner in which technological advances can alter and effect rights, exceptions, and enforcement.

The United States Constitution gives Congress the power "to promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries."[12] With this authority, and through the enactment of the Copyright Act, Congress granted a number of exclusive rights to authors, including the right to reproduce their work, the right to create adaptations, the right to distribute copies of their work to the public, and the right to perform or publicly display their work.[13] The grant of such powerful exclusive rights is often characterized as a copyright bargain, where authors and inventors are given a limited monopoly in exchange for disclosing, and eventually dedicating, their expressions to the public.

Copyright law also, however, incorporates a number of exceptions and limitations applicable to works that fall within its protection. For instance, under the first sale doctrine, buyers of copies of certain copyrighted works may largely do as they wish with their copies, including keeping them, selling them, and loaning them.[14] Likewise, the doctrine of fair use allows for the use of a copyrighted work "for purposes such as criticism, comment, news reporting, teaching, . . . scholarship, or research."[15]

Dating as far back as the advent of the printing press, technological advances have tested and challenged the nature of copyright law. While the core rights and exceptions conferred by copyright law are unlikely to change, history shows that this law otherwise nimbly evolves to address technological advances.[16]

Recent developments in digital technology, however, present a new challenge that cannot be resolved through adjustments to copyright law alone, but instead require a combination of legal and technical solutions. A brief review of some historical technological developments, and their effect on the market for media, demonstrates why recent developments in digital technology present such a novel challenge.

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12. U.S. CONST. art. I, § 8, cl. 8.
13. 17 U.S.C. § 106 (2000).
14. 17 U.S.C. § 109 (2000).
15. 17 U.S.C.A. § 107 (West. Supp. 1967).
16. *See* Sony Corp. of Am. v. Universal City Studios, Inc., 464 U.S. 417, 430 n.11 (1984).

1. Copyright Law in the Analog World

When media production, distribution, and enjoyment were achieved solely through analog technologies, the copyright legal regime effectively protected the media industry's core product, encouraged creative innovation, and served as a stable foundation for media related business models. Copyright's effectiveness stemmed from the fact that neither technology nor market structure possessed the potential to undermine copyright protections.

The media industry in the United States blossomed with the advent of technological innovations that allowed consumers to enjoy media content through intermediary outlets such as movie theaters, radio, and television. The technology available during these early stages defined the structure of the market. Businesses such as radio stations, movie production studios, and movie theaters were built upon, defined by, and limited by the technologies available to them. These respective camps maintained contractual rights between each other concerning the use of copyrighted content. Importantly, while there were some logistical challenges, for the most part the industry was able to self-police these agreements. Any intermediary, such as a movie theater or radio station, acting contrary to its contractual rights could be easily identified and held accountable through traditional legal means.[17] Moreover, consumers did not complicate copyright enforcement, as in this early market structure composed of intermediary outlets—consumers played no direct role in the ownership, licensing, or distribution of copyrighted content.

It was not until the widespread commercial availability of the long-playing (LP) record in the 1950's that consumers began to develop a sense of ownership of media content. With LP's, consumers decided when, where, and how many times they wanted to listen to music. Consumers were given the ability to listen to albums without commercial interruptions. Overall, consumers became vested with a new sense of freedom, control, and ownership.

Through the LP, technology derived a way to give consumers more rights to media content, and the market acceptance of LP's suggests that the content industry chose to embrace and encourage that technology. This choice is no surprise, given the attractive new business models that the LP technology enabled. It is important to note that with the LP, it was technology, rather than copyright law, that defined the outer limits of consumer freedom. For example, while consumers enjoyed new-found freedoms, consumers still had no way of copying their music onto additional, or different, physical media. Consumers had no feasible way of broadcasting or otherwise mass distributing the content they

17. *See, e.g.*, Hampton v. Paramount Picture Corp., 279 F.2d 100 (9th Cir. 1960).

purchased. Given such technical limitations, content producers comfortably allowed consumers to enjoy and control content to the outer limits of technical possibility.

The pattern of technological advancements continued to further liberate consumers' control over content: however, content producers eventually took a historic stand against technology. With the advent of the Video Cassette Recorder (VCR), content producers confronted technology's ability to extend a consumer's control over content well beyond the limits that content producers intended. VCRs enabled consumers to record and store over-the-air broadcast content even though the content producers only intended these broadcasts for a single viewing at a particular time. VCRs also enabled consumers to make copies of content onto long term physical media storage. As such, the VCR, at least in theory, raised the specter of illicit mass production and distribution of copyrighted content.

The content production industry's historic stand against the VCR is often revisited in the contemporary debate concerning the effect of technological advancements on the market for media. For example, Rep. Zoe Lofgren, during a recent symposium on DRM at the University of California at Berkeley, recounted the Motion Picture Association of America's (MPAA's) blunt opposition to the VCR.[18] In his 1982 congressional testimony, MPAA president Jack Valenti exclaimed:

> I say to you that the VCR is to the American film producer and the American public as the Boston strangler is to the woman home alone. . . . We are going to bleed and bleed and hemorrhage, unless this Congress at least protect[s] one industry that is able to retrieve a surplus balance of trade and whose total future depends on its protection from the savagery and ravages of this machine.[19]

The MPAA's legal attacks against the VCR were as forceful as its rhetoric. Reverting to its core rights, content producers challenged the VCR on copyright grounds. This action eventually led to a U.S. Supreme Court decision with profound consequences for the future of the market for media.

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18. Zoe Lofgren, *Edited Transcript of the David Nelson Memorial Keynote Address: A Voice from Congress on DRM*, 18 BERKELEY TECH. L. J. 495 (2003).

19. *Home Recording of Copyrighted Works, Hearing Before the Senate Judiciary Comm.*, 97th Cong., 2d Sess., No. 97, Pt. 1, at 8 (1982) (statement of Jack Valenti, Chairman of the Motion Picture Association of America).

2. The Betamax Case

While many courts have recently considered the scope of copyright protection in the context of new media and technological advancements,[20] the Supreme Court's decision in the Betamax case remains the most instructive benchmark of the judiciary's approach to copyright and new media issues.[21] In this case, the media industry employed indirect liability theories to level its attack on Sony, the manufacturer of the Betamax, rather than pursuing actions for direct infringement against the thousands of actual users of the Betamax. These indirect liability theories failed, however, as after engaging in a thorough evaluation of (1) the media market, (2) the Betamax technology, and (3) the effects of the technology on the market, the Court arrived at its often cited conclusion that where a device that is used for copyright infringement also has a substantial noninfringing use, the provider of the device may not be held vicariously or contributorily liable for copyright infringement.[22]

In its opinion, the Court noted that many media interests encouraged taping of content, that taping of freely broadcast content furthered the socially beneficial goal of expanding public access to that content, and importantly, that taping exacted little, if any, commercial harm on the industry.[23] Specifically, the Court determined that any future commercial harm was speculative and without factual support as television production was more profitable at the time of the trial than it had ever been, despite consumers' use of Betamax.[24] The Court determined that "time shifting," or "recording a program to view it once at a later time," was largely a non-commercial activity.[25]

Contrary to the industry's fears, the VCR proved to be a tremendous benefit and a platform for successful new businesses. In 2002, for instance, over 24 films grossed between $50-$100 million each in film rentals.[26] Moreover, the advent of the VCR did little to erode the content owners' control of their content. The practical limitations of the

20. *See, e.g.*, N. Y. Times Co. v. Tasini, 533 U.S. 483 (2001); UMG Recordings, Inc. v. MP3.com, Inc., 92 F. Supp. 2d 349 (S.D.N.Y. 2000); A&M Records, Inc. v. Napster, Inc., 239 F.3d 1004 (9th Cir. 2001); Kelly v. Arriba Soft Corp., 280 F.3d 934 (9th Cir. 2002); Universal City Studios, Inc. v. Corley, 273 F.3d 429 (2d Cir. 2001).

21. Sony Corp. of Am. v. Universal City Studios, Inc., 464 U.S. 417 (1984).

22. *See, e.g.*, Dynacore Holdings Corp. v. U.S. Philips Corp., 363 F.3d 1263, 1275 (Fed. Cir. 2004).

23. *Sony Corp. of Am.*, 464 U.S. at 421.

24. *Id.*

25. *Id.*

26. MOTION PICTURE ASS'N OF AM., MOTION PICTURE ASSOCIATION WORLDWIDE MARKET RESEARCH, U.S. ENTERTAINMENT INDUSTRY: 2003 MPA MARKET STATISTICS (2003), *at* http://www.mpaa.org/useconomicreview/ (registration required).

technology, in the form of degradation from copy to copy, countered the enticement of unauthorized mass production. Even where efforts were made to mass produce illegal first generation copies, pirates were faced with difficult production and distribution challenges. In short, while the technology afforded consumers the ability to copy content, limits still inherent in both the technology itself, and in the structure of the market, prevented consumers from exercising control over content for the purpose of creating a commercially significant illicit market.

That the fears of copyright owners were not realized during the launch of the VCR, however, does not mean that those analogous fears in today's headlines should be discounted. The industry certainly is guilty of crying "wolf" in the past.[27] But now, its cries are justified because digital is different. With the digital revolution, technological limitations and market structure no longer stand as barriers to an illicit market.

C. The Digital Revolution and its Effect on Media

The media industry has progressed to the widespread use and sale of its copyrighted content through digital physical media. This trend began in the late 1970's when an industry consortium led by Philips and Sony challenged analog systems with a new standard, the Compact Disc (CD).[28] The trend continues today in the form of the video content market's continuing transition to the Digital Versatile Disc (DVD). Overall, the industry has encouraged and sanctioned a transition from analog to digital physical media.

While cautious of the transition to digital, as it has been with every technological advance, the industry mistakenly assumed that it would be able to use new digital technologies to protect itself as well as to improve itself. In embracing and encouraging the transition to CDs and DVDs, the industry did not appreciate that hackers armed with personal computers and other technological tools would handily defeat the industry's efforts at copy protection. More importantly, the industry did not appreciate the combination of technological developments on the near horizon that would exacerbate the problem into a credible threat to the industry's ability to exercise any control over its content whatsoever. Such developments include (1) advances in digital compression techniques, (2) widespread deployment of broadband data communication capabilities, (3) the rise of specialized digital file sharing technologies, such as peer to peer (P2P) technologies, and (4) the

27. Stan Liebowitz, *Copyright in the Post-Napster World: Legal or Market Solutions?*, *in* COPY FIGHTS 97, (Adam Thierer et al. eds., 2002).

28. Ida Shum, *Getting "Ripped" Off by Copy-protected CDs*, 29 J. LEGIS. 125 (2002) [hereinafter *Copy-protected CDs*].

convergence of personal computing technology, communication technology, and traditional consumer electronics technology.

1. Consequences for the Market for Media

Such technological advances, particularly convergence and specialized P2P applications are "disruptive technologies" in that they serve to change virtually every aspect of the market by, *inter alia*, altering the market's competitive dynamics and basis for competition.[29] Unquestionably, the competitive dynamics in the market for media are significantly altering.[30] On the demand side, consumers have indicated their desire to obtain media content in the form of digital files delivered directly to their personal computers and to use personal computers as a platform for media management. This demand is likely born from the flexibility that such a scheme affords to the consumer. For example, once a consumer obtains a digital song on a personal computer, that consumer can play the song through speakers on the personal computer, transfer the song to a portable MP3 player, burn the song to a CD, play the song in a traditional CD player, transfer the song to a MiniDisc, play the song through a stereo connected to the computer, and offer the song to friends through a shared directory.

While this new distribution and consumption scheme does not render obsolete traditional mechanisms, such as physical media storage and consumer electronics, it does assign new roles to such traditional mechanisms, centered on the personal computer as a platform. As such, it brings many new players and interests into the picture, and alters the cost structure associated with both the distribution and production of media content. Given these dramatic structural changes, some consumers are beginning to question the content production industry's traditional rationale for large profit margins.

D. Digital Piracy

Lower costs across the board, increased consumer flexibility, and blossoming innovation in software and consumer electronics lend a positive and exciting air to the market for digital media. Many interests in the media market, however, are confronting a disconnect as to what these new benefits mean. At a broad level, consumers expect the content production and distribution cost savings to be passed along. Consumers

29. CLAYTON M. CHRISTENSEN, THE INNOVATOR'S DILEMMA: WHEN NEW TECHNOLOGIES CAUSE GREAT FIRMS TO FAIL 14-24 (1997).

30. Brendan M. Schulman, *The Song Heard 'Round the World: The Copyright Implications of MP3s and the Future of Digital Music*, 12 HARV. J.L. & TECH. 589 (1999).

also wish to be the beneficiaries of the flexibility that new technologies enable.

Comfortable with their current market and profit structure, on the other hand, content producers have thus far proven reluctant to fully embrace digital distribution models and reluctant to recognize consumer demands. Caught in the middle of this disconnect stand telecommunications interests with their desire to fill empty capacity, as well as software, consumer electronics, and computing interests with their desires to preserve an innovative atmosphere for fostering new products and sales.

As seen with the imposing presence of adaptable P2P networks, entrepreneurs, innovators, and consumers are not waiting for content producers to warm up to the idea of digital distribution. Instead, they are forging ahead with innovative technologies and business models centered upon the infringement of content producers' copyrights. Due to the ease with which digital media files can be copied, stored, and most importantly, distributed throughout the network, many consumers have shown a propensity to abuse the technological environment by stealing copyrighted media content. Additionally, the majority of file sharers do not care if the files contain copyrighted content, and they make the choice to steal largely free of any social, economic, or legal consequences.[31] Armed with technology and free from moral qualms and legal repercussions, music consumers have devastated the music industry through Internet piracy. Some reports place the music industry's losses at 30 percent of sales across three years, amounting to $5 billion.[32]

The content production industry argues that digital piracy stands as the primary hurdle to the legitimate widespread digital distribution of media content.[33] On the other hand, the content industry's refusal to sponsor a reasonable digital distribution business model might be the cause of widespread piracy.[34] Under either cause and effect perspective, piracy must be curtailed and a workable digital distribution model must be pursued. New legal regimes and new DRM technologies will be needed to achieve such goals.

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31. *See* MARY MADDEN & AMANDA LENHARTPEW INTERNET & AMERICAN LIFE PROJECT, MUSIC DOWNLOADING, FILE-SHARING AND COPYRIGHT (July 2003) *at* http://www.pewinternet.org/pdfs/PIP_Copyright_Memo.pdf.pdfreports/toc.asp?Report=96.

32. Frank Aherns, *A Reprise of Lawsuits Over Piracy*, WASH. POST, Jan. 22, 2004, at E1. [hereinafter *Reprise of Lawsuits*].

33. *See* Press Release, Motion Picture Ass'n of Am., Valenti Testifies to Studios' Desire to Distribute Movies Online to Consumers (Apr. 23, 2002), *at* http://www.mpaa.org/jack/2002/2002_04_23a.htm.

34. While many larger content production and distribution companies have begun to pursue legitimate digital distribution models, such an industry remains in its infancy. *See, e.g.*, Aliya Sternstein, *Legalize It*, FORBES, Feb. 17, 2003, at 99.

E. Legal Reactions to the Digital Revolution

In an effort to combat piracy, the media industry, through its trade groups such as the Recording Industry Association of America (RIAA) and the MPAA, has aggressively sought to enforce its copyright protections against purveyors of P2P file sharing networks. For example, in the well known *Napster* case, the RIAA succeeded in shutting down the "old" centralized Napster network as federal courts in California found that the RIAA would likely succeed on its claims for contributory and vicarious copyright infringement.[35]

A similar copyright infringement challenge against Grokster failed before the District and Circuit Courts largely because of the decentralized architecture of Grokster's P2P network.[36] Indeed, some commentators suggest that decentralized file sharing technologies evolved specifically to avoid vicarious and contributory copyright infringement as those theories were applied by the Ninth Circuit in the *Napster* case.[37] Regardless of how the Supreme Court eventually rules, the *Grokster* case has taught the vital lesson that file sharing technologies will be quick to arise, quick to adapt, and elusive to traditional legal enforcement. In fact, it may be safe to assume that any legal interpretation or statute could be circumvented by savvy technologists.

Just such an assumption has driven the media industry to the desperate, highly publicized measure of enforcing its copyrights against the actual direct infringers hiding behind the veil of file sharing networks: the individual members of those networks.[38] The publicity of these lawsuits may stem the tide of file sharing piracy to some extent, and some commentators even suggest that the strategy may result in long term success.[39] Investigation and legal action, however, directed towards the more than 57 million users of such P2P networks remains

35. A&M Records, Inc. v. Napster, Inc., 239 F.3d 1004 (9th Cir. 2001).

36. Metro-Goldwyn-Mayer Studios, Inc. v. Grokster, Ltd., 259 F.Supp.2d 1029 (C.D. Cal. 2003), *aff'd*, 380 F.3d 1154 (9th Cir. 2004), *cert. granted* Metro-Goldwyn-Mayer Studios, Inc. v. Grokster, Ltd., 125 S. Ct. 686 (2004).

37. JESSICA LITMAN, DIGITAL COPYRIGHT (2001) [hereinafter DIGITAL COPYRIGHT].

38. This legal onslaught has implicated interesting statutory construction and constitutional challenges to the Digital Millennium Copyright Act (DMCA). *See* Recording Indus. Ass'n of Am., Inc. v. Verizon Internet Serv., Inc., 351 F.3d 1229 (D.C. Cir. 2003); Verizon Internet Serv., Inc., 257 F. Supp. 2d 244 (D.D.C. 2003); Verizon Internet Services, Inc., 240 F. Supp. 2d 24 (D.D.C. 2003).

39. Stacey L. Dogan, *Code Versus the Common Law*, 2 J. ON TELECOMM. & HIGH TECH. L. 73, 80 (2003).

impractical. Moreover, some indications suggest that file sharing continues to surge and grow, despite the lawsuits.[40]

Importantly, the legal actions may serve to incite consumers and inspire further illegal behavior.[41] "Legal attacks may scare people, but risk alienating customers and making them try harder to rip off the industry, which cannot, even in America, sue everyone."[42] In essence, copyright enforcement through traditional legal means remains impractical given the nature of the technology enabling copyright infringement, and the structure of the markets based on such technology.

F. Technological Reactions to the Digital Revolution

Given the shortcomings of traditional legal enforcement, the industry has been exploring technical solutions to its copyright dilemma. Digital rights management stands as a promising technical self-help mechanism for managing digital media content, and for enabling a flexible distribution scheme which could provide both market incentives against piracy and technical roadblocks to piracy.[43] DRM techniques provide the owners or managers of digital content with the ability to assert specific controls over the uses of digital content.[44] Flexible DRM techniques can yield unique sets of contractual rights regarding digital content, and enable creative bargaining between owners and users of digital content.[45] Among other things, DRM can be used to "track rights, rights holders, licenses, sales, agents, royalties, and associated terms and conditions."[46] In many senses, DRM schemes serve to enforce and protect the rights of all parties involved.[47] Because of its promise to

40. *See The NPD Group Notes Recent Increase in Peer-to-Peer Digital Music File Sharing*, BUSINESS WIRE (Jan. 16, 2004), *at* http://www.npd.com/dynamic/releases/press_040116.htm.

41. Matthew C. Mousley, *Peer-to-Peer Combat: The Entertainment Industry's Arsenal in its War on Digital Piracy*, 48 VILL. L. REV. 667, 695 (2003).

42. *Piracy and the Movie Business: Tipping Hollywood the black spot*, ECONOMIST, Aug. 30, 2003, at 43.

43. *See* GARRTNERG2 & THE BERKMAN CTR. FOR INTERNET & SOCIETY AT HARVARD L. SCHOOL, FIVE SCENARIOS FOR DIGITAL MEDIA IN A POST-NAPSTER WORLD (The Berkman Ctr. For Internet & Societ at Harvard Law School, Research Publ'n No. 2003-07, 2003), *at* http://cyber.law.harvard.edu/home/uploads/286/2003-07.pdf (describing "the effective technology defense scenario.)

44. *Digital Rights Management Emerges to Control Content*, ELECTRONIC COM. NEWS, Jan. 29, 2001.

45. *See generally*, Lionel S. Sobel, *DRM as an Enabler of Business Models: ISPs as Digital Retailers*, 18 BERKELEY TECH. L.J. 667 (2003).

46. BILL ROSENBLATT, BILL TRIPPE, & STEPHEN MOONEY, Digital RIGHTS MANAGEMENT: BUSINESS AND TECHNOLOGY (2002).

47. Joan Feigenbaum et al., *Privacy Engineering for Digital Rights Management Systems*, *in* SECURITY AND PRIVACY IN DIGITAL RIGHTS MANAGEMENT 76 (Tomas Sander ed., 2001).

enable new business models and provide relief from rampant digital theft and piracy, DRM is viewed as critical to the success of online commerce.[48] Given the nature of the digital copyright problems faced by the media industry and consumers, a successful DRM standard will at the very least, (1) prevent unauthorized use of digital content, and (2) afford users their fair use of the content as authorized by copyright law. That said, a DRM scheme that allows the greatest degree of flexibility between the seller and buyer of copyrighted digital content is also desirable.

1. The Need for DRM Compliant Hardware

While the technologies upon which a DRM standard will be built, such as encryption and watermarking, can be deployed on a software platform, an effective and robust DRM standard will require both hardware and software participation. Commentators focusing on both the technical and economic realities involved in DRM consistently recognize the need for hardware's integration into any proposed DRM solution.[49]

More importantly, this recognition extends beyond mere commentary, as policy makers and companies contributing to DRM standardization are actively pursuing a hardware-based solution. As an example, Microsoft's "Palladium" initiative, renamed as the "Next-Generation Secure Computing Base for Windows," envisions the widespread launch of Palladium-based hardware to accomplish overall improvements in security, privacy, and system integrity. A specific goal of "Palladium" involves rendering software-based DRM technologies stronger by coordination with Palladium-based hardware.[50] Unsurprisingly, Microsoft's vision in this respect might be quietly but quickly becoming a reality, as some sources are reporting that Intel is

48. *See, e.g.*, U.S. Patent No. 6,330,670 (issued Dec. 11, 2001).

49. *See, e.g.*, David Kravitz, Kim-Ee Yeoh, and Nicol So, *Secure Open Systems for Protecting Privacy and Digital Services*, *in* SECURITY AND PRIVACY IN DIGITAL RIGHTS MANAGEMENT 106 (Tomas Sander ed., 2001) (Recognition is growing that protection of digital intellectual property must involve the use of consumer-situated hardware.); *Piracy and the Movie Business: Tipping Hollywood the black spot*, ECONOMIST, Aug. 30, 2003, at 44 (For copy protection to work, hardware needs to spot it.). *See also* John R. Perkins, Jr., *Curbing Copyright Infringement in Cyberspace: Using MediaKey to Stop the Bleeding*, 21 J. MARSHALL J. COMPUTER & INFO. L. 325 (2003); Jonathan Weinberg, *Hardware-Based ID, Rights Management, and Trusted Systems*, 52 STAN. L. REV. 1251 (2000). *See also* Digital Broadcast Content Protection, *Report & Order & Further Notice of Proposed Rule Making*, 18 FCC Rcd. 23,550, at ¶ 39 (2003) (The "keystone of a flag protection system is the ubiquitous ability of reception devices to respond and give effect to the redistribution control descriptor.).

50. Press Release, Microsoft Windows Trusted Platform Technologies, Microsoft "Palladium": A Business Overview (2002), *at* http://www.microsoft.com/presspass/features/2002/jul02/0724palladiumwp.asp.

already working with Microsoft to develop a chipset designed to enable Microsoft's Palladium initiative.[51]

Moreover, recent political and regulatory initiatives reinforce the same mind set regarding hardware integration. The most prominent example is the controversial Consumer Broadband and Digital Television Promotion Act introduced by Senator Hollings in 2002, which contemplates a hardware component to the DRM standardization solution.[52] Other examples on the regulatory front, which will be discussed in detail in Section III, include the FCC's recent Plug-and-Play and Broadcast Flag initiatives.

While the need for hardware-based DRM enjoys recognition and support from certain critical companies, politicians, and regulatory bodies, the idea does not stand unchallenged. To its critics, the prospect of hardware-based DRM raises numerous concerns including the erosion of fair use, the imbalanced centralization of control, and the stifling of innovation.[53] Additionally, as a practical matter, many view the overhaul or replacement of every networked hardware system as a daunting and unrealistic possibility.[54]

Indeed, a comprehensive overhaul of all relevant hardware devices faces significant technical, policy, and market challenges. From a technical perspective, such a plan implicates the diverse interests of consumer electronics, computing, and telecommunications companies, in addition to the interests of content owners. These divergent interests will need to engage in complex negotiations and resolve difficult technical problems that will have far reaching business implications for all interests involved. From a policy perspective, as has already been noted, the plan implicates a wide spectrum of interests and generates some well founded fair use and innovation policy criticisms. Finally, from a business perspective, the plan will likely confront difficult resistance, as consumers are likely to prefer systems that maximize flexibility rather than restrict it.

These types of challenges suggest that government intervention is necessary for a successful standardization effort. Specifically, in the DRM case, government maintains the exclusive ability to (1) bring diverse interests to the bargaining table, (2) ensure the participation of non-commercial interests, and (3) dispatch the force of law to guarantee compliance with a resulting standard, despite market pressures for

51. Nick Stam, *Inside Intel's Secretive 'LaGrande' Project*, EXTREMETECH.COM (Sept. 19, 2003), *at* http://www.extremetech.com/article2/0,3973,1274119,00.asp.

52. Consumer Broadband and Digital Television Promotion Act, S. 2048, 107th Cong (2nd Sess. 2002).

53. *Copy-protected CDs*, *supra* note 28.

54. *See id.*

noncompliance. Nevertheless, government intervention in the development of technology remains a particularly unpopular prospect in many quarters. Only in the most dire of circumstances should the government dictate the particular path of technological progress. An evaluation of several successful standardization case studies will highlight the general nature of standardization efforts, how and why market forces prevail under most circumstances, and when government intervention into standardization processes is necessary.

II. THE MECHANICS OF STANDARDS DEVELOPMENT: CASE STUDIES

Under many circumstances, left to its own devices, the market adequately solves its own standardization problems. These market-based solutions include *de facto* standards, such as Microsoft Windows, often times resulting from a standards war between competing commercial interests in the market.[55] Market-based solutions can also take the form of more amicable *de jure* standards established through collaboration among and between interests in the market. The nature and extent of such collaborative efforts span a wide spectrum, but can be generalized into (1) open, non-proprietary collaborative efforts, including those conducted through formal standards bodies such as the Institute of Electrical and Electronics Engineers (IEEE), and (2) closed proprietary development efforts, including competitive alliances such as the MPEG patent pool participants.

On the other hand, the solutions to some standardization problems are pursued through government intervention, rather than left to the various market devices. The nature and extent of government participation in the standardization process can take many forms, including direct mandates through federal law,[56] or more commonly delegation of standardization responsibility to a federal agency. Notably, the FCC has developed, deployed, and enforced standards in the communications industry.[57]

The case studies presented in this section explore and expose the details of the various standardization procedures. Specifically, the case studies of Ethernet, the VCR, and MPEG, are presented as illustrations of three different market-based standardization mechanisms, whereas the

55. Carl Shapiro & Hal R. Varian, *The Art of Standards Wars*, CAL. MGMT. REV., Winter 1999 [hereinafter *The Art of Standards Wars*].

56. The government took this approach, for example, in order to standardize the gauge of the Pacific railroad at four feet eight and one half inches. 12 Stat. 807 (1863).

57. *See generally* Michael J. Schallop, *The IPR Paradox: Leveraging Intellectual Property Rights to Encourage Interoperability in the Network Computing Age*, 28 AIPLA Q.J. 195, 221-22 (2000) [hereinafter *The IPR Paradox*].

case study of digital television is presented as an illustration of government-based standardization. Because all of these divergent efforts arguably resulted in a successful standard, consideration of the case studies, and how they bear upon the propriety of government intervention in the DRM context, involves a focus not necessarily on the result achieved but rather on (1) the intricacies and characteristics of the different processes, as well as (2) the contrasting nature of the underlying standardization problems.

A. Ethernet

Ethernet stands as arguably the most successful standard ever developed and deployed in the computer industry. "If you use a personal computer, you almost certainly use Ethernet."[58] Invented in 1973 by Robert Melancton Metcalfe, Ethernet technology remains dominant, 30 years later, as the primary networking technology for local area networks (LANs). In addition to its amazing temporal resilience, Ethernet is the quintessential example of a platform standard that has served as the foundation for generations of creative product and business model innovations. This includes not only the wild proliferation of successful Ethernet companies in the 1980's, such as Metcalf's 3Com and Ungerman-Bass, but also current day, cutting edge technological innovations and standards such as WiFi built on top of 802.11 and the personal area network protocol 802.15.4.[59] As much as any technology can, Ethernet has created an attractive economic space.[60]

1. A General Note on Open, Non-Proprietary Collaboration

Open, non-proprietary collaboration of the type that led to Ethernet standardization often occurs under the auspices of established Standards Development Organizations (SDOs). Some of the more famous SDOs include the IEEE, and the Internet Engineering Task Force (IETF). In the United States, the American National Standards Institute (ANSI) certifies and endorses certain SDOs within each technical subject matter area and additionally endorses particular standards that have been properly developed by that SDO.[61] ANSI certification requires the SDO to maintain and employ a formal set of

58. *Case History: Out of the ether*, ECONOMIST TECH. Q., Sept. 4, 2003, *available at* http://www.economist.com/science/tq/displayStory.cfm?story_id=2019967.

59. *Id.*

60. URS VON BERG, THE TRIUMPH OF ETHERNET: TECHNOLOGICAL COMMUNITIES AND THE BATTLE OF THE LAN STANDARD 125 (2001) [*hereinafter* THE TRIUMPH OF ETHERNET].

61. AMERICAN NATIONAL STANDARDS INSTITUTE, ANSI AND THE U.S. STANDARDIZATION PROCESS: TOOLS FOR BUSINESS SUCCESS (2000).

policies and procedures for the development of standards consistent with ANSI's guidelines.

While each SDO maintains a unique set of formal policies and procedures for standards development, most of these SDOs are open in the sense that they maintain little, if any, barriers to participation, and that they allow and encourage the participation of a wide spectrum of interests. For example, "IEEE-SA standards are openly developed with consensus in mind. Participation in their development and use is entirely voluntary. However, history has shown that standards developed in an open forum can produce high-quality, broadly accepted results that can focus companies and forge industries."[62]

Most SDOs are also typically non-proprietary in the sense that they maintain policies against the aggressive enforcement of patents covering technologies included in the standard.[63] Some SDOs, such as the World Wide Web Consortium (W3C), have at times gone as far as refusing to incorporate any patented technology into their standards unless that technology is offered on a completely royalty-free basis.[64] The more conventional practice of the SDOs allows the incorporation of patented technology into a standard, but requires the owner of such technology to disclose their proprietary positions throughout the standards development process and forces the owner to offer a license on reasonable and non-discriminatory (RAND) terms.[65]

The collaborative aspect of developing a standard through an SDO usually requires that the participants in the process reach a broad-based consensus. Reaching such a consensus is always a particularly challenging endeavor due to the many, often divergent, interests engaged in the development process. The unified voice resulting from such consensus-based standardization, however, lends an air of legitimacy to the final product.

2. The Development of Ethernet

The fact that Ethernet was developed through an open, non-proprietary collaborative process bears much of the responsibility for its success. Almost from its inception, Ethernet's inventor, Robert Metcalfe, and the owner of Ethernet's patent rights, Xerox, envisioned

62. Roger B. Marks et al., *Standards from IEEE 802 Unleash the Wireless Internet*, IEEE MICROWAVE MAG. 46, 47-48 (June 2001).

63. Mark A. Lemley, *Intellectual Property Rights and Standard Setting Organizations*, 90 CAL. L. REV. 1889, 1901-02 (2002).

64. Janice Mueller, *Patent Misuse Through the Capture of Industry Standards*, 17 BERKELEY TECH. L.J. 623, 629-30 (2002).

65. Indeed, even the W3C with its strong philosophy of open access once proposed a RAND licensing policy for its standards. Interestingly, this proposal was initially withdrawn after meeting with sharp internal and public criticism. *Id.* at 630 n.37.

an open collaborative process in further developing Ethernet and in deploying the technology as a standard.[66] This is not to imply that Ethernet's rise consisted solely of a breakthrough invention followed by a win-win collaborative free for all resulting in a resounding success. To the contrary, the history of Ethernet includes back-room negotiations, aggressive dominance by computer industry giants, surreptitious manipulation of standards bodies and their processes, personal vendettas, lost fortunes, an infamous "dark day in the history of standardization," and even a pseudo standards war.[67] A thorough look at the history of Ethernet's rise to an industry standard reveals a stark contrast between the theory and practice of open, non-proprietary collaboration. Nevertheless, Ethernet remains largely the product of an open, non-proprietary collaborative process that yielded a versatile, resilient, and economically beneficial standard.

3. Technical Overview

In 1972 Metcalf was hired by Xerox to develop a network for connecting hundreds of Alto computers, over hundreds of meters, at very high speeds.[68] Metcalfe answered this challenge with Ethernet, and its core technical principle of carrier sense multiple access/collision detection (CSMA/CD). Using this medium access control technique, computers connected to a common wire will (1) listen to the wire, and (2) broadcast their message if the wire is silent.[69] When two messages are transmitted on the wire at the same time, a collision occurs. After recognizing a collision, the computers will cease transmission, wait a random interval, and then attempt transmission again.[70]

As a point of reference, this technology can be contrasted with "token ring" technology, developed by David Farber and eventually sponsored by IBM.[71] In a token ring system, the computers are connected in a logical ring and pass a "token" around the ring to each other. In order to transmit data, a computer must wait until it possesses the token before transmitting the message.[72] It then seizes the token, transmits its message unidirectionally around the ring, and passes the token when it has finished its transmission.

66. THE TRIUMPH OF ETHERNET, *supra* note 60; *see also* Yochai Benkler, *Intellectual Property and the Organization of Information Production*, 22 INT'L REV. L. & ECON. 81 (2002).

67. THE TRIUMPH OF ETHERNET, *supra* note 60, at 118.

68. *Id.* at 70.

69. WILLIAM STALLINGS, DATA AND COMPUTER COMMUNICATIONS 472 (6th ed. 2000) [hereinafter DATA AND COMPUTER COMMUNICATIONS].

70. *Id.*

71. THE TRIUMPH OF ETHERNET, *supra* note 60, at 54.

72. DATA AND COMPUTER COMMUNICATIONS, *supra* note 69, at 482.

Some of the fundamental technical differences between these two LAN technologies include (1) Ethernet's randomness versus token ring's organized structure, (2) Ethernet's silent status versus token ring's active status when no computer has a message to send, (3) Ethernet's ability to adapt to bus, tree, or star topology versus token ring's limitations to a ring topology, and (4) Ethernet's broadcast messages versus token ring's unidirectional messages.[73]

4. The Mechanics of Ethernet Standardization

Ethernet's ascension to its now ubiquitous status began with a secret, closed collaborative alliance between DEC Corporation, Intel, and Xerox known as the DIX alliance. The group was formed in 1979 to develop a set of Ethernet specifications after Metcalfe, then a consultant with DEC, urged DEC to contact his former employer, Xerox, about licensing the Ethernet technology.[74] In an uncharacteristic move, Xerox agreed to license the technology and the DIX alliance agreed to develop specifications for the world to use as an open standard.[75]

Throughout 1979 and 1980 the DIX group secretly met, developed, and eventually published a set of Ethernet specifications nicknamed the "blue book." Long before the DIX group achieved this goal, however, a much broader, open initiative to develop a LAN standard was launched at the IEEE. The appeal of such an IEEE initiative is obvious: the advent of LAN technology and the recognition of the need for standardization of this technology inspired a general interest and anxiety throughout the industry. Because DIX was closed, and even secret during its infancy, the many other interests affected by the development and deployment of a LAN standard needed an alternate forum. While IEEE, through its IEEE 488 project, had been working on more primitive networking specifications as early as 1971, it took the leadership of Tektronix engineer Maris Graube to convince the IEEE to engage in standard development for a more technologically advanced network.[76] At the persistence of Graube, the IEEE approved project 802 in 1979 and scheduled its inaugural meeting for early 1980.

An incredibly diverse set of over 75 interests attended the first meeting of IEEE 802. The members of the DIX group, although they

73. As can be expected in any standardization effort involving complex technology, the technical differences between competing proposals tend to inspire passionate debates during the standard development process. While the core of these debates centers on the relative technical merits, often political and business agendas are hidden behind dueling technical proposals.

74. CARL SHAPIRO & HAL R. VARIAN, INFORMATION RULES: A STRATEGIC GUIDE TO THE NETWORK ECONOMY 253 (1999) [hereinafter INFORMATION RULES].

75. THE TRIUMPH OF ETHERNET, *supra* note 60, at 102.

76. *Id.* at 108.

had yet to make their alliance public, attended this initial meeting, as did all of the major computer vendors of the time, such as IBM, Data General, and Honeywell, along with new Ethernet start up companies, semiconductor firms, office automation firms, and factory automation firms. Each of these general groups brought its own agenda and goals to the LAN standardization effort.[77]

As the IEEE 802 group progressed through its infancy, the diversity of interests in the group and their competing agendas became a source of tension and at times the project's primary obstacle. For instance, to the surprise of many participants, the DIX alliance's participation in the 802 project proved to be an effort to strong-arm other participants into adopting its own blue book specifications. In mid to late-1980, the DIX alliance finally made itself public and published its blue book Ethernet specifications. The group offered the specifications to IEEE 802 for adoption, with the warning that the DIX alliance intended to support Ethernet products built to its blue book specifications regardless of what IEEE 802 chose to do. This aggressive stance placed many members of the IEEE 802 group on guard, as these members joined IEEE 802 with the intention of participating in the development of the specifications, not merely ratifying the DIX blue book.[78]

Moreover, for reasons related to reliability and electrical interference, many of the factory automation interests preferred specifications based on token technology, such as a token bus, to the CSMA/CD technology. IBM also preferred the token ring, and had already begun development of a token ring prototype. IBM strongly believed that token ring's topology, deterministic elements with greater reliability, and ability to prioritize messages would be superior for the types of enterprise-wide networks employed by IBM's primary customer base.[79]

DIX saw the picture differently. DIX's blue book Ethernet specifications, while less reliable than the token ring technology, were more than adequate for most smaller networks and were much closer to commercialization than IBM's proposals. On the more subtle side, DEC's promotion of Ethernet improved its competitive position with respect to IBM. Specifically, DEC hoped to lock its minicomputer customers into Ethernet communication protocols and coaxial wire. This lock-in effect would be preserved by the high switching costs involved in a transition to IBM's token ring protocols that employed shielded twisted pair wire. As a result, IBM would face barriers to

77. *Id.*
78. *Id.* at 112.
79. *Id.* at 113.

penetrating the minicomputer market and would be more likely to focus solely on its mainframe market. In short, an incurable difference of opinion began to develop in the IEEE 802 group between the supporters of Ethernet and the supporters of token ring.[80]

As this incurable difference crystallized, the respective supporters tackled the challenge of persuading the other interests in the market of their positions. The DIX group consistently painted an attractive economic picture for many of the smaller participants at the IEEE 802 meetings by focusing attention on the potential for quick commercialization in combination with a promising philosophy of multi-vendor support. By using the IEEE forum to recognize the needs and incentives of the smaller interests, the DIX alliance eventually overcame the initial disdain these interests harbored due to the DIX's strong-arm tactics. Eventually, DIX garnered key support from many start up Ethernet suppliers, including 3Com and its charismatic founder, Robert Metcalfe.[81]

In the end, the philosophical fissure between the major competing interests proved irreparable, and in what Metcalfe calls a "dark day in the history of standardization," the 802 group split into three different subgroups, 802.3 for Ethernet, 802.4 for token bus, and 802.5 for token ring.[82] Despite this disappointing split, the early IEEE 802 project meetings served as an important and insightful sounding board for different perspectives on networking technologies and for critical evaluation of the different technical proposals.

Tensions remained high, however, even within the 802.3 group as HP took a legitimate substantive stance against the DIX group arguing fiercely over preamble length, collision methods, high-level data-link control framing, address length, and other technical details. These disagreements stalled development for over a year and resulted in HP's outright defection from the DIX group's proposals.[83] Meanwhile, other companies have been accused of manufacturing disingenuous conflicts in order to use IEEE 802 participation as a pretext for competitive manipulation. For instance, some believe that Wang participated in 802.3 primarily to stall the process while engaging in a parallel effort to

80. THE TRIUMPH OF ETHERNET, *supra* note 60, at 118.

81. From the early stages, Metcalfe and 3Com intended to manufacture and market Ethernet products for workstations and personal computers. Brett Frischmann, *Privatization and Commercialization of the Internet Infrastructure: Rethinking Market Intervention into Government and Government Intervention into the Market: Privatization and Commercialization of the Internet Infrastructure*, 2 COULM. SCI. & TECH. L. REV. 1, 13 n.24 (2001).

82. THE TRIUMPH OF ETHERNET, *supra* note 60, at 118.

83. *Id.* at 121.

develop and market Wangnet, their own proprietary networking solution.[84]

DIX, the clear leader of the 802.3 efforts, responded to these stalls and distractions by cleverly and quickly pushing its specifications through the European Computer Manufacturers Association (ECMA) and garnering the support of numerous European computer manufacturers.[85] This momentum carried through to the IEEE 802.3 group, and in 1985 IEEE ratified the Ethernet standard with only modest changes from DIX's original blue book specification. Pursuant to IEEE policy, as well as the philosophy of the DIX group, the standard remained open with Xerox offering a reasonable, non-discriminatory license to the patented technology for a $1,000 flat fee.[86]

5. Market Reactions

Despite its IEEE ratification, Ethernet continued to face competition in the marketplace from both proprietary LAN technologies by companies such as Datapoint, Nestar, Proteon, and Sytek, as well as competition from the IBM token ring technology. Ethernet, however, entered the market with three primary advantages: (1) IEEE ratification, (2) sponsorship of the industry giant members of DIX, along with their commitment to focus on their core businesses while encouraging other companies to manufacture specialized Ethernet products, and (3) a cadre of small, innovative Ethernet supporters eager to profit from specialized Ethernet products. As noted above, all of these advantages were spawned from the open, collaborative IEEE proceedings.

Ethernet's proprietary competitors, on the other hand, suffered from several key disadvantages. For one, they proved financially and strategically unable to move into the multitude of markets that were opening up in the LAN economic space. Instead, each of these networks settled into one specific market, and as a result became highly exposed to market vulnerabilities. Additionally, because of the proprietary nature of the technologies, these competitors also suffered from lack of product variety. Lacking collaboration with and contribution from other companies, the products of the proprietary companies tended to stagnate compared to Ethernet. Finally, the prices of the proprietary technologies remained high relative to Ethernet. The open culture created by the standardization process for Ethernet allowed companies with Ethernet technologies to avoid all of these pitfalls and prevail handily over their proprietary competition.

84. *Id.* at 15-16.
85. *Id.* at 121.
86. INFORMATION RULES, *supra* note 74, at 253.

Ethernet's struggle with IBM and its token ring technology was a bit more challenging. Some even consider the Ethernet/token ring battle to resemble a traditional standards war. Token ring entered the market in 1986 as a high-end, technologically superior LAN solution. The open Ethernet community responded to this technological competitor by further innovating and improving the Ethernet standard. Some key developments include AT&T's 1987 introduction of a 1-Mbps Ethernet for UTP wire, and Synoptics's reversion to star topology designs in order to improve performance and management.[87] Importantly, consistent with the open, collaborative culture established during its initial standardization, the Ethernet community continued to actively meet in the IEEE 802.3 forum, share ideas, and improve the Ethernet specifications to respond to market demands and competitive challenges. Ultimately, this culture produced critical product enhancements to answer token ring's challenges, such as 10Base-T, which was ratified in 1990 as part of the Ethernet specification.[88] "[T]he Ethernet standard proved mutable . . . [and] the institutional design of the IEEE was sufficiently flexible to standardize new variants of the original Ethernet standard."[89] These group-effort technological improvements allowed Ethernet to claim outright victory over token ring by the early 1990's.[90]

Ultimately, the industry's success in deploying Ethernet as a standard is attributable to the culture created in developing that standard. The cadre of innovative Ethernet supporters would never have existed but for the IEEE 802 meetings. Their presence was made known to the DIX group during the standardization process, and the DIX group tailored a synergistic business and standardization strategy with the well being of these small voices in mind. Additionally, the 802.3 meetings served as a forum for the smaller interests to meet one another, to become educated about the technology, and to begin collaboration. This culture pervaded the mature Ethernet market, with the innovative Ethernet specialists openly collaborating and fiercely competing at the same time. With time, the residual 802.3 group became a continuing forum for improving the product, identifying threats, and responding to challenges. The 802.3 forum was critical not only to Ethernet's original success, but to its continued dominance in the market.

87. THE TRIUMPH OF ETHERNET, *supra* note 60, at 177.

88. Needham J. Boddie, II et al., *A Review of Copyright and the Internet*, 20 CAMPBELL L. Rev. 193, 211 n.80 (1998).

89. THE TRIUMPH OF ETHERNET, *supra* note 60, at 205.

90. *Id.* at 194.

6. Ethernet vs. DRM

When considering Ethernet standardization in the context of the current DRM standardization challenge, several key differences are apparent. For one, although both efforts demand participation from a diverse set of interests, the interests involved in Ethernet standardization all hailed from the computer and data communications industry, whereas the interests needed for DRM span across industries. Moreover, while all of the diverse Ethernet intra-industry groups arguably stood to gain from the eventual standardization of data communications, the diverse DRM inter-industry groups remain convinced that a standardization success for any one industry necessarily threatens to harm other industries.

The nature of the technology represents another key difference between Ethernet and DRM. Ethernet stands as pure technological advancement, whereas some might argue that DRM represents the use of technology to further policy agendas in the intellectual property and innovation contexts. Arguably, DRM does not represent pure technological advancement in terms of, for instance, the speed, volume, and efficiency sought by Ethernet.

Moreover, tough policy questions were not interposed upon the technological challenges involved in Ethernet standardization. The launch of Ethernet only affected a core group of specialized producers and consumers, many of which anticipated and expected the change as technology naturally progressed. DRM, on the other hand, will affect wide consumer bases in the consumer electronics and media industries. DRM will also inevitably effect innovation and technological direction in consumer electronics and data communications, as well as incentives for the creators of media content. DRM's wide reaching effects raise difficult policy questions that, unlike Ethernet, hinder the development and launch of a standard.

Finally, Ethernet represents a self-enforcing standard, whereas a DRM standard carries with it enforcement challenges. As a widely developed compatibility standard, manufacturers have an independent incentive to produce Ethernet compliant products. DRM will not carry such market incentives for self enforcement, and arguably will carry with it incentives for non-compliance by those unhappy with the resulting standard.

B. VCR

In stark contrast to the open, market-based collaborative efforts involved in Ethernet standardization, the VCR standardization case history exposes a vicious and costly outright standards war between

Sony's Betamax standard and Japan Victor Corporation's (JVC) VHS standard. In retrospect "[t]here seems [to be] little doubt that the whole Japanese industry, including JVC as well as Sony, would have been better off without the costs of the standards war."[91] While the standardization process involved some costly casualties, the winning VHS standard itself served as a great long run benefit to consumers, content producers, and electronics manufacturers. Moreover, similar to the Ethernet standard, the VHS standard served as a platform for new and innovative business models. This often discussed case study highlights the potential harms and benefits of a standards war and illuminates the market conditions that might inspire a standards war.

1. A Note on Network Effects

The market for VCRs is a prime example of a market characterized by network effects. Such markets are prone to standardization and often exhibit unconventional behavior. These markets might converge to a single design, inferior technology might prevail over better solutions, and competitors might freely give expensive R&D away to each other and to customers.[92] In an effort to analyze and explain such paradoxical behavior economists have forged a set of tools and ideas under the rubric of "network economics." These principles strive to explain, describe, and predict the economic and strategic implications of networks.[93]

Network economics teaches that the value of a network increases exponentially with the number of users. As noted by Shapiro and Varian, "[t]his fundamental value proposition goes under many names: network effects, network externalities, and demand-side economies of scale."[94] One specific variant of this value proposition is captured in Metcalf's Law, which holds that the value of a network increases as the square of the number of network users.[95] Examples include the network of facsimile machine users and the network of AOL instant messaging users. The value of these networks in the abstract, and the value of these networks to each individual user, increases as the overall number of users increases.

The network value proposition is concomitant with another proposition: the growth of a network tends to inspire further growth of

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91. PETER GRINDLEY, STANDARDS, STRATEGY, AND POLICY: CASES AND STORIES 93 (1995) [hereinafter STANDARDS, STRATEGY, AND POLICY].

92. *See id.* at 18.

93. *See* INFORMATION RULES, *supra* note 74, at 108. With regard to network economics, the book by Shapiro and Varian remains "still the best read on the network economy." *Coming of Age: A Survey of the IT Industry: The Fortune of the Commons*, ECONOMIST, May 10, 2003, at 13.

94. INFORMATION RULES, *supra* note 74, at 174.

95. *Id.* at 184.

that network. As new individuals join a network, that network's value is enhanced to all users, and as a result, additional new users are liable to join the network. This "virtuous cycle of growth" is called positive feedback.[96]

Standards are a critical aspect of networks as they enable and define networks. Specifically, standards define the substantive details of the core technology or idea upon which a network is based. Where several networks are competing against each other, such as in the case of a standards war, positive feedback will cause a market to "tip" in favor of one network, or one standard. As such, standardization occurs naturally in markets characterized by network effects. Additionally, such standardization carries with it a certain gravity, as consumers usually stick with the standard they have chosen. This behavior allows consumers to avoid the "switching cost" of migrating to a different standard. Where switching costs are high, for example as in the case of a consumer's purchase of a new VHS machine after that consumer has already invested in a Betamax machine, consumers become "locked in" to their choice of standard. Such locked in consumers are called an "installed base" in network economic parlance. Where the market tips in favor of one standard, the installed base of consumers who have chosen the losing standard become "stranded."

Network economics explains some of the very general market forces operating to standardize technology. The discipline also highlights some of the dangers and costs involved in allowing the market, through standards wars, to chose its own fate. The principles of network economics are not always applicable to every standardization effort, but they are directly applicable to the VCR standards war.

2. The Nature of the VCR Market and Standardization Strategies

During the VCR's technical maturation process, the leading interests in the industry not only strove to advance the technical characteristics of their product, but also strove to define and understand the market for the product.[97] Initially, consumers understood the product primarily as a means to make and view home movies, but eventually the product's capabilities for time shifting and viewing of pre-recorded content became drivers. As such, this market maturation process ignited the interests of content producers as well as that of consumer electronics companies. When the standards war began to take form in the mid to late 1970's, the battle involved and implicated a

96. *Id.* at 176.
97. *See* STANDARDS, STRATEGY, AND POLICY, *supra* note 91, at 77.

distinct set of interests, including major consumer electronics manufacturers, consumer electronics suppliers, and content producers.[98]

Sony's Betamax product was launched in Japan and the U.S. in 1975. JVC's VHS product did not arrive in the U.S. until two years later in 1977. Although incompatible with each other, both products were similar in many respects, as they were based on the same core technology cross-licensed between Sony, Matsushita, and JVC. Similarity between the products meant that opportunities for technical innovation were confined to limited areas such as programmability, picture quality, and playing time. While JVC and Sony did challenge each other by quickly innovating within these confines, neither company was able to distinguish itself with a truly unique breakthrough or innovation.[99] Despite the fact that innovation in these products quickly became saturated, some commentators have noted that JVC's early adoption of a 4 hour playing time, to accommodate taping of an NFL football game, was an important product differentiation bearing upon the critical early stage acceptance of the JVC product.[100] While quickly answering the competition's innovation was important, the more critical aspect of this standards war centered on business philosophy and strategy.

Sony stuck with its proprietary philosophy. Due to its size and experience, Sony believed that it had the capacity to meet the production requirements for the entire market. As such, Sony was reluctant to negotiate with and license other manufacturers. JVC, on the other hand, as a smaller audio component specialist company, intended to create a network of partnerships to manufacture and distribute its product. From the perspective of influential consumer electronics manufacturers and distributors, JVC was an approachable company as, unlike Sony, it served only a niche in the market and did not represent a large competitive threat. In furtherance of its business philosophy, JVC licensed Matsushita as a manufacturer, and RCA as a distributor for the U.S. market. Although JVC was two years late to the market, RCA's huge distribution network proved invaluable.

98. In contrast with the Ethernet case, which implicated a vast diversity of interests within one general industry, the VCR battle implicated diverse interests across very different industries. Where standards have implications across different industries, the technical standards development process often proceeds in parallel with vibrant inter-industry legal and political battles. The *Betamax* case and the contemporary DRM debates are evidence of this complication.

99. *See* Michael I. Krauss, *Regulation vs. Markets in the Development of Standards*, 3 S. CAL. INTERDISC. L.J. 781, 803 (1994).

100. STANDARDS, STRATEGY, AND POLICY, *supra* note 91, at 85.

3. Market Reactions and Consequences

Although Sony maintained the first mover advantage in the U.S. market, within a year of JVC's introduction of VHS, the sales of VHS surpassed those of Betamax.[101] With its diverse group of manufacturers and the premier U.S. distributor on its side, JVC was able to undercut Sony's prices and convince the majority of the market that the VHS standard would prevail. By 1981, JVC had generated an installed base of 1.2 million users in the U.S., double that of Sony.[102]

Operating in parallel to its pricing, manufacturing, and distribution strategies, JVC also maintained a competitive advantage in the important market for complementary goods. As part of its distribution arrangement, RCA agreed to ensure that all RCA/Warner movies were available in the VHS format.[103]

By 1985 sales of VHS product reached nearly 1.6 million, while sales of Betamax had plummeted to around 100,000. In other words, the market had tipped fully in favor of VHS. Nevertheless, Sony had garnered roughly 3 million sales in the U.S., and these consumers were now all stranded.[104] By 1988, Sony began production of a VHS product, leaving Betamax as an unattractive legacy in Sony's corporate history.

Like the Ethernet standardization effort, JVC's open, collaborative strategy focused on creating commercial synergies. Unlike the Ethernet effort, the losers in this battle were more profoundly damaged. Those losers included not only Sony, but also the millions of customers stranded with Sony's obsolete technology. Whereas purchasers of a non-Ethernet proprietary niche LAN system could at least use that system, once the VCR market tipped, purchasers of Betamax were left with an entirely obsolete product.

Once the fallout from the standards war had subsided, however, the VHS standard served as a true marketplace success. The product met with enthusiastic consumer acceptance and served as a platform for the launch of business models based on the feature film "aftermarket."

4. VCR vs. DRM

The VCR and DRM standardization efforts have certain similar characteristics. These efforts involve both the consumer electronics and media production industries. As was seen in the *Betamax* case, both efforts involve contentious disputes between these two separate industries. Additionally, both efforts involve implications for the

101. *Id.*
102. *Id.*
103. *Id.* at 86.
104. *Id.* at 85.

consumer concerning rights to media content. Despite these similarities, standardization in DRM will likely not exhibit characteristics of a standards war.

For one, the spoils of a standards war in the DRM context are uncertain. While VCR manufacturers were battling for monopolistic control over a lucrative consumer electronics market, DRM occupies a somewhat different position in the market. DRM is largely a technological means to an end. As such, the financial rewards for providers of DRM technology itself, rather than the applications that DRM will enable, remain uncertain. These uncertain rewards cannot justify the risks involved in a standards war. Moreover, the strategy involved in a DRM standards war might be unconventional and ill-understood, as many would argue that the DRM standardization effort will not exhibit the type of network effects involved in prior standards wars.

Most importantly, DRM faces adoption and enforcement challenges. Such challenges will detract from market acceptance of the standard, as natural market forces will likely inspire migration toward non-complaint systems. Where acceptance of the standard is an issue, a standards war between different variants of a DRM standard makes no sense. As part of a counter to consumer and market tendencies to reject the entire idea of DRM altogether, proponents of DRM will be likely to grant unfettered access to their DRM technologies, rather than erecting barriers and engaging in proprietary behavior. The real war behind DRM will be between compliance and non-compliance, rather than between different variants of a DRM standard.

C. MPEG

Somewhere between the open, collaborative Ethernet process and the aggressive, competitive VCR process lies a standardization process involving a balance of collaboration and closed, competitive conduct. For example, the Moving Picture Experts Group (MPEG) was established in 1988 as an ISO group formed to develop standards for coding video and audio. MPEG is open in the sense that anyone may participate, as long as the participant is accredited by a national standards body. As such, it has been called an "almost open" organization.[105] When it first met in 1988, MPEG consisted of 25 people, and it has now grown to around 350 people representing 200 companies and organizations.[106]

105. GABRIEL BOUVIGNE, MP3' TECH, OVERVIEW OF MP3 TECHNIQUES (2001), *at* http://www.mp3-tech.org/tech.html [hereinafter OVERVIEW OF MP3 TECHNIQUES].

106. *See* CHIARIGLION, THE MPEG HOME PAGE, *at* www.chiariglione.org/mpeg/ (last visited Apr. 5, 2005).

1. Development of the Standard

MPEG-1 is a standard developed by MPEG for coding and compression of video and audio data.[107] MPEG-1 encompasses the popular MP3 file format for audio data. The work on this standard began in 1988 and the standard was adopted as ISO/IEC IS 11172 in 1992.[108] While the standard was discussed and debated in MPEG's semi-annual meetings, the majority of the development work for the standard was performed by individual corporations on a closed and proprietary basis. Such closed collaboration, occurring in parallel with a larger open effort, is a common phenomenon in standardization efforts.[109] Like the DIX Alliance in the case of Ethernet, the Fraunhofer Institute performed the majority of the development work associated with the MP3 standard. Unlike DIX, however, Fraunhofer never intended to relinquish its proprietary control over the standard. Beginning in 1998, Fraunhofer began actively asserting its patent portfolio covering the MP3 standard. Fraunhofer has joined with Thomson Multimedia to create a portfolio of 18 patents covering the standard, and offers a package license of these patents.[110] Additionally, other companies maintain patents covering other aspects of the standard.

2. Market Acceptance

As an efficient and effective method of compressing digital audio files, the MP3 file format quickly became popular in the market. Part of the reason for MP3's popularity was the fact that it did not incorporate or require much by way of rights management. In other words, initially consumers were free to do what they pleased with the MP3 files. Again, as already noted, such freedom fills a growing consumer demand for flexible and unencumbered media technologies. Moreover, the fact that the MP3 standard could be software-based made distribution and implementation of the standard easy. The standard was widely adopted, despite its proprietary nature.

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107. *See* ISO & IEC, MPEG-1 (CODING OF MOVING PICTURES AND ASSOCIATED AUDIO FOR DIGITAL STORAGE MEDIA AT UP TO ABOUT 1,5 MBIT/S), *at* http://www.itscj.ipsj.or.jp/sc29/29w42911.htm#MPEG-1 (last visited Apr. 5, 2005).

108. *See* Karlheinz Brandenburg, *MP3 and AAC Explained*, AEC 17TH INT'L CONFERENCE ON HIGH QUALITY AUDIO CODING (1999), *at* http://www.aes.org/publications/downloadDocument.cfm?accessID=14703162000122117 [hereinafter *MP3 and AAC Explained*].

109. *See* ROBERT PERRY ET AL., FINAL REPORT OF THE CO-CHAIRS OF THE BROADCAST PROTECTION DISCUSSION SUBGROUP TO THE COPY PROTECTION TECHNICAL WORKING GROUP (2002), *at* http://www.eff.org/IP/Video/HDTV/bpdg-report/pdf/BPDG_Report.pdf [hereinafter BPDG FINAL REPORT].

110. OVERVIEW OF MP3 TECHNIQUES, *supra* note 105.

3. Additional MPEG Developments and a Note on Proprietary Strategy

In developing its second standard, MPEG-2, the group took a more proactive stance regarding the potential proprietary nature of the technology involved in the standard. During and after the MPEG-2 standard development, the group solicited submissions from patent owners believing that the standard practiced their patents.[111] An independent expert evaluated over 8,000 patents in connection with this project to identify the set of patents that are essential to practicing the standard. The owners of the patents that would read upon the standard formed a package license based on this "patent pool."[112]

Before attempting to market the standard, the patent pooling arrangement and the package license were presented to and approved by the Department of Justice (DOJ), in the form of a business review letter, asking for an advisory opinion regarding possible DOJ enforcement due to anti-competitive conduct.[113]

The eventual technical solution to rights management in digital media content will implicate the patent rights of various interests. The government has provided a framework for the appropriate licensing of such rights under the DOJ-FTC IP Licensing Guidelines and the DOJ business review letter process.[114] Moreover, recent legislation has generally relaxed SDO antitrust liability stemming from treatment of intellectual property.[115] Nonetheless, it should be noted that aggressive enforcement of patent rights covering a potential standard might dissuade the market from accepting the standard.[116] Moreover, where government directly participates in the standard development and deployment, government rather than the market, will minimize the potential for intellectual property misuse by imposing safeguards to

111. *See* Regis C. Worley, Jr., *The MPEG LA Patent Pool: A Rule of Reason Analysis and Suggestion to Improve Procompetitiveness*, 24 T. JEFFERSON L. REV. 299, 300 (2002).

112. *See* Dorothy Gill Raymond, *Benefits and Risks of Patent Pooling for Standard Setting Organizations*, 16 ANTITRUST 41 (2002). The specific interests involved include the University of Columbia, Fujitsu Limited, General Instrument Corp. Lucent Technologies, Inc., Matsushita Electric Industrial Co., Mitsubishi Electric Corp., Philips Electronics N.V., Scientific-Atlanta, Inc., and Sony Corp.

113. *See* Letter from Joel I. Klein, Acting Assistant Attorney General, Antitrust Division, Department of Justice, to Gerrard R. Beeney, Esq. (June 26, 1997), *at* http://www.usdoj.gov/atr/public/busreview/1170.pdf [hereinafter *MPEG Pool Letter*]. *See also* 28 C.F.R. § 50.6 (1999).

114. *See* DEP'T OF JUSTICE AND FEDERAL TRADE COMM'N, ANTITRUST GUIDELINES FOR THE LICENSING OF INTELLECTUAL PROPERTY (Apr. 6, 1995), *available at* http://www.usdoj.gov/atr/public/guidelines/ipguide.htm; 28 C.F.R. § 50.6 (1999).

115. *See* Standards Development Organization and Advancement H.R. 1086, 108th Cong. § 102 (2004), *available at* http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=108_cong_public_laws&docid=f:publ237.108.

116. *See The IPR Paradox*, *supra* note 57, at 221-22.

ensure that proprietary technologies are licensed on reasonable and non-discriminatory bases.

4. MPEG vs. DRM

Like the VCR standardization, the somewhat closed collaborative model of standardization involved in MPEG includes a proprietary philosophy. For the same reasons that a standards war will be unlikely in the DRM context, specifically the consumer acceptance challenges, a closed proprietary collaborative model will also be unlikely. DRM standardization will involve an expensive overhaul of all consumer electronics hardware and the data communications infrastructure. This overhaul must occur against the backdrop of skeptical consumers and unconvinced consumer electronics manufacturers and data communications infrastructure providers. A proprietary strategy, whether in the form of a standards war or a closed collaborative effort, remains unlikely.

D. DTV

Unlike the case studies covered thus far, the U.S. government, primarily acting through the FCC, was and remains heavily involved in the digital television standardization process. For a host of reasons, not the least of which being that the transition from analog to digital broadcasting may not be completed for more than 30 years from the beginning of the standardization effort, many commentators view this case as a colossal failure.[117] On the other hand, other commentators, recognizing the incredible legal, technical, economic, and political complexities involved in this particular standardization initiative, view the U.S. effort as a success and a model.[118]

1. The Promise of Digital Television

Digital television (DTV) broadcasts are far superior to the traditional analog NTSC format. Such a broadcast scheme can support crystal clear HDTV signals, CD quality audio, the broadcasting of multiple signals on the same 6Mhz channel (multi-casting), dynamic interactive data capabilities, and high volume data communications.[119] The use of digital broadcasting also relieves certain interference

117. Erwin G. Krasnow, & M. Wayne Milstead, *FCC Regulation and Other Oxymorons Revisited*, 7 MEDIA L. & POL'Y 7 (1999) [hereinafter *Oxymorons*].

118. *See* STANDARDS, STRATEGY, AND POLICY, *supra* note 91, at 121.

119. THOMAS G. KRATTENMAKER, TELECOMMUNICATIONS LAW AND POLICY 321-39 (2nd ed., 1998).

concerns.[120] Moreover, such a technical scheme can serve as a platform for further innovations surrounding the convergence of television, computing, and communication technologies.[121] Achieving the promises of DTV, however, has proven to be a monumental task. For one, like the Ethernet standardization effort and even more like the current DRM challenge, the DTV effort spans a wide spectrum of interests, such as content producers, consumer electronics manufacturers, broadcasters, and consumers.[122] Unlike the Ethernet situation, however, the DTV effort faces additional obstacles such as the need for consumers to replace their existing televisions, the need to inspire a costly upgrade of the broadcasting infrastructure, and the need to develop and deploy standards in the public's communication spectrum, a technical area fraught with political controversies and legal restraints.

2. The Nature of the Market

In the case of DTV, the market itself simply would never provide organic incentives for content owners, broadcasters, and consumer electronics manufacturers to make the transition on their own. The "logjam" acting against DTV signal standardization stems in part from similar market forces as those acting in the current DRM context. As has already been noted, content production interests were more than comfortable with the profitable status quo. A transition to all digital production and broadcasting raised several uncertainties from the content production interest perspective, including increased costs of production and the always looming threat of digital piracy. Likewise, from the broadcasters' perspective, the projected conversion costs of $10-12m per station provided a significant financial disincentive.[123] And while the consumer electronics interests would obviously benefit from sales of high priced digital television sets, without the backing of content producers and broadcasters, the investment in R&D and the effort required to develop, manufacture, and bring to market such sets could not be justified. Moreover, averse to risky and costly standards wars, the consumer electronics manufacturers were further reluctant to engage in the transition from analog to digital without a standard in place. In short there was no market catalyst for standardization.

120. *See* FEDERAL COMMUNICATIONS COMM'N, FCC CONSUMER FACTS: COMPATIBILITY OF CABLE TV AND DIGITAL TV RECEIVERS - "PLUG-AND-PLAY" (Sept. 11, 2003), *at* http://ftp.fcc.gov/cgb/consumerfacts/plugandplaytv.html.

121. *See* Advanced Television Sys. & Their Impact Upon the Existing Television Broad. Serv., *Fourth Further Notice of Proposed Rule Making & Third Notice of Inquiry*, 10 FCC Rcd. 10,540 (1995).

122. *See* STANDARDS, STRATEGY, AND POLICY, *supra* note 91, at 121.

123. *See id.* at 212.

The FCC's involvement could be viewed not only as providing deadlines, guidance, and mandates, but also as crafting incentives to inspire the respective players to begin the innovation process. While FCC intervention served as the initial catalyst, once the process was underway, the market activity was marked by innovation, over achievement, and new organic market incentives to further inspire the transition from analog to digital.

3. The Mechanics of DTV Standard Development

The U.S. standardization story began in 1977 when the Society of Motion Picture and Television Engineers (SMPTE) created a task group to study high definition television (HDTV).[124] At this time, the Japanese and Europeans had already recognized the promise of HDTV and had already begun to chart a course for the transition to HDTV. The U.S. did not seriously begin pursuit of its own standard, however, until nearly a decade later. The FCC formally entered the process in 1987 when a group of 58 companies, mostly broadcasters, petitioned the FCC for a formal proceeding to explore advanced television.[125] In retrospect, the motives behind the original petition that implicated the FCC appear somewhat ulterior. Specifically, the broadcasters' push into the advanced television realm was the manifestation of a short sighted ploy to stave off an FCC decision that would have allocated public spectrum for the use of land mobile rather than broadcasting.[126] In an effort to preserve all of their allocated spectrum, the broadcasters successfully argued that they needed the spectrum for advanced television, even though their genuine interest in harvesting the possibilities of advanced television remained questionable.

In response to the 1987 petition, the FCC created the Advisory Committee on Advanced Television Service (ACATS or the advisory committee) to study advanced television (ATV) and to provide recommendations to the FCC.[127] The ACATS was established by the

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124. HDTV refers to a high resolution picture. As will be seen, the original HDTV proposals were largely analog, not digital. Digital Television (DTV), on the other hand, refers to using a digital transmission, and encapsulates high definition television, regular definition television, and other services.

125. *See* Daniel Patrick Graham, *Public Interest Regulation in the Digital Age*, 11 COMM. L. CONSPECTUS 97, 98 (2003) (paraphrasing Advanced Television Systems and Their Impact on the Existing Television Broadcast Service, *Notice of Inquiry*, 2 FCC Rcd. 5125, at ¶ 2).

126. JOEL BRINKLEY, DEFINING VISION: HOW BROADCASTERS LURED THE GOVERNMENT INTO INCITING A REVOLUTION IN TELEVISION (1997) [hereinafter DEFINING VISION].

127. *See* Richard E. Wiley, *The Digital Television Future: What Next?*, 16-FALL COMM. L. 3 (1998).

FCC pursuant to the Federal Advisory Committee Act (FACA).[128] FACA provides a detailed set of guidelines and uniform procedures for such advisory committees including features such as congressional review of advisory committee activities, public notice of advisory committee meetings, open public meetings, public access to the committee, and public access to documents, reports, agendas, and transcripts produced by the committee.[129]

The ACATS was headed by former FCC Commissioner Richard Wiley and was composed of "industry leaders representing diverse viewpoints, including those of the television broadcast networks and stations, equipment manufacturers, cable systems, and the communications bar."[130] In conjunction with general study of advanced television, the ACATS, in 1988 and 1989, invited the submission of competing advanced television proposals from industry with the intention of recommending a winning proposal to the FCC for adoption as a standard.[131] In parallel, the industry created and funded a test center, the Advanced Television Test Center, with the technical capabilities to evaluate and judge the various proposals.[132]

While in theory the competition was designed to promote innovation, aspects of the process were characterized by "gamesmanship, scheming, and political maneuvering."[133] The process involved hidden agendas concerning, *inter alia*, the allocation of spectrum, proprietary intellectual property incentives, and protectionist trade policy. Nevertheless, the process continued and by 1991, when testing was to begin, the original 23 proposals for the standard were whittled down to six.[134] One of these proposals, proffered by General Instruments as a showcase of its VideoCipher division's expertise, was a surprising all-digital proposal.[135] Despite a general skepticism as to whether an all digital system could operate in a 6Mhz band, the proposal was well received as a technological success. The proposal also marked a change

128. *See* The Federal Advisory Committee Act (FACA), Pub. L. No. 92-463, 86 Stat. 770 (1972) (codified at 5 U.S.C. App. 2).

129. *See id.* §§ 5, 10.

130. Advanced Television Sys. & Their Impact on the Existing Television Broad. Serv., Review of Technical and Operational Requirements: Part 73-E, Television Broad. Stations Reevaluation of the UHF Television Channel and Distance Separation Requirements of Part 73 of the Comm'n's Rules, *Tentative Decision & Further Notice of Inquiry*, 3 FCC Rcd. 6520, 6522 (Sept. 1, 1988).

131. DEFINING VISION, *supra* note 126, at 43-44.

132. *See id.* at 66.

133. *Id.* at 120.

134. *See* INFORMATION RULES, *supra* note 126, at 220-21.

135. *See* FCC ADVISORY COMMITTEE ON ADVANCED TELEVISION SERVICE, ATV SYSTEM RECOMMENDATION (Feb. 24, 1993), *at* http://www.atsc.org/news_information/papers/1993_atv_report/index_atvrpt.html.

in the philosophy and goals of the ATV effort. Specifically, the focus shifted away from high definition and toward digital signal transmission.

By 1993, ACATS indicated that four competing digital standards, with seven different corporate sponsors, were under consideration.[136] Also in 1993, the corporate sponsors of these remaining digital proposals, including Zenith, AT&T, General Instrument, MIT, Philips, Sarnoff Research Labs, NBC, and Thomson, joined together to form a "Grand Alliance."[137] The advisory committee's role as a referee and a compromise broker was critical to the formation of this alliance, as the process required compromise on countless business, strategic, economic, technological, and intellectual property disputes between the respective interests.

One of the most consequential disputes, for example, concerned whether the alliance would pursue an interlaced technology, or alternatively a progressive scan technology, as part of the display format incorporated within its standard. Broadcasters had many strategic reasons to prefer an interlaced technology, including their patent positions with respect to video equipment used in producing interlaced pictures. On the other hand, computer interests needed a progressive scan technology to foster interoperability between computing and digital television. These respective interests caused an acrimonious and fundamental split among the participants, with Philips, Sarnoff Research Labs, NBC, and Thomson supporting an interlaced technology and General Instruments, Zenith, AT&T, and MIT supporting a progressive scan technology. With prodding from the advisory committee, the participants reached a hard fought compromise to develop a technology capable of accommodating both interlaced and progressive scan formats.[138] Importantly, without the advisory committee process, the industry acting alone would have little incentive to compromise on such fundamental technological issues.

The "Grand Alliance" corporations cross licensed their patents, worked collectively to combine the competing proposals into a single system, divided the work for the components of the system between themselves based on expertise, and extensively researched and tested the resulting system. The work was documented and adopted by the Advanced Television Systems Committee (ATSC), a private sector organization self described as a broad-based organization (also described

136. *Id.*

137. *See* Comments of Grand Alliance, HDTV System Specification, *Advanced Television Sys. & Their Impact on the Existing Television Broad. Serv.*, (F.C.C. filed May 3, 1994) (MM Docket No. 87-286), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or _pdf=pdf&id_document= 1292130001.

138. *See* DEFINING VISION, *supra* note 126, at 247-76.

as a "broadcast industry technical group"[139]) which develops voluntary standards within the television industry.[140] In late 1995, ACATS voted to recommend that the FCC adopt the Grand Alliance's proposal as the DTV standard.[141]

4. The FCC's Adoption of the Standard

Following the advisory committee's recommendation, the FCC sought public comment on its potential adoption of what was called the ATSC DTV standard.[142] Just as FACA regulates the activities of advisory committees, the Administrative Procedure Act (APA) regulates the activities of federal administrative agencies such as the FCC.[143] Under the APA, all FCC proceedings and rule-makings must be open for public comment and must be transparent and fair. As a practical matter, in the FCC, such notice and transparency generally takes the form of FCC requests for public comment and notices of proposed rule-making.[144] Consideration of wide ranging comments, from high-powered lobbying and special interest groups down to individual citizens themselves, always stands as a prelude to the promulgation of rules by the FCC. Generally speaking, APA rule-making proceedings are conducted before the FCC in the spirit of fierce advocacy, rather than compromise. During such a process, the FCC must grapple with advocacy-induced arguments, which at times might distort the relevant facts and agendas.

As part of the APA rule-making process for the DTV standard, the FCC solicited comments on the possibility of an FCC adopted ATSC standard.[145] In this notice, the FCC outlined four goals regarding the standard:

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139. *Id.* at 369.

140. *See* ADVANCED TELEVISION SYSTEMS COMMITTEE, DEVELOPMENT OF THE ATSC DIGITAL TELEVISION STANDARD, *at* http://www.atsc.org/history.html (last visited Apr. 5, 2005).

141. *See* Advanced Television Sys. & Their Impact Upon the Existing Television Broad. Serv., *Fourth Report & Order*, 11 FCC Rcd. 17,771 (Dec. 24, 1996) [hereinafter *DTV Order*].

142. Advanced Television Sys. & Their Impact Upon the Existing Television Broad. Serv., *Fifth Report & Order*, 11 FCC Rcd. 6235 (May 20, 1996).

143. *See* 5 U.S.C. §§ 500-596 (2004).

144. For example, upon issuing its notice of proposed rule-making for digital broadcast copy protection, the FCC received and evaluated over 6,000 comments. *Piracy Prevention and the Broadcast Flag: Hearing Before the Subcomm. On Courts, the Internet, and Intellectual Property of the House Comm. on the Judiciary* 108th Cong. (Mar. 6 2003) (Statement of W. Kenneth Ferree, Chief, Media Bureau, Federal Communications Commission) *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-236789A1.pdf [hereinafter *Ferree Piracy Prevention and Broadcast Flag Statement*].

145. *See* Advanced Television Sys. & Their Impact Upon the Existing Television Broad. Serv., *Fifth Further Notice of Proposed Rule Making*, 11 FCC Rcd. 6235, 6262 (May 9, 1996).

> 1) to ensure that all affected parties have sufficient confidence and certainty in order to promote the smooth introduction of a free and universally available digital broadcast television service; 2) to increase the availability of new products and services to consumers through the introduction of digital broadcasting; 3) to ensure that our rules encourage technological innovation and competition; and 4) to minimize regulation and assure that any regulations we do adopt remain in effect no longer than necessary.[146]

The FCC considered myriad comments regarding these goals and the Grand Alliance's proposed standard. The most forceful objection came from the computer industry's revived advocacy for progressive scan. The comment period became yet another opportunity for the fundamentally opposed groups to address their concerns. Negotiations between the respective industry groups resulted in an agreement that the display formats be removed from the standard altogether. Such an action arose from a vision that television manufacturers would produce sets capable of receiving either format, and that the FCC would not need to endorse one format or the other, but rather would leave the issue to the market.[147] The FCC adopted the standard on December 24, 1996.[148] Most notably, the FCC took great comfort in adopting the standard given the process by which the standard was developed:

> The consensus among the broadcast, set manufacturing and computer industries gives us confidence that the DTV Standard we are adopting does not reflect overreaching or over-regulation by government. The Agreement itself recognizes that the ATSC DTV Standard is a "voluntary" one, selected by private parties under the auspices of the ATSC, an American National Standards Institute (ANSI) - accredited organization. That parties representing major segments of such widely divergent industries have forged a consensus over the appropriate standard at once furthers our confidence in the DTV Standard itself and ameliorates concerns that adoption of a standard might retard competition and innovation.[149]

While the FCC applauded the diverse industry groups for arriving at a consensus-based standard, this reality could have never been achieved without the FCC's catalytic oversight and prodding, primarily through its advisory committee. Additionally, the FCC's APA rule-making process gave opposed interests another opportunity to vent differences

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146. *DTV Order*, *supra* note 141, at ¶ 30 (paraphrasing Advanced Television Sys. & Their Impact Upon the Existing Television Broad. Serv., *Fifth Further Notice of Proposed Rule Making*, 11 FCC Rcd. 6235 (May 9, 1996).

147. *See* DEFINING VISION, *supra* note 126, at 372-93.

148. *See DTV Order*, *supra* note 141, at ¶ 1.

149. *Id.* ¶ 43 (internal cite omitted).

and reach a well-informed compromise before exposing the standard to the market. Throughout the process the advisory committee and the FCC narrowly negotiated countless solutions to problems and stalls between the industry participants that would have otherwise derailed the standard development.[150]

5. Market Acceptance

In some senses, the market acceptance of this standard is a forgone conclusion as FCC regulations mandate that all broadcasters upgrade their equipment, and broadcast digital signals, in compliance with an FCC timetable.[151] Specifically, the transition proceeds in steps and requires that by 2006 all broadcasters fully transition from analog to digital broadcasts.[152] Nevertheless, there remains some skepticism about the transition.[153] The reaction of the 35 million U.S. consumers who receive television exclusively from over the air broadcasts remains to be seen. While some might initially resist upgrading to an expensive digital television set, opting instead to subscribe to a cable or satellite system, with time the upgrades will be inevitable.

6. DTV vs. DRM

The DTV signal standardization effort more closely resembles the DRM challenge. The effort required an inter-industry participation and involved seemingly impossible conflicts between industries. The DTV case also included a "logjam" problem, with independent disincentives for any one interest, or any one industry, to take the initiative in moving forward with standardization. DTV also included an expensive hardware overhaul, both for consumers and producers. Additionally, the DTV effort involved complex policy problems, such as appropriate use of spectrum, overlaying complex technical problems. The DRM case

150. *See* DEFINING VISION, *supra* note 126, at 283-84.

151. Doug Halonen, *Digital Television Derailed: Trouble with standards, programming delays rollout*, ELECTRONIC MEDIA (July 17, 2000) [hereinafter *Digital Television Derailed*]; This is not to suggest that market acceptance has proceeded smoothly without skeptics and critics. Most notably, a market movement captured in a petition to the FCC filed by Sinclair suggests that the European coded orthogonal frequency division multiplex transmission standard (COFDM) is far superior to the FCC's chosen 8-VSB standard. *See Digital Television Derailed*, *supra* note 151; *Reader Feedback*, BROADCAST ENGINEERING (Aug. 1, 2002); *see also* Review of the Comm'n's Rules & Policies Affecting the Conversion to Digital Television, *Report & Order & Further Notice of Proposed Rulemaking*, 16 FCC Rcd. 5946 (2001).

152. *See* Carriage of the Transmission of Digital Television Broadcast Stations, 63 Fed. Reg. 42,330, 42,332 (Aug. 7, 1998).

153. *See* Aaron Futch, et al., *Digital Television: Has the Revolution Stalled?* 2001 DUKE L. & TECH. REV. 14.

includes all of these elements, and as developed in detail below, the DRM case is also a prime candidate for FCC intervention.

III. FCC INTERVENTION IN DRM STANDARDIZATION

The case studies discussed above expose the practical and realistic side of the standardization process. They also teach that every standardization problem is unique. The specific combination of market structures, incentives, players, hidden agendas, political landscapes, and consequences of each standardization effort are inimitable. Nevertheless, certain facets and elements of every standardization effort can be better understood by reference to how such facets have played a role in historic standardization efforts. As noted, the DRM standardization problem includes elements such as the necessary participation of a diverse set of inter-industry interests, the need to phase in new consumer hardware on a grand scale, the drive to protect media industry intellectual property, the financial disincentives against standardization, the empowered force of consumer expectations, and to the call for defeating an illegal network founded upon copyright infringement. A close exploration of those specific facets, with some reference to history, reveals how government intervention can foster progress in each of these areas, whereas the market cannot, especially when left to its own devices.

A. Diverse Interests

Identifying and garnering the participation of the comprehensive and appropriate set of interests needed in the DRM standardization effort is itself a formidable task. A standardization effort that lacks the participation of a key interest is bound to fail. Clearly, DRM standardization implicates the cooperation of an odd set of commercial interests, including content producers and owners, consumer electronics firms, computer firms, and communications firms. For obvious reasons, it is highly unlikely if not impossible for market-based procedures such as standards wars, and closed proprietary collaboration to gain the participation of the wide array of interests needed for this effort. On the other hand, as has been demonstrated, the market acting independently through SDOs, as in the case of Ethernet, and the FCC acting through intervention, as in the case of DTV, have both rallied diverse commercial interests around a standardization cause.

While closer to the case of DTV, the problem of gathering the participation of a diverse set of interests in the DRM context—both commercial and non-commercial–is distinguishable from both Ethernet and DTV in several important respects. The distinctions highlight the

importance of government intervention and the need for a government forum when developing and deploying a DRM standard.

1. The Unique Consumer Relationship with DRM

DRM standardization expands the scope of key interests beyond the commercial interests minimally necessary to make the standard a technical and business reality. With DRM, more than any standardization effort before it, market acceptance and policy concerns force attention on the desires and reactions of a broad set of non-commercial groups including consumers, artists, and even pirates. Of course, at some level, the demands of consumers are critical to any successful standardization effort, as market acceptance of a standard ultimately hinges thereon. But with DRM, unlike past standardization efforts, consumer passion surrounds the standardization questions bearing on enjoyment of media. This consumer passion has driven fair use and copyright considerations onto center stage, and has placed the business practices of copyright owners under new scrutiny. As a result, the DRM standardization effort is more consumer-oriented and politically charged than any standardization effort before it.

The legal and political wheels are already irreversibly in motion. Federal courts are presiding over seminal lawsuits centering on technology and copyright. New lobbying groups representing P2P networks are posturing among the traditional consumer, electronics, telecommunications, and copyright lobbying interests.[154] Newspaper headlines are keeping the general public informed as to day-to-day copyright and technology developments. Consumer groups are wary of political maneuvering in this area. Heavy-handed law enforcement initiatives and legislative proposals are becoming commonplace.[155] Overall, there is a political and public policy undertone to the DRM standardization effort unprecedented by even the most politically charged historical standardization efforts.

At the bottom line, society as a whole is uneasy about how technological advances will restrict access to and ownership of media content. As previously noted, consumers have developed certain expectations regarding their enjoyment of media content. Moreover, both legitimate copying techniques and today's widespread illicit networks have already empowered consumers in realizing these expectations. The process of taking that technology away from

154. *See* David McGuire, *Music Sharing Services To Start Lobby*, WASH. POST, June 24, 2003, *available at* http://www.washingtonpost.com/ac2/wp-dyn/A26744-2003Jun24.

155. Inducing Infringement of Copyright Act of 2004, S. 2560, 108th Cong. (2004); Press Release, U.S. Department of State, Justice Department Creates Intellectual Property Task Force (Mar. 31, 2004), *at* http://usinfo.state.gov.

consumers is an unsettling prospect. DRM technologies of the future, however, must serve to limit and restrict consumers *vis-à-vis* the possibilities enjoyed by consumers today.

Given such a reality, the consumer seat at the standardization table is not merely warranted in principle, but is critical to successful DRM standardization. If consumers are precluded from participation in the standard development and deployment process, those consumers are likely to revolt against the resulting standard by migrating to future variants of today's networks founded upon copyright infringement.

Transparent, public-minded FCC proceedings are likely to afford the greatest degree of necessary consumer involvement. Indeed, as seen with the VCR and MPEG case studies, standards wars and proprietary collaborative efforts are far removed from direct consumer participation. Even open SDO procedures are traditionally accustomed to pragmatic technical collaboration among industry participants, and less accustomed to addressing public concerns and overarching policy implications. FCC proceedings, with their transparency, traditional consideration of policy implications surrounding technological choice, and opportunity for direct consumer involvement, will afford the most protection to consumer interests in the DRM standardization process.

With a transparent FCC proceeding, consumers will at least be aware of the relevant developments and receive an opportunity to directly comment upon them. Moreover, their comments will be read and considered.[156] Lobbying groups and consumer interests group will also have occasion to present aggregate concerns to the FCC.[157] Some might argue that despite these procedures, the FCC is often guilty of simply ratifying industry-proposed solutions. Such ratifications do not necessarily mean that the FCC process discounts consumer input. To the contrary, the commercial interests that propose technical solutions to the FCC will likely be wary of the policy implications of their proposals and build compromises into their proposals. In other words, commercial interests will be more inclined to act reasonably in the first instance as a preemptive counter to arguments that their proposals ignore threats to non-commercial interests. The FCC forum creates a sense of accountability to the public that does not exist otherwise. Moreover, as the FCC has consistently demonstrated, when specific aspects of an industry proposal ignore consumer concerns or policy implications, the FCC will decline to adopt those aspects.

156. *Ferree Piracy Prevention and Broadcast Flag Statement*, *supra* note 144.

157. Press Release, Center for Democracy & Technology, Public Interest Groups Call Upon FCC to Consider Consumer Impact in Broadcast Flag Rulemaking (Aug. 7, 2002), *at* http://www.cdt.org/press/020807press.shtml.

2. Commercial Interests

Certain historical case studies demonstrate the market's independent ability to gather diverse interests, as in the case of Ethernet. However, DRM is distinguishable from such efforts. The participants in Ethernet, while diverse, all stood to reap potential commercial rewards from the resulting standard. As such, all participants maintained an independent market incentive to push for standardization.

With DRM the long-term commercial effects remain ill-understood. Some might suggest that only the copyright owners stand to reap any commercial benefits. There seem to be little, if any, independent market incentives for the other commercial interests. Although content owners will provide some financial incentives to DRM developers, consumer demand for flexible products threatens to counter any such incentive. A good argument can be made that there are direct market disincentives for all commercial interests other than the content owners. Again, computer manufacturers and consumer electronics manufacturers are subject to market pressures to provide consumers with the greatest degree of flexibility. Consumer electronics companies are wary of costly changes to their products solely to protect the business models of content owners.[158] This is particularly true where technical convergence suggests the need to install DRM hardware in a vast array of electronic devices. Moreover, the consumer tendency to resist any hardware that restricts freedom cannot be overstated.[159] The competing market forces from copyright owners and consumers bearing upon device manufacturers are artfully captured by Professor Litman:

> Technological protection standards have historically been hammered out in negotiations between representatives of copyright owners and organizations representing consumer electronics manufacturers. Consumer electronics companies are resistant to demands that they disable their machines, or install devices likely to impair viewing, listening, or recording performance. They have, however, been willing to install copy-protection devices so long as the technology is not too costly and every manufacturer agrees or is legally required to install precisely the same device. This removes the threat to compliant manufacturers that other manufacturers will compete by using less effective devices. It also removes the threat to copyright

158. *Copyright Issues*, *supra* note 2, at 2536 ("we are committed to protecting your intellectual property . . . but we are not committed to protecting your business model.").

159. Megan E. Gray, & Will Thomas DeVries, *The Legal Fallout from Digital Rights Management Technology*, 20 No. 4 COMPUTER & INTERNET LAWYER 20, 23 (2003) (quoting EEF's Fred von Lohmann) [hereinafter *Legal Fallout*].

> owners that some consumers will insist on purchasing non-compliant equipment.[160]

This understanding of the need for agreements or laws requiring all manufacturers to work in concert implicitly recognizes an underlying market incentive for the production of non-complaint devices.

Similarly, data communication service providers have little independent economic incentive to subscribe to a DRM standard. As long as these companies remain insulated under the DMCA from liability for the content that crosses their networks, data communication providers stand to gain as data traffic increases regardless of the progress of a DRM solution.

The lack of true independent economic incentives for the computer, consumer electronic, and communication interests leaves a taint that these interests are being strong-armed and manipulated by the content owners. The lack of incentive also translates to a lack of "glue" which would otherwise hold together independent industry-wide initiatives to develop and deploy a DRM standard. Indeed, the market has already demonstrated its failures at such initiatives. For example, the Secure Digital Music Initiative (SDMI)[161] failed to gain acceptance throughout the industry, and as a result, failed to derail the consumer migration to illegal MP3 music files.[162]

Similarly, the market has failed even to present a basic united policy front when pressured by government to begin independent development of a DRM standard. Specifically, in reaction to the Hollings Bill, the industry published a set of joint policy principles offered to demonstrate its capability of acting without government intervention. The policy principles were sketchy on details and deficient in many respects, most notably in that the MPAA refused to subscribe because the principles advocated against government-mandated hardware solutions.[163]

Given the lack of independent economic incentives to hold together standardization negotiations between a wide array of market interests, in combination with repeated signals from the industry that such independent negotiations are unrealistic, government oversight and intervention becomes an attractive, if not the only, solution.

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160. DIGITAL COPYRIGHT, *supra* note 37, at 151-52.

161. Linden deCarmo, *Safety in Numbers: A Look at the Secure Digital Music Initiative*, EMEDIALIVE.COM (Nov. 1999), *at* http://www.findarticles.com/p/articles/mi_m0FXG/is_11_12/ai_63692053.

162. DIGITAL COPYRIGHT, *supra* note 37, at 155-58.

163. BUSINESS SOFTWARE ALLIANCE, COMPUTER SYSTEMS POLICY PROJECT, AND THE RECORDING INDUSTRY ASSOCIATION OF AMERICA, TECHNOLOGY AND RECORD COMPANY POLICY PRINCIPLES, *at* http://www.bsa.org/resources/loader.cfm?url=/commonspot/security/getfile.cfm&pageid=1226&hitboxdone=yes (last visited Apr. 5, 2005).

B. Consumer Acceptance: Defeating the Illicit Network

It is unlikely that policy debates concerning the substantive conflict between fair use and content control will end in the foreseeable future. There is alson no apparent solution to healthy marketplace competition testing the appropriate price and appropriate levels of control over content. Regardless of the positions or strategies employed in these debates, no straight-faced argument can be made that consumers should be permitted to ignore a content owner's copyright or allowed to exploit technology to gain more rights in content then they have paid for or than they are entitled to under law.[164] Defeating current and future illegal underground markets and networks founded upon theft of copyright stands as the ultimate goal of DRM standardization.

A successful DRM standard will allow content owners to realize the exact contractual limitations that they place on their digitally distributed copyrighted content. A highly lucrative DRM standard will allow a maximum degree of flexibility when it comes to market-based negotiations between the content owner and the consumer.[165] This realization will only occur, however, if the industry succeeds in dissuading consumers from joining illegal networks.

In pursuing such dissuasion, it is important for the content industry to continue to recognize that a strong consumer psychology component underlyies the potential success of a DRM standard. Content owners need to explore and understand the consumer psychology behind circumvention. Will a DRM standard cause consumers to feel that the industry has taken something away from them? How might consumer awareness campaigns affect the market? To what degree does the consumer perception of past industry abuse play into future consumer behavior? Why do consumers remain loyal to certain legitimate networks despite the presence of easy and convenient circumvention measures? On the other hand, why do consumers exhibit disloyalty by aggressively pursuing circumvention measures in other networks characterized by strong hardware-based restrictions?[166]

The restoration of law and morality on the digital media content frontiers will involve a multi-faceted industry effort. The content industry must adopt a comprehensive approach to erecting barriers and establishing disincentives. A strong DRM standard is a critical

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164. In some senses, this position begs the question of what, exactly, consumers are entitled to under law and how consumers should be able to manipulate technology to achieve those entitlements. *See, e.g.*, Julie E. Cohen, *A Right to Read Anonymously: A Closer Look at 'Copyright Management' in Cyberspace*, 28 CONN. L. REV. 981 (1996).

165. Richard A. Epstein, *"Digital Rights Management" Best Left to Private Contract*, LEGAL BACKGROUNDER, Nov. 15, 2002 [hereinafter *Private Contract*].

166. DEFINING VISION, *supra* note 126, at 84-91.

component to such an approach. Similarly, a legal strategy that will level consequences upon participants, and more importantly, purveyors of illicit networks is also critical. Consumer awareness campaigns, such as those recently employed by the MPAA, are yet another component. The most important facet, however, will be recognition of an economic compromise between the content industry and its consumers.[167] In essence, once a standard is in place, the price of a consumer's legitimate use of content and the consumer's permitted flexibility of use must both be set at levels which will inspire the consumer to choose the legitimate network over an illicit network.

Importantly, the DRM standardization process will play an important role in this calculus. First, the DRM standard will define the parameters of potential business models and creative negotiations permitted between the consumer and the content owner. More importantly, however, the DRM standardization forum, if it included all participants, could serve as a communication conduit between content owners and consumers. Content owners could gain a broader understanding of the consumer perspective, specifically with respect to particular DRM proposals. This would assist them in launching successful and popular business models. Finally, and most importantly, if consumers are excluded from the process, they may revolt against the product of that process regardless of what that product may be. In other words, the interests involved in the DRM standardization effort do not only owe the consumer interests a seat at the table as they refine the technical boundaries bearing upon copyright and fair use, they must invite consumer participation because without it this crucial perspective, their efforts will likely fail when launched in the market.

Once again, closed door proprietary standardization efforts and standards wars are repugnant from a consumer acceptance perspective. Likewise, SDOs are not as well equipped as the FCC in considerately accepting and managing the interests of non-commercial groups.

C. Enforcement

Obviously, as Professor Litman's quote highlights, an industry's commitment to a standard is a necessary element of that standard's success. An evaluation of the forces that cause an industry to stay the course once chosen reveals that a DRM standard, unsurprisingly, stands in a novel position with respect to such forces.

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167. Jennifer Norman, *Staying Alive: Can the Recording Industry Survive Peer-to-Peer?*, 26 COLUM. J.L. & ARTS 371 (2003).

For the most part, compliance with standards is self-regulating through market forces.[168] For instance, as demonstrated in the VCR standards wars, once a market tips in favor of a particular standard, a manufacturer's "compliance" with the standard is not an issue. After VHS won the war, no manufacturers were tempted to manufacture Betamax, or other variant. In short, network economic effects ensure compliance as part of the fallout from the standards war.

On the other hand, network economic forces are not always responsible for ensuring compliance with standards. Where broad-based voluntary preemptive standards are developed, such as the IEEE Ethernet standard, an industry agreement ensures that all participants follow through with the standard. The agreements are likely successful where an industry is developing compatibility standards. All parties must cooperate or risk that their particular components or products will not work with a greater whole. Compliance with the standard serves not only as a stamp of legitimacy, but also as an assurance to consumers that the product will work with the network.

Sometimes the market power and vertical integration of a standard's proponent can serve to ensure successful enforcement of that standard. For example, when color television was launched in the U.S. by RCA, the company controlled a large share of both broadcasting and television manufacturing.[169] As such, these interests did not stray from the concerted effort to launch the standard. In the context of DRM, some might argue that today's vertically integrated interests, controlling both content and consumer electronics, might be able to achieve such command-and-control style enforcement. To date, however, such strategies have yet to completely succeed. For instance, Sony launched product lines in connection with its MiniDisc format which employed a DRM scheme based on the reasonable technical and policy principles embodied in the industry's SDMI initiative.[170] Nevertheless, this DRM scheme has failed to achieve widespread market acceptance, as consumers continue to employ alternative digital music platforms without the SDMI restrictions.

In the case of DRM, non-compliant products could potentially capture a huge market by virtue of their noncompliance. Consumers and consumer groups have consistently expressed their aversion toward "less

168. David A. Balto, Assistant Director Office of Policy and Evaluation, Bureau of Competition, Federal Trade Commission, Standard Setting in a Network Economy, Address Before Cutting Edge Antitrust Law Seminars International (Feb. 17, 2000), *at* http://www.ftc.gov/speeches/other/standardsetting.htm .

169. *The Art of Standards Wars*, *supra* note 55.

170. SONY, PORTABLE MINIDISC RECORDER MZ-S1 OPERATING INSTRUCTIONS (2002).

functional" products.[171] Without a legal ban, more functional but non-complaint products will take the form of general use products, such as computers. These non-complaint products will provide many substantial non-infringing uses in addition to serving as a platform for infringement and illegal distribution. As in the *Betamax* case, the non-infringing uses will insulate manufacturers from liability for vicarious or contributory infringement. Unless non-compliant products are prohibited, the industry remains powerless to prevent manufacturers from meeting the market demand for non-complaint products.

The industry has already failed to tackle the problem where the products facilitating infringement are not themselves illegal. As seen in evaluating the nature of P2P networks, faced with a creative and elusive technology, the content industry is incapable of aggregating liability at the source under a contributory or vicarious liability theory. Moreover, the actual acts of infringement are too frequent and dispersed to pursue on an individual level. In essence, even if the market were able to agree on an effective and robust DRM standard, the market could not enforce that standard. As such, the content industry will remain unable to protect its intellectual property.[172]

Only a specific government mandate can solve this enforcement dilemma. As noted by a leading consumer advocacy group in connection with the FCC's Broadcast Flag proceeding, "[a] government mandate would be required because manufacturers know that consumers prefer today's fully-functional digital TV equipment to the less-functional equipment which would be required under the Compliance and Robustness Rules. . . . Many manufacturers will only make more expensive, less useful 'Compliant' equipment if they are forced to."[173]

D. FCC Expertise

As highlighted by the DTV case study, the FCC's relentless pursuit of the digital television transition has presented the Commission with some of its greatest challenges. The saga of DTV signal standardization was only the first of many steps. Recently, the pursuit of the DTV transition has cast the FCC into the briar patch of standardization, copyright, and technical copy controls for digital television content. Despite DTV signal standardization, the overall DTV transition remains locked into a "logjam" problem. Consumers remain unconvinced that an

171. ELECTRONIC FRONTIER FOUNDATION, EFF CONSENSUS AT LAWYERPOINT: FAQ ON BROADCAST FLAG, *at* http://bpdg.blogs.eff.org/archives/000148.html [hereinafter EFF CONSENSUS].

172. Clay Shirky, *Where Napster is Taking the Publishing World*, HARV. BUS. REV., Feb. 1, 2001.

173. EFF CONSENSUS, *supra* note 171.

expensive investment in a digital television will in fact grant them access to digital and high definition content. Such unease is understandable, given that content producers, citing the lack of reliable copy protection controls, continue to resist the production and distribution of digital content.

Were content producers comfortable with the ability to maintain a fair level of control over their content as it is distributed, they would be more inclined to provide digital content through new and unique distribution schemes and business models. The availability of content would inspire consumers to retire their analog systems and invest in digital systems. As such, digital content protection across the distribution network stands as the catalyst for a chain reaction that will yield a complete transition from analog to digital.

Importantly, the FCC is familiar with what is needed to inspire such chain reactions through its handling of several recent proceedings with direct implications upon rights management in digital television content. The FCC's actions in these areas are a testament to the agency's cumulative expertise in this field. The following discussions of the Plug-and-Play and Broadcast Flag proceedings at times delves far into the details of the FCC's processes. These details, however, expose the common themes that remain so critical to successful government intervention in DRM standardization. As seen in these recent proceedings, such themes include compromise between opposed industries, provision for future innovation, transparent processes, opportunity for public participation, protection of consumer interests, and effective management of development responsibilities.

1. DFAST (Plug-and-Play)

The first DRM challenge arrived before the FCC via the somewhat circumspect route of proceedings concerning the commercial availability of navigation devices. These proceedings took place after Congress gave the FCC the explicit directive to ensure that navigation devices, also known as set top boxes, were made available through multiple providers rather than only through the consumer's cable company.[174] One of the rules adopted to implement this mandate, often referred to as the security separation requirement, forced MVPDs to parse conditional access and security functions out of the navigation device and place such functions in their own, dedicated device called a POD.[175] As an example of

174. 47 U.S.C. § 549 (2004).

175. In essence, such a requirement prevents the cable company from tying general navigation capabilities to exclusive conditional access capabilities. *See* Implementation of Section 304 of the Telecommunications Act of 1996, Commercial Availability of Navigation Devices, *Report & Order*, 13 FCC Rcd. 14,775 (1998).

regulatory "jawboning" the FCC did not delve into the actual technological challenges that its rule presented, but rather gave cable companies a July 1, 2000, deadline to develop the technology necessary to implement the rule. Importantly, the FCC maintained oversight by requiring the submission of semi-annual progress reports concerning the initiative.[176]

The industry assigned CableLabs, a non-profit organization credited with accomplishments such as the DOCSIS standard, to the task of developing the POD and defining the interface between the POD and the navigation device, or "host" device. As part of this undertaking, CableLabs identified, developed, and incorporated certain technology, some patented, which enabled the enforcement of a copy protection scheme. Referred to as the Dynamic Feedback Arrangement Scrambling Technique, or "DFAST," the technology is located in both the POD and the host by virtue of CableLabs' design of the POD-host interface. DFAST dictates whether the consumer is (1) unable to copy digital video content at all (copy-never), (2) able to copy content only once (copy-once), or (3) able to copy content at will (copy-always). The technology addresses the concern of content owners that digital media could be subject to unauthorized copying and retransmission after it was descrambled by the POD and passed along to other components in the host.

As a result of the FCC's transparent process, interests opposed to copy protection in the host were able to consider and formally object to such a technical scheme. Led by consumer electronics retailer Circuit City, the opponents suggested that the incorporation of copy controls into the host violated the FCC's security separation rule. In support of this position, some interests advanced the interesting and novel position that because DFAST did not necessarily allow for fair use, it was not truly a "copy protection" technology as that term should be understood after the Supreme Court's *Betamax* decision.[177]

In issuing an important declaratory ruling, the FCC addressed the concerns and began to sketch the contours of the Commission's treatment of digital copy protection.[178]

176. *Id.* ¶ 81.

177. Implementation of Section 304 of the Telecomms. Act of 1996, Commercial Availability of Navigation Devices, *Further Notice of Proposed Rule Making & Declaratory Ruling*, 15 FCC Rcd. 18,199, ¶ 22 (2000) [hereinafter *Commercial Availability of Navigation Devices Order*].

178. *Id.*

> Unlike the analog context, digital technology affords users the ability to make an unlimited number of virtually perfect copies of digital content. Also unlike the analog context, copyright holders of digital content possess the ability to prevent misuses of copy protected material through methods not previously available. Through the use of contractual licensing requiring consumer electronics manufacturers to install certain copy protection technology in their equipment in exchange for access to desirable digital content, copyright holders will be able to control, through the insertion of coded instructions in the digital stream, whether such equipment will allow consumers to make one copy, unlimited copies, or prohibit copying altogether of digital content received from an MVPD. It is the first generation of this licensing and technology and its relation to the Commission's navigation devices rules that we address here.[179]
>
> . . .
>
> Copy protection for digital video content in its current formulation and in a very broad sense, involves techniques of encoding content as it crosses interfaces and of establishing two-way communications paths and protocols across these interfaces so that video content is only released after the receiving device is queried by the sending device and confirms that it is an eligible content recipient.[180]

In issuing its decision, the FCC relied primarily upon its express statements in its Navigation Devices Order that technology which "impose[s] a limited measure of data encryption control over the types of devices that may record (or receive) video content" for purposes of copy protection would not run afoul of the security separation mandates.[181] The FCC clarified that the "inclusion of some measure of copy protection within a host device" does not violate its security separation requirements.[182] The FCC also offered the somewhat ambiguous statement that the technology described in the DFAST license would likely be such "some measure" which could be safely included in the host.[183]

While giving the industry enough assurance to move forward, the FCC sidestepped, but did not entirely dodge, the more challenging issue of fair use and consumer expectations in digital content. Despite the fact that DFAST allowed for a copy-never alternative, the FCC determined that "no evidence has been presented that the evolving copy protection

179. *Id.* ¶ 15.
180. *Id.* ¶ 27.
181. *Id.* ¶ 23.
182. *Id.* ¶ 25.
183. *Commercial Availability of Navigation Devices Order*, *supra* note 177 at ¶ 32.

licenses and technology discussed herein would preclude reasonable home recording of such content."[184] In a footnote, the FCC acknowledged the MPAA's position that business and marketplace forces would prevent content owners from abusing the copy-never option.[185]

In summary, the FCC's Order could be viewed as a limited endorsement of DFAST coupled with an invitation for comment from industry and the public regarding the difficult issues surrounding the actual implementation of the scheme.

a. Plug-and-Play Order

In October of 2003, the FCC issued an Order resolving many of the outstanding issues regarding commercial availability of navigation devices and enabling the provision of digital cable ready television sets in the marketplace.[186] This action addressed transmission standards, PODs, tuning and guide information, high definition STBs, exemptions from the standards, and future innovation and changes to the standards. As a paramount issue, the FCC addressed encoding rules submitted by cable and consumer electronics interests:

> [T]he Commission has been working to achieve Section 629's mandate of commercial availability of navigation devices since 1996. One of the stumbling blocks has been inability of industry to agree on a comprehensive set of technical copy protection measures and corresponding encoding rules. Adoption of the encoding rules will finally remove that block and ensure the availability of high value content to consumers in a protected digital environment.[187]

These encoding rules allowed the FCC to revisit the merits and policies surrounding the copy protection technologies to be included in host devices. Specifically, the FCC considered draft encoding rules that would (1) ban selectable output control, (2) prohibit down resolution of broadcast content, and importantly, (3) apply copy protection caps.

b. Selectable Output Controls

In its Order, the FCC banned a particularly draconian form of DRM technology referred to as selectable output controls. While the nature of this technology and its implications are somewhat complex, the

184. *Id.* ¶ 28.
185. *Id.* ¶ 28, n.68.
186. Implementation of Section 304 of the Telecomms. Act of 1996, Commercial Availability of Navigation Devices, *Second Report & Order & Second Further Notice of Proposed Rulemaking*, 18 FCC Rcd. 20,885 (2003) [hereinafter *Plug & Play Order*].
187. *Id.* ¶ 55.

FCC recognized that the technology posed an unfair threat to consumers. Specifically, the technology would cause early adopters of high definition televisions to become stranded, unable to access high definition content. For this reason, in an exhibition of its awareness and sensitivity to non-commercial consumer concerns, the FCC prohibited selectable output controls.[188]

c. Down Resolution

The FCC also addressed encoding which would enable down resolution, a type of DRM that involves the process of deliberately degrading the resolution of video content in certain circumstances. Broadly speaking, down resolution artificially mimics the degradation from copy to copy which existed in analog devices such as the VCR. Again, however, down resolution would prevent certain consumers from realizing the high definition capabilities of their digital televisions. The FCC concluded that cable interests should be prevented from enabling down resolution of any content that is available via free over the air broadcasts. With respect to other content, the FCC has sought further comment while initiating an interim procedure allowing down resolution only after public notice is first given to the FCC.[189]

d. Encoding Rules

Finally, the FCC addressed a DRM scheme involving copy protection caps. The specific provisions regarding copy protection serve to first break content down into three "defined business models," and then assign caps representing the most restrictive level of copy protection allowable for each model. The three business models are (1) unencrypted broadcast content, (2) pay television, non-premium subscription service, and free conditional access delivery transmissions, and (3) video on demand, pay per view, and subscription on demand. Their respective copy protection caps are (1) no copy restrictions, or copy-always, (2) one generation of copies, or copy-once and (3) no copies, but pausing capabilities for up to 90 minutes, or copy-never.

188. *Id.* ¶¶ 60-61.

189. The encoding rules at issue here implicate the "analog hole" problem. Regardless of what types of DRM are encoded into the data and built into hardware, a consumer might still be able to display high quality data on an analog output and then create a new digital copy from that analog display. The new copy would be free of the DRM. In considering the issue, the FCC subtly endorsed the continuing industry efforts to address this variant of the analog hole problem. "The difficulties of resolving this issue are reflected in private sector efforts such as the Analog Reconversion Discussion Group to the Copy Protection Technical Working Group." *Id.* ¶ 64. Recognition of an ongoing and apparently productive industry effort stood as part of the FCC's rationale in postponing a complete decision on down resolution.

Recognizing that the proposal reflected market realities as well as the spirit of the DMCA, and noting that the proposal received little substantive objection during the notice and comment period, the FCC accepted this business model approach to encoding rules wholeheartedly.

Notably the FCC imposed this encoding scheme upon DBS and other non-cable (MVPD) services, ensuring that all content providers be placed on a level playing field as to negotiations with content owners over the copy restrictions placed on content. This action recognizes that if one type of distribution network was given the ability to provide content with more liberal copy restrictions in each business category, that network would stand at a distinct competitive advantage.

The proposal as adopted provides for a significant degree of flexibility. For example, the understanding incorporates a provision for an MVPD to petition the FCC for modification to these encoding rule caps when launching a new service within a defined business model. While the petition is pending, the MVPD will be permitted to actually launch the service on a trial basis. Additionally, new program offerings that might fall under a currently undefined business model can be launched as long as a description of the offering and its encoding scheme are published to the public. The MOU contemplates that the FCC accept complaints and objections to such encoding schemes within a two year period.

The downside of such flexibility is that the proposal creates opportunities for regulatory gamesmanship. The classification process of a new programming service, whether within a new or previously defined business model, might be subject to abuse. Such a classification scheme, however, is needed to accommodate future developments and innovations. Additionally, the process remains transparent and public, with FCC oversight as its cornerstone.

The FCC also commented upon the DFAST license, revisiting the contentious issues such as defining compliant technologies how such technologies would acquire FCC approval, and the accommodation of future technical innovations.

Of particular note, the FCC rejected the provision in the DFAST license that would allow CableLabs to make an initial determination as to the approval of new technologies, with the FCC serving an appellate style role in such a decision. The FCC noted that centralizing such a decision in CableLabs held the potential to hinder "innovation and interoperability."[190] Rather, the FCC solicited further public comment

190. *Id.* ¶ 78.

on the issue, but adopted the CableLabs approval process as an interim procedure.[191]

2. Broadcast Flag

On the heels of its Plug-and-Play decision, the FCC gave the industry further incentive to move forward in the digital transition by issuing its Broadcast Flag decision.[192] As the FCC's Plug-and-Play decision did for digital content over cable, the Broadcast Flag decision endowed the industry with a comfortable framework regarding the protection of digital content broadcast across public spectrum. Similar to the Plug-and-Play decision, the Broadcast Flag proceeding employed a transparent public process to yield a reasoned and fair result.

The Broadcast Flag originated under the auspices of the Copy Protection Technical Working Group (CPTWG). The CPTWG, a voluntary industry group formed in 1996, focused on discussing and developing technologies for content owners to protect encrypted content on physical media.[193]

Recognizing the potential copy protection challenges illuminated by the transition to digital broadcasting, the Consumer Electronics Association, the Information Technology Industry Council, and the MPAA joined together to initiate a forum to address the issue under the CPTWG. In January of 2002, the CPTWG approved the charter of the Broadcast Protection Discussion Group (BPDG) as a subgroup of the CPTWG.

By June of 2002, the BPDG released a final report to the CPTWG containing a detailed plan for the protection of digital broadcast content. In its final report, the BPDG admitted that it had not achieved a complete consensus among its members, and incorporated the points of contention into its report. Additionally, the BPDG emphasized that:

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191. In its Report and Order and Further Notice of Proposed Rule-Making, where the FCC formally solicited such comments, the FCC sought comment not only as to how the approval process should proceed, but also as to what types of content protection technologies would fall within such a process "including, but not limited to digital rights management, wireless and encryption-based technologies." Digital Broad. Copy Protection, *Report & Order & Further Notice of Proposed Rulemaking*, 18 FCC Rcd. 23,550, ¶ 61 (Nov. 4, 2003) [hereinafter *Broadcast Flag Order*]; *Plug & Play Order*, *supra* note 186, at ¶ 83. The FCC sought comment on whether, and what objective criteria should be used to evaluate such technologies, explicitly referencing a proposal from Microsoft/HP regarding the functional requirements used to evaluate DRM technologies.

192. *Broadcast Flag Order*, *supra* note 191.

193. BPDG FINAL REPORT, *supra* note 105. The FCC has recognized the CPTWG and its work in several of its recent proceedings. Annual Assessment of the Status of Competition in the Mkts. for Delivery of Video Programming, *Fifth Annual Report*, 13 FCC Rcd. 24,284 (1998); Carriage of the Transmission of Digital Television Broad. Stations, *Notice of Proposed Rule Making*, 13 FCC Rcd. 15,092 (1998).

> [T]he BPDG is a discussion group. It is not a standards body or public policy decision-making forum. Individuals, companies, and groups of companies were free to meet separately to form and negotiate proposals and present those to the full BPDG. This may have given the unintended appearance that the BPDG was not fully transparent and some parties may have felt 'excluded' from particular discussions. Nevertheless, every proposal contained in the Requirements document and described in this report was subject to considered discussion and scrutiny by all BPDG participants in meetings, on teleconferences, and/or on the email reflector scrutiny.[194]

The substance of the technical copy protections in the BPDG final report were presented to the ATSC, and in March of 2003, the ATSC adopted a version of the solution proposed in the BPDG final report as its ATSC A/65B standard. Given that ATSC's membership includes representatives of the broadcast, broadcast equipment, motion picture, consumer electronics, computer, cable, satellite, and semiconductor businesses, the adoption of ATSC A/65B (the broadcast flag) by this voluntary international standards organization arguably represents a fairly wide industry consensus.

Generally speaking, the Broadcast Flag standard provides for the optional encoding of a "flag" prior to the signal's transmission over the air that will alert the receiving hardware as to exactly how that hardware may treat the content. In essence, the standard provides that content marked with the flag may be copied, but not retransmitted, by the recipient. "In order for a flag-based protection system to work, therefore, all demodulators used in DTV broadcast reception equipment would need to have the ability to recognize and give effect to the ATSC flag and a list of approved content protection and recording technologies would need to be developed."[195] Just as in the Plug-and-Play context, therefore, the Broadcast Flag proceedings address both a content encoding component and a hardware component.

At the surface, the FCC's broadcast flag proceedings only required it to address a relatively easy question: should the agency adopt the ATSC A65/B standard which was developed via a broad-based industry discussion group and approved by an even more expansive international voluntary standards organization? But like any copy protection solution that envisions hardware participation, the broadcast flag scheme needed the endorsement, oversight, and enforcement that can only be achieved with government intervention. As such, the natural answer to the easy question ensnared the FCC in a much more difficult inquiry: if the

194. BPDG FINAL REPORT, *supra* note 105, at 2.10.1.
195. *Broadcast Flag Order*, *supra* note 191, at ¶ 13.

agency adopted ATSC A65/B, how should the appropriate hardware be put in place? Unsurprisingly, the lack of consensus among the members of the BPDG centered upon the details of this hardware question.[196]

After considering several alternative proposals, such as encryption at the source and watermarking, the FCC adopted the Broadcast Flag standard. As part of its discussion, the FCC acknowledged the broad industry consensus behind the broadcast flag, but did not base its adoption on such consensus alone. Rather, the FCC evaluated the criticisms regarding the broadcast flag, including the lack of consensus on certain key points, the limited variety of interests truly involved in its development, the ease of circumvention, and specific analog hole circumvention concerns.[197] The FCC also briefly considered the fair use arguments raised by interests such as the American Library Association. Because the broadcast flag standard does not prevent the recipient from copying content, but only prevents the recipient from indiscriminate redistribution of content, fair use concerns were somewhat muted.

The FCC also compared the broadcast flag with other proposed alternatives (encryption or watermarking). While recognizing that these alternatives could be a more robust technical solution, the FCC stated that such technologies were not yet ripe. Moreover, the FCC noted that deployment of these technologies would render certain legacy DTV equipment obsolete, stranding consumers, whereas the broadcast flag would not. After conducting its independent evaluation of the criticisms and alternatives, the FCC answered the easy question in the affirmative, adopting the ATSC A/65B standard.

Turning to the tougher question, how to handle the details of hardware implementation of the broadcast flag, the FCC adopted a set of rules covering all products containing DTV demodulators, but sought further comment as to the process for determining whether any specific hardware product in fact met the FCC's requirements. The rules require that demodulator products direct flagged and unscreened content to specific types of outputs such as analog outputs, and digital outputs and digital recording technologies with approved content protection technologies.[198]

The FCC rejected the "Table A Proposal" which was proffered as a procedure to place the FCC's stamp of approval on specific hardware capable of implementing the broadcast flag rules. The Table A Proposal,

196. This hardware question continues to be the most challenging aspect of the FCC's broadcast flag proceedings. *See, e.g.*, Jonathan Krim, *TiVo's Plans Lead to Fight on Copyrights; Technology Would Allow Transfer of Programs*, WASH. POST, July 22, 2004, at E1.

197. EFF CONSENSUS, *supra* note 171.

198. *Broadcast Flag Order*, *supra* note 191, at ¶ 42.

characterized as a market-based solution, would define such approved technologies by listing the technologies on an FCC approved table. The proposed table would include technologies which were either (1) used or approved by 3 major studios or TV broadcast groups, (2) approved by 2 major studios and 10 major device manufacturers, (3) at least as effective as a prior approved technology, or (4) expressly referenced in the licensing terms of another approved technology. While comments of critics of this system were helpful, the FCC had no trouble recognizing the table as an effort by major studios and broadcast groups to hijack FCC authority. The proposal was rejected outright and a FNPRM was issued to address how technologies should be approved. As an exclamation point, the interim procedure for adopting new technologies, unlike the DFAST license discussed above, consisted of independent FCC review rather than interim acceptance of the Table A proposal.[199]

3. Summary of FCC Expertise

The Plug-and-Play and Broadcast Flag proceedings illustrate the merits of the FCC's process and judgment when intervening to assure the appropriate treatment of hardware-based rights management technologies. Specifically, the FCC has fine-tuned its ability to evaluate overarching policy implications, to recognize when the assignment of a technical challenge to industry is warranted, to serve as a check and balance upon industry actions, to carefully and thoroughly evaluate complex industry proposals, to ensure transparency in the development and deployment of new technology, and to endorse standards which account for future technical innovations. Moreover, the professionals at the FCC, after having reviewed and considered thousands of comments from the entire spectrum of interests in connection with these two proceedings, have developed an invaluable institutional knowledge of DRM.

4. A Note on Copyright, Fair Use, and the FCC

Throughout these recent proceedings, the FCC emphasized that it is not engaging in substantive evaluation of content or considering the scope of copyright protections.[200] In reality, the FCC is in fact doing just

199. *Id.* ¶ 53.

200. *Plug & Play Order*, *supra* note 186, at ¶ 54; In response to the *Plug & Play* decision, FCC Commissioner Michael Copps stated:

> I vote for today's Order with the understanding that it will not affect any of the rights or remedies available under our nation's copyright laws and cognizant that it is Congress that ultimately sets national policy in this critical and sensitive area. As we implement this decision, I for one, and I trust my colleagues, will remain sensitive to this and not venture into content matters beyond our authority.

that. While the FCC does not directly evaluate content, the business model approaches set forth in the Plug-and-Play proceedings communicate a clear framework. Copy-never, copy-once, and copy-always, while sensible and based on a thoughtful evaluation of the realities and patterns in today's marketplace, certainly define the practical scope of copyright protection. As the most apparent example, there will be no space shifting and limited time shifting of content that falls into a copy-never "business model." Going further, there will be no copying for education, commentary, or criticism.

While the FCC does not directly engage in the evaluation of content to determine what types of content belong in what types of "business models," the FCC knows that the market is going to make such evaluations and choices. The FCC also recognizes that its endorsement of technology with heavy restrictions at one end of the spectrum, against the background of the DMCA, which criminalizes circumvention of such technology for any reason whatsoever, unquestionably bears upon the scope of copyright protection. As such, critics will chastise the FCC for, *inter alia*, venturing into copyright territory and endorsing a system of standards that threaten fair use.

But remember that fair use, at its core, is nothing more than a subjective judgment call. Some have recognized that the concept of fair use changes with technology.[201] As such, there is simply no way to placate all interests when it comes to fair use; more pragmatically, there is no way to incorporate the perfect execution of fair use into any technology. In other words, perfectly building fair use into technology would require a "federal judge on a chip."[202]

While the FCC's aversion to taking credit for the copyright implications of its rule-makings is understandable, the FCC's model is, in reality, good for now. Hopefully, fair use will not be abdicated, as market demands will force content into the more copy-friendly business models. Most importantly, there is recourse if such market demands are impaired through some currently unforeseen means, or if the content industry takes a draconian approach to digital distribution. Under the FCC's model, the government can act if all content somehow migrates into the copy-never business environment. The FCC can reconsider its business model classifications. Courts and perhaps even Congress can intervene to strike an appropriate balance. Such future solutions remain

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Id. at 20,967 (statement of Comm'r Copps).

201. GARTNERG2 & THE BERKMAN CENTER FOR INTERNET & SOCIETY AT HARVARD LAW SCHOOL, COPYRIGHT AND DIGITAL MEDIA IN A POST-NAPSTER WORLD (The Berkman Ctr. For Internet & Societ at Harvard Law School, Research Publ'n No. 2003-05, 2003), *at* http://cyber.law.harvard.edu/home/uploads/254/2003-05.pdf.

202. *Legal Fallout*, *supra* note 159.

possible only because the technologies forming the FCC's newly-mandated infrastructure allow for the entire spectrum of copy protections, from copy-always all the way to copy-never. The importance of the fact that the FCC mandated an infrastructure capable of executing across this entire spectrum cannot be overstated. These technologies will be launched throughout the entire next generation of consumer electronics. To a large extent, they will be entrenched. Had the FCC permitted more restrictive floors and ceilings, the ability to correct fair use problems in the future could have been jeopardized. Instead, the FCC's judgment confers an exciting and promising experiment upon the market, without placing fair use in harm's way.

E. The FCC as a Safeguard Against a DRM Trojan Horse

In addition to asserting a heightened sensitivity to fair use concerns and acting as a safeguard against technology which could permanently alter the fair use calculus in an unfair or lopsided manner, the FCC stands in an ideal position to guard against similar abuses that might otherwise be perpetrated under the guise of DRM. Many in the electronics and computing industries are beginning to recognize DRM as the driver for, or at least a necessary element of, the next generation of consumer electronics and computers. As such, the danger that industry interests will seek to tie additional applications or technologies together with DRM becomes apparent.

For example, technologies which would offend consumers' privacy represent some of the most troubling of these potential extraneous items. DRM, by its very nature, raises privacy red flags in that it must be designed with advanced technical tracking and policing capabilities in order to work.[203] The line between monitoring and policing a consumer's activity to protect and encourage a creative, privately negotiated contract, and monitoring and policing a consumer's activity in order to exploit the consumer in some manner is not altogether clear.

As another example, some fear that DRM technologies will be used to hide the technology and details of a device's functionality, turning the device into a "black box."[204] This black box phenomenon prevents important analysis, understanding, and evaluation of technology. Moreover, as noted by Professor Felten, the black box phenomenon will have the tendency to spread throughout an entire device, even where a

203. Julie E. Cohen, *A Right to Read Anonymously: A Closer Look at 'Copyright Management' in Cyberspace*, 28 CONN. L. REV. 981 (1996).

204. *Edited & Excerpted Transcript of the Symposium on the Law & Technology of Digital Rights Management*, 18 BERKELEY TECH. L.J. 697, 724 (2003) (comments of Edward Felten).

DRM system was originally designed to apply only to a specific feature of the device.

> For example, if you're talking about a computer system, you might say, "Well, only the part that deals with the media has to be a black box." The boundaries of that black box tend to grow because there's concern that the content will be grabbed off of the video card or the audio card, that it would be grabbed off of the disk, that it will be grabbed as it goes across the system's IO bus, and so on.[205]

Indeed, the Plug-and-Play case study provides a practical example of such a phenomenon, as the reach of DRM technology extended from the POD module to the host device by virtue of the design of the POD-host interface.

The FCC's involvement in the standard development process, and its involvement in the subsequent enforcement of the standard, will serve as a much needed safeguard against potential extraneous abuses or unintended consequences associated with a DRM launch. FCC intervention will address this problem on several fronts. First, by providing an inclusive forum with the participation of opposed interests, all skeptical of each other's agendas, the FCC will be able to create a watchdog environment between the respective interests. Second, the FCC's direct participation in the development of a standard will implicate its responsibility to serve the public interest, and will involve the FCC's direct evaluation and consideration of potential overreaching associated with DRM. Finally, the FCC's ongoing enforcement and oversight of the resulting DRM standard will place the FCC in a position to retroactively recognize and address extraneous technology and unintended consequences.

While FCC participation in the process will greatly minimize the potential Trojan horse dangers associated with DRM, it should be noted that the problems of extraneous technology and unintended consequences are extremely complex. Perhaps no amount of oversight or safeguarding can completely eliminate these threats. While some forms of these dangers will be easily identified and eradicated other forms will be much more subtle and sophisticated.

Concerns such as privacy, the black box phenomenon, and other presently unforeseen situations will present difficult scenarios. As noted above, privacy concerns and black box implications are not entirely extraneous to DRM technology, but rather are inherent to DRM. Moreover, the potential problems introduced by these issues do not lend themselves to clear cut, objective solutions. FCC intervention occupies a

205. *Id.*

necessary but precarious relationship to these difficult issues. Without FCC intervention, DRM's inherent dangers might be unleashed upon the market without careful consideration, without consequences for the perpetrators, and without consumer recourse.

Preventing such dangers through FCC intervention, however, will require the FCC to strike a careful balance between its accountability to the public and its power to regulate, or perhaps over-regulate, technology. In the case of the DRM standard, the FCC will remain primarily accountable to the public for any damage that the standard inflicts upon, for instance, consumer privacy. Such accountability might inspire a tendency for the FCC to resort to a complicated, burdensome regulatory regime in an effort to address the countless permutations that might arise with the DRM regime. Due to the posture of the DRM standardization problem, which implicates the designs and technologies incorporated in consumer electronics, the FCC might also tend to consider extending its regulations beyond DRM and into other aspects of consumer electronics.

The FCC can and will resist any potential tendencies to over-regulate. Again, because its processes involve the participation of a balanced group of interests, the FCC will be constantly reminded of the dangers of over-regulation. History dictates that industry interests will undoubtedly present artful positions before the FCC, advocating against extending regulations beyond the DRM context.[206] In short, participants in the FCC process will provide checks and balances not only upon each other, but also upon the FCC, itself.

While there certainly are no easy answers to questions concerning technological dangers inherent to DRM, and while there might be no way to anticipate or address some of the unforeseen or unintended consequences of a DRM regime, the involvement and participation of a publicly accountable agency throughout the industry's struggle with such issues provides added safeguards and benefits that could not be realized without FCC intervention.

F. Traditional Anti-Intervention Rationales

The cost-benefit analysis of government intervention into the standardization process involves careful, nuanced judgment calls unique to each standardization effort.[207] Despite the strong argument that FCC intervention is the most appropriate, if not the only, manner in which to handle certain specific facets unique to DRM standardization, and

206. *Id.* at 711 (comments of Alex Alben).

207. *See* Kathleen M. H. Wallman, *The Role of Government in Telecommunications Standard-Setting*, 8 COMMLAW CONSPECTUS 235, 250 (2000) [hereinafter *Role of Government*].

despite the FCC's demonstrated experience and judgment in the area, the prospect of FCC intervention faces classic arguments against government mandates. The majority of these arguments derive from the attractive general proposition that private ordering is preferable and more efficient than government intervention.[208] The arguments do not, however, apply to DRM standardization.

1. Complex Technology Should not be Regulated in its Nascent Stages

Critics of FCC intervention might suggest that government should not intervene in markets characterized by nascent technology and rapid, complex technological change. A particularly artful variant of this argument was presented by TCI in connection with the FCC's DTV proceedings.[209] The argument is twofold, speaking to aspects of both substance and timing. On the substantive side, the argument emphasizes that complex technical standards questions are best addressed and conquered by the private sector.[210] The private sector is in the best position to provide appropriate technical solutions seeing as even specialized agencies of government do not compare, in terms of knowledge and ability, to the private sector.

This argument, while insightful, does not account for the FCC's recently demonstrated ability in the form of its Plug-and-Play and Broadcast Flag proceedings. Nor does it account for the FCC's preference to assign complex technical tasks to industry groups while maintaining oversight of the progress of those industry groups. Moreover, the FCC's internal technical expertise, while likely capable of solving complex technical problems should such a course be chosen, is certainly capable of working with industry, either directly or in an oversight capacity, to solve complex technical problems.

The timing argument is a bit more troubling. Anti-intervention proponents might argue that a specific government mandated technology in a market characterized by nascent technology and fast-paced innovation will likely result in locking the industry in to an inferior standard. Indeed, the late arrival of COFDM in the DTV market is frequently cited as just such a scenario. While the risk of mandating an inferior technology is certainly present in DRM, there is a greater risk in expecting the market to develop and deploy standards where there is an

208. *Private Contract*, *supra* note 165.

209. Comments of Tele-Communications, Inc., Advanced Television Sys. & Their Impact Upon the Existing Broad. Serv., (F.C.C. filed July 11, 1996) (MM Docket No. 87-268), *available at* http://ftp.fcc.gov/Bureaus/Mass_Media/Orders/1998/fcc98315.pdf.

210. Philip J. Weiser, *Internet Governance, Standard Setting, and Self-Regulation*, 28 N. KY. L. REV. 822 (2001).

absence of market incentives for standardization and an absence of means to enforce a standard. Additionally, the FCC has learned from the DTV transition. There was simply no way to predict the course of technological innovation in DTV, just as there is no way to predict such a course in DRM. Nevertheless, the FCC, in both the DTV and its recent DRM proceedings, has made a clear effort to accommodate future innovations.

The FCC's resulting DTV mandate, for example, envisioned an innovative transition from interlace to progressive scan screen display. Likewise, in the Plug-and-Play and Broadcast Flag contexts, the mandates expressly include mechanisms to incorporate new technological developments within the standard. The FCC seems to envision mandated standards as platforms, upon which and within the parameters of which innovation is welcome and encouraged. In analogous market-based efforts, such a platform approach is beneficial because "[o]nce a platform is accepted and proliferated, competitors are encouraged to compete on that platform by innovating on top of the platform, such as by adding new functionality, increased performance implementations, and new applications or extensions for the platform."[211]

2. Intervention is Inappropriate in the Absence of Network Effects

Anti-intervention proponents will also argue that a primary traditional rationale for government intervention, namely protecting consumers from becoming stranded in a market characterized by network effects, is not present in the DRM context. To a large extent, this is true. Network effects, tipping, and potential stranding are not present in the DRM context to the same extent that they were present in the VCR context for instance. But government intervention into standard setting activities should not only be limited to markets exhibiting network effects. While preventing consumer stranding is a good justification for government intervention, it is not the only justification.

In the context of the digital transition, for instance, FCC intervention into standardization has centered upon removing certain "logjams," regardless of the presence of strong network effects or the potential for consumer stranding. The transition from expensive, entrenched, and stagnant infrastructures, such as the analog broadcast infrastructure, simply does not occur unless the commercial interests involved have a reasonable level of comfort in new standards. Where standardization serves the public but the market is unable to agree on its own standard, the FCC has rightly recognized its responsibility to

211. *The IPR Paradox*, *supra* note 57, at 268.

intervene.[212] Even harsh critics of FCC involvement in standardization concede that some oversight is necessary given certain market conditions.[213] Moreover, even where the market is able to agree upon a standard, FCC intervention might still be needed to serve as a check upon the standard, to enable and oversee the implementation of the standard, and to ensure enforcement and compliance. These justifications stand independent of network effects.

3. Government is Slow and Inefficient vis-à-vis the Private Sector

A valid criticism often levied at government standardization efforts concerns the length of time that the process consumes. Government, typically, is criticized as less efficient than the market, both with respect to government's speed, and with respect to the level of innovation reflected in the resulting standard.[214] Government is often an easy target in this regard, being frequently characterized as inefficient, bureaucratic, inconsistent, rigid, and arthritic.[215] DTV stands as an example of an inefficient and delayed process. In the DTV case study, FCC involvement inspired a certain degree of costly lobbying, pandering, and gamesmanship that distracted from the task at hand. Market forces do not lend themselves to these tactics, and as such, are generally quicker than government processes.[216] Moreover, standardization in the absence of government intervention is often more innovative due to the competition surrounding aspects of the standard.[217]

While these criticisms carry weight, it must be noted that government intervenes into the most complex of standardization efforts. Often, government intervenes only where difficult policy implications are transposed onto the already difficult technical standardization challenges. The government must take its time to carefully consider such issues, and to allow the public and the affected interests to be heard on such policy issues. As such, government standard setting, while slower, can be "fairer."[218]

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212. Advanced Television Sys. & Their Impact Upon Existing Television Broad. Serv., *Fifth Further Notice of Proposed Rulemaking*, 11 FCC Rcd. 6235, ¶ 31 (1996).

213. *Oxymorons*, *supra* note 117.

214. *The IPR Paradox*, *supra* note 57, at 217-18.

215. Mark A. Lemley, *Standardizing Government Standard-Setting Policy for Electronic Commerce*, 14 BERKELEY TECH. L.J. 745 (1999); *Private Contract*, *supra* note 165.

216. *The IPR Paradox*, *supra* note 57; Mark A. Lemley, & David McGowan, *Legal Implications of Network Economic Effects*, 86 CAL. L. REV. 479, 516-18 (1998) [hereinafter *Legal Implications*].

217. Philip J. Weiser, *The Internet, Innovation, and Intellectual Property Policy*, 103 COLUM. L. REV. 534, 585 (2003) (discussing the competitive platforms model).

218. *Role of Government*, *supra* note 207.

The market, while generally able to develop an innovative standard quickly, rarely tackles the responsibility of thoroughly considering policy and public implications of its standards in parallel with its standards development. Additionally, the market does not always move at lightning speed, particularly when operating through broad consensus-based standards efforts.[219] Finally, while competition in the market does yield innovative technical solutions on its own, the FCC is capable of harnessing such market forces, constructing competitive environments, and challenging the industry to compete in developing innovative solutions.

IV. THE MECHANICS OF FCC INTERVENTION

Despite the strong policy and economic justifications for FCC intervention, the practical mechanics of such action raise additional challenges, the most prominent being FCC authority. Many of the FCC's past regulatory actions, some of which encapsulate problems similar to the DRM standardization problem, have weathered judicial challenges to FCC oversight. As such, FCC authority operates within a clear framework, and the challenge of regulating DRM occurs against this framework. An exploration of FCC intervention in DRM standardization further emphasizes why the FCC should intervene in DRM standardization, and also provides the context and legal framework within which such intervention must occur.

A. FCC Authority

While the FCC stands as a competent, appropriate, and much needed federal agency in the DRM standardization process, unfortunately, the FCC does not currently posses the authority to intervene in the development, deployment, and enforcement of a comprehensive DRM standard. This lack of authority seems surprising given the FCC's exercises of authority in the recent DTV DRM standardizations. Despite these recent actions (which incidentally might not stand on the surest ground from an authority perspective) a review of the FCC, the various grounds for its authority generally, and its exercise of authority in specific circumstances, such as the Plug-and-Play and Broadcast Flag proceedings, exposes the FCC's lack of regulatory authority to engage in a comprehensive DRM standardization effort. As such, the FCC must await a specific mandate from Congress before it may begin to resolving the industry's DRM dilemma. Two recent bills addressing FCC authority are discussed below, foreshadowing the types

219. *Id.*; *Legal Implications*, *supra* note 216.

of legislation that could enable, or alternatively prohibit, the FCC's intervention into the area of DRM standardization.

1. The FCC and its Authority Generally

Congress created the FCC in 1934 through the passage of the Communications Act of 1934.[220] Being a creature of statute, both the FCC's existence and its jurisdiction are defined and limited by Congressional grant. As part of its grant of authority, the FCC maintains rule-making authority.[221] Generally speaking, the FCC will frequently promulgate rules in the Code of Federal Regulations implementing the specific responsibilities delegated to the FCC by Congress. The FCC's rule-making is governed by the Administrative Procedure Act, which requires, *inter alia*, specific notice and comment procedures when conducting rule-making.[222] Any rule-making conducted by the FCC is subject to judicial review.[223] Such review has produced numerous judicial opinions addressing FCC action and highlighting the two bases for FCC authority: specific and ancillary jurisdiction.

2. Specific FCC Authority

Where Congress gives the FCC an express mandate to accomplish a particular goal, the FCC is unquestionably empowered to promulgate rules for implementing that express Congressional goal. With particular relevance to the DRM challenge, numerous examples of the FCC's exercise of such specific authority touch on the controversial and intrusive regulation of consumer hardware.[224]

The FCC's actions with respect to its DTV Tuner Order illuminate the nature of the FCC's specific authority in the context of consumer

220. THOMAS G. KRATTENMAKER, TELECOMMUNICATIONS LAW AND POLICY 20 (2nd ed., 1998).

221. For example, with respect to the Telecommunications Act of 1996, the FCC's rule-making authority is set forth in 47 U.S.C. § 201(b) which provides that the Commission "may prescribe such rules and regulations as may be necessary in the public interest to carry out the provisions of this chapter." 47 U.S.C. § 201(b) (2004).

222. 5 U.S.C. § 552(a).

223. 47 U.S.C. § 402(a)-(b).

224. For instance, the FCC's security separation requirements associated with Section 629 of the Telecommunications Act of 1996 implicate the FCC's specific authority as applied to regulating consumer hardware. Gen. Instrument Corp. v. FCC, 213 F.3d 724 (D.C. Cir. 2000); Implementation of Section § 304 of the Telecomms. Act of 1996, Commercial Availability of Navigation Devices, *Notice of Proposed Rulemaking*, 12 FCC Rcd. 5639 (1997); Similarly, the FCC's recent plug-and-play proceedings implicate the FCC's specific authority. See, *Plug & Play Order*, *supra* note 186; Implementation of § 304 of the Telecomms. Act of 1996, *Further Notice of Proposed Rule making & Declaratory Ruling*, 15 FCC Rcd. 18,199, at 18,211 (2000).

hardware regulation. Invoking its authority under the All Channel Receiver Act (ACRA),[225] the FCC ordered that certain types of televisions must be equipped with hardware capable of receiving DTV signals.[226] Commentators have suggested that the FCC was acting beyond its authority,[227] and the Consumer Electronics Association (CEA) formally challenged this Order, arguing that the FCC lacks authority for such action under ACRA, or, alternatively, that the Order is an arbitrary and capricious abuse of any authority granted.[228]

The ACRA granted the FCC authority to ensure that new manufactured televisions were capable of receiving channels broadcast across the UHF spectrum. The FCC had just approved the use of 70 new UHF channels for television broadcasting in response to the industry's saturation of the 12 available VHF channels.[229] Broadcasters remained reluctant to venture into this new spectrum as most televisions remained incapable of receiving anything other that the 12 original VHF channels. Consumers remained reluctant to invest in new televisions capable of receiving UHF channels due to the lack of content being broadcast on those channels. Likewise, television manufacturers remained reluctant to manufacture more expensive televisions capable of receiving the new UHF channels due to lack of consumer demand. ACRA was enacted to address this "logjam" by giving the FCC authority to ensure that televisions are capable of receiving all frequencies allocated to the FCC for television broadcasting.[230]

The FCC again faced a "logjam" in the more contemporary context of overseeing Congress's mandated transition to digital television:[231]

> The FCC found that a logjam was blocking the development of DTV: broadcasters are unwilling to provide more DTV programming because most viewers do not own DTV equipment, and the lack of attractive DTV programming makes consumers reluctant to invest more in DTV equipment, which in turn, reinforces the broadcasters' decision not to invest more in DTV programming.[232]

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225. 47 U.S.C. § 303.

226. Review of the Comm'n's Rules and Policies Affecting the Conversion To Digital Television, *Second Report & Order & Second Memorandum Opinion & Order*, 17 FCC Rcd. 15,978 (2002) [hereinafter, *Digital Tuner Order*].

227. Eugene Rome, *Regulatory Overreaching: Why the FCC is Exceeding its Authority in Implementing a Phase-in Plan for DTV Tuners*, 23 LOY. L.& ENT. L. REV. 533, 553 (2003) [hereinafter *Regulatory Overreaching*].

228. Consumer Elecs. Ass'n v. FCC, 347 F.3d 291 (D.C. Cir. 2003).

229. *Regulatory Overreaching*, *supra* note 227.

230. 47 U.S.C. § 303.

231. *Id.* § 309(j)(14)(a).

232. *Consumer Electronics Ass'n*, 347 F.3d at 300.

Dusting off the authority granted to it under ACRA, the FCC promulgated rules requiring new televisions to include digital tuners.[233]

The Court evaluated CEA's challenge to FCC authority under ACRA using the standards set forth in the *Chevron* case.[234] Specifically, the Court addressed CEA's position that Congress was not cognizant of this particular issue when drafting the ACRA. After reviewing the statutory text of ACRA, the legislative history behind ACRA, the nature of the specific problem, and the regulation at issue, the Court concluded that:

> [T]he legislative history invoked by CEA does not demonstrate that Congress meant to limit ACRA's application to the analog context. That history does show that Congress was most immediately concerned with empowering the FCC to address the problem of UHF reception. . . . But, as the Commission found in the *Digital Tuner Order*, nothing in the legislative history compels (or even suggests) the conclusion that Congress intended to limit the statute to that specific application. . . . The use of broad language in ACRA - speaking only of "receiving *all* frequencies allocated by the Commission to television broadcasting," . . . to solve the relatively specific problem of UHF reception, militates strongly in favor of giving ACRA broad application.[235]

In addition to finding that step one of the *Chevron* test did not preclude the FCC from promulgating its Digital Tuner Order, the Court also found that the FCC's interpretation of ACRA was reasonable under step two of the *Chevron* test and that the FCC's actions were not arbitrary, capricious, nor an abuse of discretion under the APA.[236]

3. FCC Ancillary Authority

In contrast with its direct statutory authority to engage in rule-making, the FCC also sometimes invokes its somewhat more ambiguous ancillary authority. The FCC's original foray into the regulation of cable

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233. *Digital Tuner Order*, *supra* note 226.

234. Chevron U.S.A., Inc. v. Natural Res. Def. Council Inc., 467 U.S. 837, 844 (1984). Under the *Chevron* standards, a court reviewing an agency's action must evaluate (1) whether Congress, through the relevant statute, has specifically spoken on the precise question at issue, and (2) where the statute is silent or ambiguous, whether the agency's construction is a permissible construction of the statute. In the event that Congress has not explicitly spoken on the precise question at issue, Congress has left a "gap" for the agency responsible for administering the statute to fill. In these circumstances, an agency's interpretation of the statute, and the regulations promulgated in order to fill the gap, are given deference by the courts during judicial review. A court will only disturb the agency's determinations where the agency's regulations are "arbitrary, capricious, or manifestly contrary to the statute." *Id.*

235. *Consumer Elecs. Ass'n*, 347 F.3d at 299 (citations omitted).

236. *Id.* at 292.

systems stands as the most notable example of the FCC exercising its ancillary authority. This situation resulted in a Supreme Court opinion outlining the boundaries of the FCC's ancillary authority.

The case stemmed from a 1965 FCC Order forbidding cable providers from importing distant signals into any of the 100 largest television markets.[237] Not surprisingly, cable interests challenged this particular exercise of FCC authority.

The Supreme Court, in evaluating this challenge, first noted that the FCC's regulatory authority in the broadcasting and communications realm derived from the Communications Act of 1934, which was applicable to "all interstate and foreign communication by wire or radio. . ."[238] and required the FCC to "make available . . . to all the people of the United States, a rapid, efficient, Nation-wide, and world-wide wire and radio communication service . . . ."[239] The Court acknowledged the FCC's authority as "broad" and encompassing "regulatory power over all forms of electrical communication, whether by telephone, telegraph, cable, or radio."[240]

With respect to the ultimate question of whether the FCC appropriately exercised its authority, the Court reasoned that:

> We have elsewhere held that we may not, 'in the absence of compelling evidence that such was Congress' intention . . . prohibit administrative action imperative for the achievement of an agency's ultimate purposes' . . . There is no such evidence here, and we therefore hold that the Commission's authority over 'all interstate . . . communication by wire or radio' permits the regulation of CATV systems. . . . [T]he authority which we recognize today under § 152(a) is restricted to that reasonably ancillary to the effective performance of the Commission's various responsibilities for the regulation of television broadcasting.[241]

For obvious reasons, the FCC's ancillary authority stands on less firm ground than its express authority. Nevertheless, the FCC periodically invokes the principle of ancillary authority to support a rule-making or other action. Most recently, the FCC cited its ancillary authority, as well as its express authority, when conducting proceedings and issuing its Plug-and-Play Order. More controversially, the FCC also invoked its bare ancillary authority in its Broadcast Flag proceedings.

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237. United States v. Southwestern Cable Co., 392 U.S. 157, 166 (1968).
238. 47 U.S.C. § 152(a).
239. *Id.* § 151; *Southwestern Cable Co.*, 392 U.S. at 167.
240. *Southwestern Cable Co.*, 392 U.S. at 168.
241. *Id.* at 177-78.

As discussed above, the FCC's Broadcast Flag Order mandates that all products with a demodulator capable of receiving digital television signals must also be capable of recognizing and giving effect to an encoded flag, included in digital television signals, which informs the consumer electronics device whether such digital content may be redistributed or not.[242] The FCC made clear that its Order did not apply only to television sets, but applied to any consumer electronics, PC, or IT device.[243]

Certain consumer electronics interests opposed the FCC's exercise of jurisdiction during the proceedings. Specifically, these interests advocated against the FCC's exercise of ancillary authority because (1) consumer electronics companies are unregulated entities, (2) the broadcast flag requirement is not necessary to carry out any specific provision of the Communications Act, and (3) reception equipment, unlike transmission equipment, falls outside the general jurisdictional grant found in Title I.[244] These interests noted that an explicit grant from Congress stood as a prelude to every past FCC regulation imposing requirements upon consumer electronics manufacturers.[245]

In finding that it possessed the ancillary authority necessary to implement the broadcast flag regulations, the FCC argued:

> Ancillary jurisdiction may be employed, in the Commission's discretion, where the Commission's general jurisdictional grant in Title I of the Communications Act covers the subject of the regulation and the assertion of jurisdiction is 'reasonably ancillary to the effective performance of [its] various responsibilities.' Both predicates for jurisdiction are satisfied here.[246]

The FCC determined that regulation of television reception equipment falls within the general jurisdictional grant set forth in Title I, outlining the broad language in Sections 151 and 152(a), as well as the broad definitions of "radio communication" and "wire communication" found in Sections 3(33) and 3(52). The FCC then reasoned that the broadcast flag regulatory regime was reasonably ancillary to (1) its provision of a broadcasting system throughout the communities of the United States on

242. *Broadcast Flag Order*, *supra* note 191.

243. *Id.* ¶ 35.

244. *Id.* ¶ 28.

245. *Id.* (citing All Channel Receiver Act of 1962, 47 U.S.C. §§ 303(s), 330(a)) (television frequencies); Television Decoder Circuitry Act 1990, 47 U.S.C. §§ 303(u), 330(b)) (closed-caption transmissions); Parental Choice in Television Programming provisions of the 1996 Telecommunications Act, 47 U.S.C. §§ 303(x), 330(c)) (V-Chip); 47 U.S.C. § 544a (cable compatibility); 47 U.S.C. § 549 (navigation devices).

246. *Broadcast Flag Order*, *supra* note 191, at ¶ 29 (citing *Southwestern Cable Co.*, 392 U.S. at 178).

a fair, equitable, and reasonable basis,[247] and (2) its responsibilities in "shepherding the country's broadcasting system into the digital age."[248] After reviewing these statutory provisions along with their legislative history, the FCC concluded:

> The legislative history and the Commission's ongoing and prominent initiatives in the area, make it clear that advancing the DTV transition has become one of the Commission's primary responsibilities under the Communications Act at this time. Here, the record shows that creation of a redistribution control protection system, including compliance and robustness rules for so-called "Demodulator Products," is essential for the Commission to fulfill its responsibilities under the Communications Act and achieve long-established regulatory goals in the field of television broadcasting.[249]

While the FCC ultimately determined that the exercise of its authority under the ancillary authority doctrine was appropriate, the FCC was also forced to

> recognize that the Commission's assertion of jurisdiction over manufacturers of equipment in the past has typically been tied to specific statutory provisions and that this is the first time the Commission has exercised ancillary jurisdiction over consumer equipment manufacturers in this manner . . . . even though this may be the first time the Commission exercises its ancillary jurisdiction over equipment manufacturers in this manner, the nation now stands at a juncture where such exercise of authority is necessary.[250]

The broadcast flag encountered some unsurprising criticisms in the press since its enactment, some of which are based on the FCC's jurisdictional leap.[251] Federal legislators have also expressed concern about the FCC's actions, as evidenced by Congressman Lamar Smith's comments regarding the FCC's Broadcast Flag Order: "My Subcommittee has great interest in the FCC's announcement because the agency may issue rules that impact the Copyright Act and involve my Subcommittee's jurisdiction. The Subcommittee will reserve judgment until we

247. *Id.* ¶ 30 (citing 47 U.S.C. § 151, 307(b)).
248. *Id.* ¶ 30 (citing 47 U.S.C. §§ 303(g), 309(j)(14), 336, 337, 396(k)(1)(D), 544a(c)(2), 614(b)(4)(B)).
249. *Broadcast Flag Order*, *supra* note 191, at ¶¶ 30-31.
250. *Id.* ¶¶ 32-33.
251. Paul Boutin, *Why the Broadcast Flag Won't Fly*, WIRED MAG., Feb., 2004.

undertake a complete review of the published rule and determine if the Copyright Act is affected."[252]

While the FCC's broadcast flag actions are necessary at this stage, the broadcast flag represents a risky and strained exercise of ancillary jurisdiction. The weakness in the FCC's assertion of authority in this case is somewhat novel as it does not lie in potential conflict with a statutory provision. Rather, jurisdiction lies in the lack of proximity between the FCC's actions and the specific statutory directives that those actions are designed to further. The specific statutory directives identified by the FCC are themselves somewhat vague and ambiguous, and the nexus between those directives and the FCC's broadcast flag actions is not readily apparent. Indeed, the primary opponent of FCC authority during the rule-making process, the American Library Association, launched a formal challenge to the FCC's jurisdiction currently pending before the U.S. Court of Appeals for the District of Columbia Circuit. Should the FCC's Broadcast Flag Order survive this challenge, it will be fair to consider the Broadcast Flag as representing the far outer limits of the FCC's ancillary authority.

4. FCC Jurisdiction Over a Comprehensive DRM Regulatory Regime

As noted above, a comprehensive DRM regulatory regime would contemplate an FCC mandate covering consumer electronic hardware. More importantly, the scope of this mandate would extend well beyond the FCC's hardware-based mandates set forth in its Plug-and-Play and Broadcast Flag Orders. A comprehensive DRM mandate would apply to any type of device that could store, transmit, produce, manipulate, or play digital media files. Given the jurisdictional challenges associated with the FCC's more modest efforts to apply mandates to consumer electronic hardware in the rights management context, the FCC can assume that any effort to deploy a comprehensive DRM scheme through a regulatory mandate will be met with vigorous challenges to the FCC's authority.

Consideration of the FCC's two standing doctrines upon which it may assert its authority reveals that the FCC is lacking in the jurisdictional authority needed to apply a DRM mandate across the broad spectrum of consumer electronic devices. There currently exists no express Congressional grant applicable to DRM and the regulation of consumer hardware. Additionally, the FCC's ancillary jurisdiction under

252. Press Release, Cong. Lamar Smith, Smith: FCC Broadcast Rule May Impact Copyright Act (Nov. 5, 2003), *at* http://lamarsmith.house.gov/news.asp?FormMode=Detail&ID=327.

Title I, while arguably applicable under the broad language of Sections 151 and 152(a), nevertheless fails, as there is no nexus with any other section of the statute.[253] In short, the FCC's exercise of authority in this area will require a new, express Congressional grant.

The Hollings Bill encapsulates just such a grant.[254] This Bill expressly directs the FCC–in conjunction with the Copyright Office—to initiate a rule-making proceeding in order to develop a comprehensive DRM standard in the event that the industry fails to do so itself.

The Hollings Bill garners both supporters and harsh critics. Some of the criticisms center directly on the issue of FCC authority. For example, the Home Recording Rights Coalition described the bill as "a breathtaking delegation of authority to a regulatory agency that is ill-equipped to perform such a monumental task."[255] Fearing the FCC's exercise of authority, some interests have proposed legislation expressly limiting the FCC's reach. The Consumer, Schools, and Libraries Digital Rights Management Awareness Act of 2003 contains such an express limitation upon FCC authority.[256] In a statement introducing this Bill, Senator Brownback explained:

> Over the past few years the large media companies have persistently sought out new laws and regulations that would mandate DRM in the marketplace, denying consumers and the educational community the use of media products as has been customarily and legally permitted. As a result, the Consumers, Schools, and Libraries Digital Rights Management Awareness Act of 2003 will preclude the FCC from mandating that consumer electronics, computer hardware, telecommunications networks, and any other technology that facilitates the use of digital media products, such as movies, music, or software, be built to respond to particular digital rights management technologies.[257]

This strong opposition to FCC action must be considered in context. For instance, even Senator Brownback commended the FCC's Plug-

253. An advocate of FCC authority over DRM might argue that a comprehensive DRM standard would be reasonably necessary for the FCC to execute the express statutory mandates regarding the FCC's oversight and encouragement of widespread broadband deployment found in Section 706 of the Telecommunications Act. *See* 47 U.S.C. § 157. The links between the launch of a comprehensive DRM standard and an express FCC statutory directive regarding broadband, however, are even more tenuous than the links applicable to the FCC's authority to issue its broadcast flag order.

254. Consumer Broadband and Digital Television Promotion Act, S. 2048, 107th Cong. (2002).

255. Jon Newton, *Broadcast Flag – to be, or not to be?*, MP3NEWSWIRE.NET (Dec. 8, 2002), *at* http://www.mp3newswire.net/stories/2002/ broadcastflag.htm.

256. Consumer, Schools, and Libraries Digital Rights Management Awareness Act of 2003, S. 1621, 108th Cong. (2003).

257. 149 Cong. Rec. S11,572 (daily ed. Sept. 16, 2003) (statement of Sen. Brownback).

and-Play Order as "aimed at protecting cable TV programming from piracy, but in a manner that seeks to *preserve* the customary and legal uses of media by consumers and the educational community to the greatest degree possible."[258] As such, it seems that a carefully crafted, narrow grant of authority at least has the potential to satisfy both ends of the spectrum.

These debates and discussions at the Congressional level addressing the nature and scope of the FCC's involvement in a DRM standard are not surprising. The point remains that the FCC must await Congressional direction, and that a carefully crafted delegation of authority holds the potential to satisfy all policy watchdogs. If and when Congress provides guidance, the FCC, as evidenced by its Plug-and-Play and Broadcast Flag proceedings, stands willing and able to successfully execute the Congressional mandates.

CONCLUSION

FCC intervention is critical to the successful standardization of rights management in digital media content. The FCC's assistance and oversight in this turbulent area should be warmly welcomed. Moreover, the FCC's recently demonstrated commitment and expertise in DRM greatly enhances its ability to guide the industry toward a successful and appropriate DRM standard. While market solutions are often preferable to government intervention, DRM standardization simply does not fit within the market's established standardization models. The participation of an incredibly diverse array of interests is needed to strike an appropriate balance in this controversial area. Only the FCC is capable of including and focusing all of these diverse interests. Moreover, the labors of these diverse interests will be wasted if the resulting standard is not properly enforced in the marketplace. Only through government intervention will the resulting DRM standard be empowered and enforced with the authority of law.

The FCC has proven itself adept at developing balanced rules and regulations aimed at fostering technological progress while preserving the public interest. The FCC has demonstrated its experience and skill in policing the industry to enforce and administer its rules. Finally, the FCC has exhibited familiarity with the economic details, the technological intricacies, and the key players in the market. With the appropriate Congressional grant of authority, the FCC can lead the digital media world away from a culture of piracy and into a new era of innovation.

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258. *Id.* at 11,573.

THE IMPOSSIBILITY OF TECHNOLOGY-BASED DRM AND A MODEST SUGGESTION

JOHN BLACK*

INTRODUCTION

When I was a teenager in the late 1970s, there was no World-Wide Web, no Internet, and no IBM PC. But I, along with a small group of friends, became obsessed with computers: the TRS-80 and the Apple were the targets of our passion. Each time a new computer game was announced, we awaited its release with great anticipation: not because we wanted to kill the dragon or get to level 37, but because we wanted to see how hard it was *this time* to remove the copy protection from the software.

In those early days of personal computing, game manufacturers made perhaps one million dollars per year, and there were only a handful of companies. Few had ever heard of Microsoft, and there were no such things as CD burners or high-speed networks. So trying to control illegal copying (or "pirating" as it was already called back then) was a concern limited to just a few small companies.

Today there are software companies with tens of billions of dollars in gross revenues, each with a strong vested interest in overseeing the legal distribution of their products. Additionally, media companies (in particular, music and film producers and distributors) continue their fight to control illegal distribution of their content, especially now in the presence of the $50 CD burner. To address these problems, media companies have turned to technology such as Digital Rights Management (DRM) to prevent copying and enforce protection of copyright. In this paper I will argue that the media companies' reliance on a technological solution is almost certainly doomed, and that a variety of motives will continue to drive people to circumvent any such technology. The best solution to the problem is not a technological one, but instead one of education.

In Section I of this paper, I will discuss some historical and current examples where the media companies have relied on technology to

* Department of Computer Science, University of Colorado at Boulder, jrblack@cs.colorado.edu.

protect their products and why each has failed. In Section II, I will explain why the current dependence on DRM to solve the copyright protection problem has also failed. In Section III, I will look at the current state of legal protections that have been created to assist in the protection of digital content. Finally, I will explain what is missing from each of these approaches.

I. TECHNOLOGY TO THE RESCUE?

Technology will never solve the Digital Rights Management (DRM) problem because of the implicit challenge in attempting to conceal, obfuscate, or make "uncopyable" programs and content. Just as it happened 25 years ago, it happens still today: the harder copyright owners work to protect their content, the harder talented technicians work to circumvent these protections. The challenge of showing that these schemes do not work is irresistible to many people who spend countless hours working to break the "unbreakable." The motivation of such "crackers" varies: some wish to win peer recognition by removing the protection, some are expressing civil disobedience in objection to copyright laws, and some just enjoy solving puzzles.[1]

The various attempts to use technology to control copying (and other rights copyright holders wish to control), have all thus far failed.[2] Embarrassingly, for the software and media providers who have attempted these technological solutions, they have often failed in spectacular ways. I survey just a few examples.

A. Intentional Errors

One way in which copy protection was attempted in the old days (*i.e.*, 1978) was as follows: the game distributor would *intentionally* induce an error on some track of a diskette before distributing it. Then the software that loads the game would first check to ensure that the error was in place before it would load the game. If the defective track was not present, the game would not load. The idea here is simple: if one now attempts to copy the diskette, any self-respecting disk copy program would find the defective track unreadable and therefore make a legitimate track on the copied version. Disk copy programs would *not* reproduce the bad track, and therefore copies made this way were useless. There were two simple ways around this: (1) make a disk copy program which *did* reproduce errors, or (2) find and remove the piece of the

1. STEVEN LEVY, HACKERS (2001).

2. *See* Ryan Roemer, *Trusted Computing, Digital Rights Management, and the Fight for Copyright Control on Your Computer*, 2003 UCLA J.L. & TECH. 8, *available at* http://www.lawtechjournal.com/articles/2003/08_040223_roemer.php.

software which checked for the bad track. In 1978, method (2) was the most common technique, but two years later someone did write a program to make copies of software that included the errors, thereby defeating the entire protection scheme and allowing fast and repeated copying of programs.

Some 23 years later, Sony used a somewhat similar technique in its Key2Audio technology meant to protect CDs from being loaded on PCs.[3] After all, if you can prevent PCs from reading a CD, you can prevent copying (both the illegal and legal varieties, in fact). Sony's technique leverages the difference between low-end commodity CD players and powerful PC-based software players.[4] Low-end players have limited processing power and almost universally tolerate errors on the first track of the CD, whereas the more powerful players attempt to make sense of the data on the first track and if there is an error, they give up. Sony Key2Audio technology purposely induces errors on the first track to make CDs unplayable (and therefore uncopyable) on personal computers.[5] However, it was quickly discovered that the bogus information preventing PC-based players from loading the CD could be effectively removed using a felt tipped pen on the edge of the CD.[6] Blackening this track then allowed the CD to be loaded, played, and copied by any PC. This was an embarrassingly simple and inexpensive way to defeat a copy-protection scheme

A more recent copy-protection scheme by SunnComm underwent extensive testing before it was deployed.[7] The idea was that a special piece of software would be loaded from the SunnComm-enhanced CD into the PC in order to disable copying. Testers used "ripper" programs to attempt to copy CDs protected with their technology and none was successful.[8] The company claimed therefore that their product yielded a "verifiable and commendable level of security."[9] Not long after, it was discovered that simply holding down the "Shift" key while inserting the CD allowed the tracks to be copied.[10]

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3. *See* KEY2AUDIOXS SOLUTION, SONY DADC, *available at* http://www.key2audio.com/solution.asp (last visited Mar. 23, 2005).

4. *Id.*

5. *Id.*

6. Brendan I. Koerner, *Can You Violate Copyright Law With a Magic Marker?*, SLATE.COM, June 3, 2002, *at* http://slate.msn.com/id/2066527/.

7. SUNNCOMM, MEDIAMAX, *at* http://www.sunncomm.com/Brochure/SunncommCover.htm (last visited Mar. 23, 2005).

8. *Id.*

9. *Id.*

10. J. ALEX HALDERMAN, ANALYSIS OF THE MEDIAMAX CD3 COPY-PREVENTION SYSTEM (Princeton University Computer Science Technical Report TR-679-03, Oct. 6, 2003), *available at* http://www.cs.princeton.edu/~jhalderm/cd3/.

II. WHY TECHNOLOGY-BASED DRM IS IMPOSSIBLE

The newest technology that attempts to implement DRM (along with other objectives) is Microsoft's "Trusted Computing" concept, formerly known as "Palladium."[11] The idea behind "trusted computing" is to use secure hardware to boot the Windows operating system to ensure it is a valid version, uncorrupted by viruses or other "illegally added" code.[12] Then when Disney or any other media developer wishes to ensure that this computer has properly licensed some content, it uses a cryptographic protocol (mathematical algorithms to authenticate and encrypt digital content) which is hard to simulate without access to internal information (or "keys") embedded within the secure hardware.[13]

There are three essential technological problems with the "trusted computing" concept. The first problem is that "secure hardware" is never fully secure. In the first implementations of this scheme, there was a special chip called the "Fritz Chip" which was added next to your Pentium CPU.[14] The Fritz chip holds the cryptographic keys, and it was not too hard to extract these keys via reverse-engineering.[15] The Fritz chip will eventually be embedded into the Pentium itself (Intel is part of the Trusted Computing group) and then things will become more difficult. But most hardware experts still predict that it will be feasible to extract the keys from the chip.[16] The problem is that in order to make hardware secure, you have to spend a lot of money: typical "tamper-proof" chips must resist attempts to extract their contents.[17] Sophisticated techniques for reverse engineering include x-raying chips, sampling input-output pairs, and shaving very thin slices from their packaging until their layouts can be viewed with a microscope.[18] To circumvent such attacks, secure chip manufacturers are forced to use various techniques, such as the introduction of chemicals which cause the chip to self-destruct when exposed to air. This adds significant cost to the production process. But if the chips are to be a commodity technology, you have to spare every expense. So manufacturers will err

11. MICROSOFT, NEXT-GENERATION SECURE COMPUTING BASE, *at* http://www.microsoft.com/resources/ngscb/default.mspx (last visited Mar. 23, 2005).

12. *Id.*

13. *Id.*

14. ROSS ANDERSON, 'TRUSTED COMPUTING' FREQUENTLY ASKED QUESTIONS (Aug. 2003), *available at* http://www.cl.cam.ac.uk/~rja14/tcpa-faq.html.

15. *Id.*

16. *Id.*

17. SUN MICROSYSTEMS, SMART CARD OVERVIEW, *at* http://java.sun.com/products/javacard/smartcards.html (last visited Mar. 23, 2005).

18. Gary McGraw, *Smart cards, Java cards and security*, DATAMATION, Jan. 19, 1998, *at* http://itmanagement.earthweb.com/ecom/article.php/601661.

on the side of using a limited amount of secure technology in order to save money and keep their products affordable and competitive.[19]

The second problem, which is common to all technological attempts at DRM, is that the computer and its accessories are physically in the presence of the adversary (*i.e.*, you). The only way in which to *guarantee* the security of information is when these companies are able to hide some key piece of information from the attacker. For example, when you log in to a computer system, you often provide a password; this is the leverage you have over an attacker: the attacker does not know your password. But in the DRM setting, the computer knows all; there is no outside authority involved. Any keys or passwords used in unlocking the software or media must be contained within the computer, (whether it be in software or in hardware) and therefore, the attacker has physical access to them. Although using secure hardware does ameliorate this problem to some extent, as discussed above, it means that someone must pay for this secure hardware.

The third problem is that, at some point, the content you have purchased must appear. If it is music, sound must eventually emanate from your speakers; if it is a movie, images must appear on your screen in addition to sound. On a typical PC, the sound is generated by a "sound card" and the video by a "video card." These signals are then transferred to your speakers and screen via cables (laptop computers excepted). It is a trivial matter for anyone to attach alligator clips to these cables and record the video and the sound! At this point, the person has successfully copied a song or movie, defeating any sort of DRM anti-copying technology imaginable. If the signals on these cables are analog, there is some degradation in quality, but not much. And more and more the signals these days are digital, where there is zero degradation. This last problem would seem to be the death-knell for DRM technology. But, not to be deterred, purveyors have come up with a "solution" for this problem. The solution is called "watermarking."

A. Watermarking

One problem with cracking copy-protection schemes is that it takes a huge effort, a lot of time, and a fairly sophisticated attacker to defeat some copy-protection schemes.[20] This is good news for the copyright holder because the number of people who are willing to spend the time and money, and who possess the necessary skills is very small. The copyright holder might even be willing to ignore this small minority of lawbreakers, instead hoping that they will be only noise on the revenue

19. *Id.*
20. LEVY, *supra* note 1.

sheets. Unfortunately there is a principle known as BORA: Break Once Run Anywhere.[21] This is meant to capture the notion that once *one* person has invested the time to break the copy-protection mechanism, he can then distribute the content in unprotected form to thousands of other users who need only know how to use the Internet and a CD burner.[22] A proposed solution to this problem is known as "watermarking."

Watermarking is a technology intended to enable content distributors to uniquely mark each copy of a song or movie with a unique serial number in such a way that (1) the marking does not adversely affect the quality of the content, (2) the mark can be read efficiently by the copyright holder and its enforcement agencies, (3) the mark is "robust" in that it is preserved in spite of normal degradation or alteration to the content (for example if a song were compressed or if it were converted to analog and then back to digital), and (4) the mark is *hard to remove*.[23] The idea behind watermarking goes to law enforcement of illegal copying and distribution.[24] If watermarking could achieve all of these aims, then any content found in illegal distribution channels could be traced back to the original legitimate purchaser who could then be lawfully prosecuted for illegally distributing it.

The watermarking approach, however, fails in several respects. No one knows any watermarking technology that achieves all four of the properties above, despite several attempts at circumventing it.[25] The most famous instance of a watermarking technology thought to have all four of these properties was one developed by the Recording Industry Association of America (RIAA). The RIAA distributed a song with several watermarks and challenged researchers to remove them without degrading the quality of the music.[26] When a group from Princeton, headed by Edward Felten, succeeded in doing just this,[27] the RIAA threatened suits against Princeton, Professor Felten, and the conference

21. *See, e.g.*, STEPHEN R. LEWIS, HOW MUCH IS STRONGER DRM WORTH? (2003), *available at* http://www.cl.cam.ac.uk/users/srl32/eis1.pdf.

22. *Id.*

23. *See generally* WATERMARKING WORLD, WELCOME TO DIGITAL WATERMARKING WORLD, *at* http://www.watermarkingworld.org/ (last visited Mar. 23, 2005).

24. *Id.*

25. *Id.*

26. Letter from Matthew J. Oppehnheim, Secretary of SDMI foundation, to Edward Felten, Professor, Princeton University (Apr. 9, 2001), *available at* http://www.theregister.co.uk/extra/sdmi-attack.htm.

27. Secure Internet Programming Group of Princeton University Department of Computer Science, Status of the paper *Reading Between the Lines: Lessons from the SDMI Challenge*, *at* http://www.cs.princeton.edu/sip/sdmi/ (last visited Mar. 23, 2005).

organizers where Felten planned to present his methods.[28] Felten smartly decided to withdraw his paper from the conference.[29]

Perhaps watermarking technology will one day reach a level of sophistication where no one knows how to successfully remove the markings. But, even if a foolproof watermark were developed, there are still legal and ethical problems in attempting to enforce copyright in the manner described above. Suppose, for example, a 15-year-old girl is found to be the source of a leaked Stankonia track. Is the RIAA *really* going to try and recover perceived losses from her in court? Or worse, pursue criminal charges against her? Though the RIAA and DVD Copy Control Association (CCA) have made examples of a few particularly blatant violators, it would seem extremely impractical, not to mention cost-prohibitive, to pursue legal action against every offender.[30] What is to prevent people from claiming that a CD was lost or stolen and that *someone else* released it onto the Internet? Are we going to be asked to sign a contract accepting all liability should our purchased music be found to have been illegally distributed?

There are limited contexts in which watermarking makes sense and in which it might afford the protections desired. One example is for "screeners" who acquire high-quality copies of pre-release movies in order to view them for the *Academy Awards* (these screeners are thought to often be a source of leaks).[31] In this case the screeners are adults, are made to sign a contract, and are small in number. Another example is downloaded software where you are often required to identify yourself (via credit card and other personal information), but watermarking technology has not yet been targeted at software.[32] In any event, one can hardly imagine the watermarking solution working on a global scale, if even the technology can be realized in the first place.

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28. *See* ELECTRONIC FREEDOM FOUNDATION, FELTEN, ET AL., V. RIAA, ET AL., *at* http://www.eff.org/IP/DMCA/Felten_v_RIAA/ (last visited Mar. 23, 2005).

29. Felton later sued the RIAA but dropped the case when the RIAA assured Felton that it would not pursue the matter. *See* Media Release, Electronic Frontier Foundation, Security Researchers Drop Scientific Censorship Case (Feb. 6, 2002), *available at* http://www.eff.org/IP/DMCA/Felten_v_RIAA/20020206_eff_felten_pr.html (the RIAA further encouraged Felton to publish his findings, "because everyone benefits from research into the vulnerabilities of security mechanisms.").

30. *See generally* DVD COPY CONTROL ASSOCIATION, FREQUENTLY ASKED QUESTIONS, *at* http://www.dvdcca.org/faq.html (last visited Mar. 23, 2005).

31. Aliya Sternstein, *Disney's Pirate Fight*, FORBES.COM (Sept. 29, 2003), *at* http://www.forbes.com/2003/09/29/cz_as_0929dis.html.

32. CHRISTIAN COLLBERG & CLARK THOMBORSON, SOFTWARE WATERMARKING: MODELS AND DYNAMIC EMBEDDINGS (1999), *available at* http://citeseer.ist.psu.edu/cache/papers/cs/3565/http:zSzzSzwww.cs.auckland.ac.nzzSz~collbergzSzResearchzSzPublicationszSzCollbergThomborson99azSzA4.pdf/collberg99software.pdf.

III. LEGAL APPROACHES

Copyright law is known for its complexity, but its basic tenets are understood by most laypersons: copyrighted materials may be copied for your own "fair-use," but you may not make copies for distribution to others.[33] Though some people may have understood these rules, it does not necessarily follow that they have obeyed them. The music industry has long suffered significant losses in revenue due to music sharing, but until the Internet Age it was small enough to be tolerable.[34] By 2001, with more than 100 million computers on the Internet, illegal distribution had become all too easy, and new laws were needed.[35]

The Digital Millennium Copyright Act (DMCA), passed in 1998, was designed to augment protections for copyright holders in the age of the Internet.[36] The law attempts to compensate for the lack of any workable technology for DRM by outlawing the methods used to defeat that technology.[37] In particular, the law states that it is illegal to reverse engineer a product, be it hardware or software, for the purposes of circumventing copyright.[38]

The law provoked an immediate outcry on many fronts. Academics claimed the law rescinded their basic right to evaluate and analyze technology, a practice long established by researchers.[39] Professor Felten, mentioned above, said the law rescinded our fundamental "freedom to tinker" with the products we purchase.[40] Some claimed the law was in conflict with fair-use.[41] But now, six years later, the law remains in effect and people continue to be prosecuted under its provisions. I believe that law is the proper vehicle for enforcing the rights of copyright holders, though I also believe the DMCA is fundamentally the wrong law to do it. Academic freedom and the broad protections accorded by fair-use are

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33. *See, e.g.*, DÉMODÉ, COPYRIGHT AND COMMON SENSE, *at* http://www.demode.tweedlebop.com/copyright.htm*l* (last revised Aug. 27, 2004).

34. Vangie Aurora Beal, When Is Downloading Music on the Internet Illegal?, WEBOPEDIA.COM (Dec. 22, 2004), *at* http://www.webopedia.com/DidYouKnow/Internet/2004/music_downloading.asp.

35. See *Internet Hosts Reach 100 Million Worldwide*, INFORMATION SUPERHIGHWAYS NEWSLETTER, June 2001, *available at* http://www.findarticles.com/p/articles/mi_m0IGM/is_6_8/ai_76701365.

36. Digital Millennium Copyright Act § 103(a), 17 U.S.C. § 1201(a)(2) (2004).

37. *Id.*

38. *Id.*

39. *Tinkerer's Champion*, THE ECONOMIST, Jun. 20, 2002, *available at* http://www.economist.com/science/tq/displayStory.cfm?story_id=1176171.

40. *See* Edward Felten, Weblog, *at* http://www.freedom-to-tinker.com/about.html (last updated Mar. 23, 2005).

41. MARK LEMLEY & ANTHONY REECE, STOPPING DIGITAL COPYRIGHT INFRINGEMENT WITHOUT STOPPING INNOVATION (TPRC Program Paper No. 210, 2003), *available at* http://tprc.org/papers/2003/210/Stopping_Copyright_Infringement_Without_Stopping_Innovation.htm.

deeply jeopardized by this law. There are several researchers who have purposely steered clear of analyses of protected software or media for fear that it might land them in jail.[42] If anything, the DMCA has spurred civil disobedience and cultivated scorn by those who dislike its restrictions. As an example, the Content Scrambling System (CSS) was invented by the Motion Picture Association of America to protect DVDs.[43] CSS is a simple encryption system which prevents reading the DVD unless the machine knows the corresponding decryption algorithm.[44] However, since software to play DVDs is available for PCs, it was a fairly straightforward matter to reverse engineer the player and figure out how to decrypt CCS-protected content. The resulting program is called DeCSS[45] and is available on hundreds of websites around the world, despite its possibly prohibited status under the DMCA. Furthermore, you can purchase t-shirts, sweatshirts, and coffee mugs with the DeCSS code printed on them. I have one such t-shirt, it gives the DeCSS code along with the relevant portions of the DMCA stating "I am a circumvention device forbidden by 17 USC 1201(a)(2). Do not manufacture me, import me, offer me to the public, provide me, or traffic in me or in any part of me. You have been warned." I believe a more sensible law, respecting citizens' "right to tinker" and their continued access to fair-use of purchased content, would likely be more successful in curbing piracy. It would likely evoke far less backlash and disobedience among those who would ordinarily respect the law.

IV. THE MISSING PIECE?

Most of what I have written above is familiar to those who specialize in DRM. There are those who might disagree with some of it, but it is all familiar. However, I have never seen anyone make the following simple argument: why not attempt to curb illegal copying by simply explaining to people that it is *wrong.* It is a laughably simple suggestion. People surely *know* that distributing copyrighted material is illegal, and people surely know that it is wrong to break the law. So explaining the transitivity of these two statements should not make a difference. I disagree.

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42. *See* NIELS FERGUSON, CENSORSHIP IN ACTION: WHY I DON'T PUBLISH MY HDCP RESULTS (Aug. 15, 2001), *available at* http://macfergus.com/niels/dmca/cia.html.

43. *See* WIKIPEDIA, CONTENT SCRAMBLING SYSTEM, *at* http://en.wikipedia.org/wiki/Content-scrambling_system (last modified Mar. 19, 2005).

44. *Id.*

45. *See* LEMURIA.ORG, DECSS CENTRAL, *at* http://www.lemuria.org/DeCSS/main.html (last visited Mar. 23, 2005).

The vast majority of illegal song sharing on the Internet is done by young people.[46] I recently spoke with a small number of high school students and asked them a few simple questions about illegal sharing of content. The results were enlightening: although these students knew that sharing copyrighted songs was illegal, they thought it "wasn't a big deal." Their perception was, generally that copying bits floating over wires could not be considered "real theft" because there was no physical object being stolen. I asked them if they would ever consider walking into Wal-Mart and slipping a DVD inside their coats. None of them would consider this: it was *clearly wrong*.

Although part of this difference stems from the different levels of risk involved, *i.e.*, in the bricks-and-mortar context, there is a higher risk of getting caught, there is a more fundamental distinction. The high school students had the perception that stealing a physical object is somehow more significant than stealing digital content. These students believed that the value in a CD lay in the medium, the jewel case, and the labeling, *not* in the content. Anyone in the recording industry will tell you that exactly the reverse is true. I modestly suggest that copyright holders should spend less effort suing violators of the DMCA and those running illegal content distribution servers, and spend more effort educating young people that downloading a movie, a song, or software is *absolutely equivalent* to walking into a store and slipping that same movie, song, or program into their coats. This viewpoint could be aired through the usual channels to reach its target: television commercials, movie trailers, inserts included with CDs and DVDs. The cost would likely be sizeable, but if the losses to content providers are as staggering as they claim, surely any significant gains against piracy would be worthwhile.

In the 21st century we have a new model for content distribution—we need a new moral doctrine to match. And those best suited to educate us are those who stand to lose the most by neglecting to do so: the copyright owners.

46. Frank Ahrens, *RIAA's Lawsuits Meet Surprised Targets; Single Mother in Cali.; 12-Year-Old Girl in N.Y. Among Defendants*, WASH. POST, Sept. 10, 2003, at E1.

THE TENSION BETWEEN PRIVACY AND SECURITY: AN ANALYSIS BASED ON COASE AND PIGOU

KATHLEEN WALLMAN*

INTRODUCTION

The tensions between privacy and security are ample. Legions of writings document the intrusions that readily available technologies wreak upon privacy. Justice Scalia, in his pathbreaking opinion in *Kyllo v. United States*,[1] foresees a world in which Radio Shack supplies invasive devices for the merely curious as well as the pruriently motivated to check on neighbors, friends, and enemies.

The ways in which security demands challenge privacy rights are well documented, and, to some extent, obvious at the intuitive level. But what is more interesting is whether the United States legal system, and

* Visiting Research Professor, Georgetown University, former Deputy Assistant to the President for Economic Policy and Counsellor and Chief of Staff to the National Economic Council, Deputy Counsel to the President, Chief, Common Carrier Bureau, Deputy Chief, Cable Services Bureau, Partner, Arnold & Porter, Law Clerk to the Honorable Laurence Silberman and the Honorable Edward Tamm, U.S. Circuit Court for the District of Columbia, and the Honorable Pauline Newman, U.S. Circuit Court for the Federal Circuit. J.D., Georgetown University Law Center, M.S.F.S. Edmund A. Walsh School of Foreign Service, Georgetown University, B.A. Catholic University of America. Thanks to Steve Wallman and Elizabeth Lyle for reading drafts of this article, and to Phil Weiser for all of his help.

1. 533 U.S. 27 (2001).

the society it serves, can find and define an appropriate spot on the spectrum that maximizes the majority's privacy rights and personal security.

I suggest in this essay that the United States has found a Pareto-optimizing[2] solution to the tension between privacy and security by externalizing it to non-native American citizens and resident aliens. Worse yet, from a civil libertarian perspective, this burden of externalization falls disproportionately on parties not judged guilty or liable under the criminal laws, but are convenient "recipients" of this externalization because of their countries of origin or religion.

I. WHY IS THERE A TENSION BETWEEN PRIVACY AND SECURITY?

Jeremy Bentham postulated a horrific but effective way of controlling the behavior of incarcerated individuals: the Panopticon.[3] The concept of the Panopticon was a structure in which the incarcerated person was sheltered in a structure that allowed the prison guards to watch the incarcerated person at all times, but to do so unseen by the incarcerated person.[4] The lighting in the hypothetical structure was such that the incarcerated person was visible, always, in silhouette, to the prison guards, whose gaze upon the incarcerated person was disguised by the lighting scheme.[5] Of course, the prison guards were not at all times looking at a particular incarcerated person – but, from the perspective of the incarcerated person, the guards might be training their gaze upon him or her. Hence, the apparently constant supervisory effect was the same regardless of whether it was in fact constant, and the disciplinary effect on the incarcerated person was achieved.

The guards in Bentham's Panopticon had it easy, in a sense. They knew whom to supervise, and the number of prisoners was limited in the sense that it was less than the entire population of the country. But imagine translating this experiment to the entire United States. How? Successful translation of this experiment would require that everyone in the United States feel or believe that he or she was being watched, or might be under surveillance, at all times. Under what circumstances would this be acceptable? If the increase in perceived or actual security outweighed the cost imposed by this real or perceived intrusion on

2. A Pareto optimized or Pareto efficient outcome is one in which resource allocation choices have maximized the welfare of all actors, and none can become better off without at least one other actor becoming worse off. *See* PAUL A. SAMUELSON, ECONOMICS 460 n.12 (9th ed. 1973).

3. JEREMY BENTHAM, THE PANOPTICON WRITINGS (Miran Bozovic ed., Version 1995) (1787).

4. *Id.*

5. *Id.*

privacy, this bargain might be acceptable. Alternatively, it might be acceptable if Americans believed that the tax on privacy imposed by increased security, while evenly levied across the population, was being disproportionately collected from people who "deserved" this additional tax. That is, while everyone pays the tax by accepting surveillance, most people regard their own payment as trivial in terms of the practical restrictions upon their activities and freedom. But they believe that others will regard the restrictions as substantial, not trivial. Thus, the tax payment collected from these other people is disproportionately dear to them. In the context of this analogy, law enforcement and national security authorities function as the tax collectors.

II. WHAT IS PRIVATE?

This question is relevant because it helps establish how difficult or easy it is to impose a tax on privacy. If the boundaries of the privacy right are fluid and shrinking because of technological advances and uncertainties about how the courts will treat them, as argued here, then the tax is easier to collect. If the tax is easy to collect, that is, the tax collectors' transaction costs are low, the tax collectors can behave more decisively or even aggressively in their collection efforts. This may have implications for choices about the preferred mechanism for striking the balance between privacy and security: a government imposed tax, as might be advocated by Pigou, or a private bargaining solution, as might be advocated by Coase.

The suite of privacy protections at work in the United States is composed of both practical and legal protections. The legal sources are well known and well tested, although technology pushes the boundaries of this protection in notable ways in the jurisprudence. Although the word "privacy" appears nowhere in the Constitution, several amendments to the Constitution are commonly understood and interpreted to protect privacy. The Third Amendment protects privacy in the sense of prohibiting the bivouacking of troops in private homes except in wartime.[6] The Fourth Amendment protects the right of the people to be secure in their homes and effects from unreasonable searches and seizures.[7] The Fifth Amendment protects people against self-incrimination, which is a way of protecting the privacy of certain utterances.[8] The Fourteenth Amendment imports the protection of these federal protections to the citizens of the states,[9] and, most

6. U.S. CONST. amend. III.
7. U.S. CONST. amend. IV.
8. U.S. CONST. amend. V.
9. U.S. CONST. amend. XIV.

famously, in its penumbra, protects the species of the right of privacy that allows procreative freedoms.[10]

The practical protections of privacy are less well defined and shift with available technology. The most honored and hermetically sealed way of protecting privacy is not to tell anyone, and to make no record of the information for which privacy is sought. At least until means are invented to discover the thoughts in an individual's head, this method is reasonably likely to maintain privacy.

But once the information is outside the individual's own head, the gamble begins. Telling someone else a "private" fact compromises its privacy as a practical matter since that confidant may breach trust and tell others. But the extent to which privacy is compromised as a legal matter may depend crucially upon the role of the confidant. Privileges such as the physician-patient privilege and the attorney-client privilege shield disclosures in these contexts from official discovery through legal compulsion. The privilege of the confessional shields the penitent's admissions from discovery. But these privileges are heavily qualified by exceptions and, as developed below, are even more heavily qualified in the post-September 11 environment.

A written record of a private fact raises the stakes even higher. Some such written records are made at the option of the individual for whom the fact at issue is private, such as the now famous diary of former Senator Bob Packwood, or the equally famous diary of Joshua Steiner, Treasury aide during the Clinton Administration.[11] Such private writings, in both cases, became the subject of official inquiry when the "right question" popped up during the course of interviews or depositions.

Technological developments further challenge privacy. Surveillance cameras, once so novel in the United States that a special deployment of them at a Superbowl game caused controversy, are now commonplace in urban areas.[12] They have long been a fact of life in other countries such as Great Britain. Satellite photographic surveillance, once the exclusive purview of sovereign entities that could afford to launch and maintain the equipment, is now in the public domain.[13]

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10. *See, e.g.*, Roe v. Wade, 410 U.S. 113 (1973); Planned Parenthood v. Casey, 505 U.S. 833 (1992).

11. Linton Weeks, *Scandal May Mean the End of White House Diaries*, THE WASHINGTON POST, .March 4, 1998, at D01.

12. JOHN D. WOODWARD, SUPER BOWL SURVEILLANCE: FACING UP TO BIOMETRICS (Rand Arroyo Center, IP-209, 2001), *available at* http://www.rand.org/publications/IP/IP209/ IP209.pdf.

13. For example, visit TerraServer's website to insert your home address and see historical satellite photographs of your house and neighborhood. TERRA SERVER, *at* http:www.terraserver.com (last visited March 13, 2005).

Biometrics, including fingerprints, face recognition, and retinal scans, suggest ways that uniquely identifying information about individuals could be captured and used later to identify the individuals.[14] Problems abound, however, in deploying this system. First, how should the compilers of the database collect the information when not everyone of interest will be a willing contributor of information? Second, once the information is collected, say, at ports of entry or in consular offices abroad, to which database should the information be compared? There currently exist databases such as the National Crime Information Center's database, but there is no comprehensive public safety and national security database reference against which collected biometric information can be compared.

Nanotechnology is a futuristic challenge to privacy that is fast racing toward the present. Current deployments of nanotechnology involve implantation of microscopic radio frequency identification tags that can be read from short distances by receivers.[15] They are useful in inventory management, for example. But the future uses are suggestive of truly troubling challenges to privacy. Radio Frequency Identification (RFID) tags implanted in clothing, wallet cards or under the skin might verify an individual's presence at an airport, or a library, or a church. Its one current, significant limitation is that the power level of the chip is quite low so as not to interfere with other RF devices. If this limitation is eventually overcome so that RFID tags have long-range locational capabilities, "where are you?" may become a question that no one ever has to ask again.

These tools are cause for discomfort for everyone subject to the modern Panopticon because it diminishes the possibility of hiding from the Panopticon or preserving a perception, however illusory, of personal privacy. But the cost of this sacrifice is hard to quantify, while the touted benefits of increased security seem hard for many people to overvalue.

III. WHAT IS SECURE?

It is difficult to place a value on security for purposes of evaluating the balance between privacy and security because security is a relative concept. Even the most confident advocate of public safety and national

14. In 2004, the United States modified its immigration arrival protocols to require visitors to provide fingerprints upon arrival in the U.S. as a prelude to requiring more comprehensive biometric identification. The program received criticism from countries such as Brazil whose citizens were subject to the fingerprinting requirement. *See U.S. Starts Fingerprint Program* (Jan. 5, 2004), http://www.cnn.com/2004/US/01/05/fingerprint.program/.

15. See Vanessa Carey Pert, Sleepwalking in a Wireless World: How Will Wi-Fi and RFID Evolve? (Apr. 27, 2004) (Masters Thesis, *available at* http://cct.georgetown.edu/thesis/VanessaPert.pdf.

security would have to concede that absolute security – an environment completely free of risk of security threats – is impossible to create in a way that is compatible with the normal business of life.

Security is essentially a measure of risk.[16] This is partly based on historical statistical information. For example, the risk of having a car crash on Labor Day weekend can be understood based on historical information. The risk of a plane crashing can be understood based on how often such an event happens per thousands of flights. Another important dimension of risk measurement is the fallout of an event occurring, even an unlikely event. The risk of an intercontinental nuclear warhead exploding in a populated part of the world is probably small, but worth applying cautionary measures to prevent because the consequences would be catastrophic.

But translating statistical risk to the individual is a more emotional and less rational process. Many people have greater fear of dying in a plane crash than in a car crash, although they are much more likely to be involved in the latter than the former. Likewise, many people fear their own involvement or a loved one's involvement in a terrorist incident than they do involvement in a car crash. The reasons for this are various, but seem mostly to have to do with the relative lack of control over things like plane flight and terrorist ambitions, in contrast to familiar everyday things like driving a car. This lack of control creates a sense of anxiety, which in turn diminishes the sense of security.[17]

Thus, the process of increasing security involves two parts. The first is to control and reduce the statistical incidence of the harmful act. The second is to decrease the sense of anxiety about those aspects of the harmful acts that might occur in the future. The contributions of Pigou and Coase suggest conceptual frameworks for the ways in which the United States has pursued this agenda.

IV. PIGOU AND COASE

In the dialectic of economic thought and literature, there is likely no more famous duo than Arthur Pigou and Ronald Coase. Pigou's work, *The Economics of Welfare*,[18] developed the concepts of public goods and externalities and made the case that government had a necessary role in

16. ROSEN, THE NAKED CROWD (2004). *See* Ch. 2, *The Psychology of Fear.*

17. For many years, the Roman Catholic Mass has included a petition, following the Lord's Prayer, that God "deliver us . . . from every evil, . . . and protect us from all anxiety. . . ." DAUGHTERS OF ST. PAUL, VATICAN II SUNDAY MISSAL MILLENNIUM EDITION 642 (2002). The connection between a felt lack of control and anxiety is not a modern neurosis.

18. ARTHUR C. PIGOU, THE ECONOMICS OF WELFARE. (Transactions Publishers 2002) (1920).

controlling the generation of negative externalities through taxes and subsidies. The theory is illustrated by environmental regulations that seek to discourage pollution by taxing the activity that produces the pollutants, along the lines of the carbon tax proposed in the Kyoto Treaty on Global Warming.

Pigou's work came under attack from various quarters, but none as decisively true in aim as from the work of Ronald Coase.[19] Coase argued and proved that there were private bargaining solutions to the problem of externalities, and that government intervention by means of taxes and subsidies was not always necessary.[20] The example of the polluting neighbor illustrates the point.[21]

Assume that a chemical factory is located next to a farm. Periodic accidents that occur in the course of normal production at the chemical factory spew harmful chemicals on the crops next door. This results in the ruin of the crops and causes financial injury to the farm and its owners. Assume that the two businesses are located in a state with minimal governmental prohibitions against chemical pollution, or at least minimal resources or inclination to enforce them – say, New Jersey. The Pigou solution to this problem would be to have the government tax the chemical factory to the point where production would decrease, and accidents in the normal course of production would decrease commensurately. Additionally, or alternatively, the operators of the chemical factory might take greater care to avoid accidents, and increase internal expenditures to that end.

Coase's solution to this problem would be to have the parties engage in private bargaining. The chemical factory operators would determine how much each additional unit of production is worth to them. The farmer would determine how much each ruined unit of crop production costs. In the zone of overlap between those two figures, a mutually beneficial deal was possible. So if each additional unit of chemical production is worth three dollars, and each bushel of ruined potatoes is worth four dollars, the farmer should be willing to pay the chemical factory operators up to four dollars to cut back production, and the chemical factory operators ought to be willing to accept something between three and four dollars to forgo producing additional units of its product. There are many caveats to the operation of this elegant and possibly utopian solution. Transaction costs must be zero, in other words, the three dollar and four dollar figures must encompass all the costs on both sides, which rarely pertains. The parties must have access

19. COASE, THE FIRM, THE MARKET, AND THE LAW (1988). See particularly Chapter Five.

20. *Id.* at 95-96.

21. *Id.* at 97-04.

to one another, apply rational bargaining skills, and have relatively equal bargaining power, at least as to the matter at hand. To witness perfect application, the government must not put its thumb on the scale in favor of either party to the possible private bargain. But it plausibly suggests that there is another way altogether for dealing with conflicts and tensions between parties: engineering government taxation as Pigou suggests, letting the affected parties strike a bargain as Coase suggests, or introducing the government as an intermediary in and enforcer of a tacit private bargain between the affected parties.

V. APPLYING PIGOU AND COASE TO THE TENSION BETWEEN PRIVACY AND SECURITY

The theories of both Pigou and Coase address the issue of controlling externalities – promoting positive ones and discouraging behavior that expands negative externalities. To the extent that the tension between privacy and security generates externalities, the approaches of Pigou and Coase may be useful in balancing that tension, or at least understanding it.

A negative externality is a spillover cost that can be pushed off to parties other than the ones generating the cost.[22] I believe that the fundamental reason that there is a tension between privacy and security is that the perceived need for security generates an externality: the perceived need for greater surveillance, and sacrifice of privacy, on someone's part, in order to increase security or perceived security. In order for people to feel more secure, people must be watched more closely in order to inhibit the likelihood of action by some people that might impinge upon security. The increase in security might be real or only perceived, but in order for either to be achieved, surveillance must increase.

But increased scrutiny and surveillance are at odds with the basic freedoms and civil liberties that are embedded in U.S. society. How will citizens become convinced that this trade off is worthwhile? I suggest that an important element of this case of self-persuasion is for a majority of the people to become convinced that the increased scrutiny will occur at no price to their personal privacy; rather, the imposition will be felt by others to whom the intrusion is justly applied.

The role of the government as tax collector is important here. While Panopticon style surveillance may be applied to all, the government can collect a heavier tax on privacy through additional

22. *See* Martyne M. Hallgren & Alan K. McAdams, *The Economic Efficiency of Internet Public Goods*, *in* INTERNET ECONOMICS 458-59 (Lee W. McNight & Joseph P. Bailey eds., 1997).

surveillance applied to some who are deserving of this additional scrutiny. It is the government's unique ability to redistribute the cost of the sacrificed privacy that makes the surveillance and attendant sacrifices generally acceptable. In this way, the government is playing a role that is to some extent, on the one hand, in line with that described by Pigou – imposing a tax to discourage a negative behavior – and, on the other hand, that conceived by Coase as an intermediary in a bargain between two groups of private actors. One group of private actors, the persons upon whom the disproportionate burden of collection falls, well may be an unwilling party to the bargain, but a party nonetheless because of the government's power to require compliance.

This is where intelligence gathering comes into play, identifying, for example, individuals (a) who have traveled to certain areas, *e.g.*, Afghanistan, (b) who have engaged in certain forms of speech, or (c) who have associated with certain types of organizations or individuals. Often the sources of intelligence are mysterious to the public, but in the current environment, doing something about a perceived threat has lately yielded situations in which the authorities have had to convey something about what concerned them. Take, for example, the numerous flights between Europe and the United States and Mexico City and the United States that were cancelled around the 2003 year-end holidays.

But the intelligence screens appear to produce results that have one theme in common: they focus on foreign nationals in the United States, or naturalized United States citizens. In both cases, the focus is cast mostly on persons from nations classified as suspect or associated with heightened risk.

The reality that this approach produces is to identify a relatively disenfranchised segment of the population to which heightened security scrutiny is applied. The cost of acquiring increased security, real or perceived, is externalized to this segment of the population.

And a majority of Americans seem relatively comfortable with this externalization. A Gallup Poll survey taken immediately after September 11, 2001, found that 58 percent of those surveyed would favor Arabs, including U.S. citizens, undergoing special, more intensive security checks at airports before boarding planes.[23]

At the same time, a more recent poll shows that Americans regard basic freedoms such as the right to privacy and the right to due process as crucial or very important – two of the very types of rights at stake in the

23. DAREN K. CARLSON, THE GALLUP ORGANIZATION, DOES FREEDOM RING IN THE AGE OF HOMELAND SECURITY? (2004), *available at* http://www.gallup.com/poll/content/ login.aspx?ci=10300 (subscription required).

increased scrutiny to which some people will have to be subject in order to make others feel secure.[24]

This analogy has limitations. Both Coase's and Pigou's analyses depend upon the existence of clear, quantifiable rights. But the right to privacy is evolving in light of law and technology, and its boundaries are fluid and shrinking in that same light. It is of different value to different individuals. The externality at issue here, unlike the ones in Coase's and Pigou's examples, are not generated in commercial transactions, which further compounds the issue of quantification. But the framework offered by both bodies of theory regarding how to deal with a cost generated by one party that falls upon another is nevertheless instructive.

VI. THE DYSTOPIAN FUTURE

One way of understanding this cognitive dissonance[25] between how much Americans value their freedom and how they are willing, at the same time, to trade others' privacy to enjoy their freedoms with more security is through the insights provided by Pigou and Coase on externalities. Although Pigou and Coase disagreed on feasible and optimal ways of handling externalities, they agreed that when transactions produced them, they could be allowed to burden those upon whom they naturally fell or reallocated. Pigou envisioned doing this by government intervention; Coase by private bargaining, at least in certain circumstances.

It is possible that the externalities created by intrusive approaches to security are subject to a combination of the approaches of Pigou and Coase. The taxation analogy that invokes Pigou's approach is inexact for the reasons acknowledged above, yet the government plays a definite and important role in determining how the burden of privacy-invasive responses to security issues will fall. Perhaps the government is partly playing the role of tax collector as envisioned in the analogy presented above, but, equally important, is also playing a role as an intermediary in a tacit and otherwise difficult to organize private bargain between a majority willing to accept tradeoffs to their privacy and a minority that is ill-positioned to complain.

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24. Eighty-nine percent of those surveyed said that the right to due process was crucial or very important to them; 91 percent said that the right to privacy was crucial or very important to them. *Id.*

25. Cognitive dissonance is defined as a "[m]otivational state produced by inconsistencies between simultaneously held cognitions or between a cognition and behavior, *e.g.*, smoking, enjoyment and believing smoking is harmful are dissonant." MEDICAL DICTIONARY, COGNITIVE DISSONANCE, *at* http://www.books.md/C/dic/ cognitivedissonance.php (last visited Mar. 13, 2005).

In this way, externalizing the cost of this seemingly enhanced privacy to a minority that is less well positioned either to ask the government to spread the costs more evenly – Pigou's solution – or to bargain its way back to parity – Coase's solution – makes it possible for Americans to place a high value on their own privacy, while accepting intrusive approaches to security problems precisely because they believe that the cost will not be theirs to bear.

CONCLUSION

It is fair to ask what this means and whether it is a problem worth addressing. At the very least, the externalizing of privacy costs to minorities is problematic, if not domestically, then certainly in terms of the United States' advocacy abroad of democratic institutions and processes. If the intended beneficiaries of democratic reforms come to understand that the occupiers of Iraq, for example, or their designated successors, will fail to enforce norms that protect minority rights and access to privileges, then the job of reform will be all the more difficult and dangerous. Privacy rights are just one example of the type of norm that the intended beneficiaries of reform might look to as a way of understanding what might be in store.

PRESERVING UNIVERSAL SERVICE IN THE AGE OF IP

KATHLEEN Q. ABERNATHY*

Thank you very much for inviting me to speak with you today. Recently, the Federal Communications Commission (FCC) has been spending a great deal of time and energy considering the best, most appropriate regulation of broadband networks and IP-enabled services.[1] Today, I want to focus on an important aspect of our discussions. Namely, what are the implications of the digital revolution for our universal service program?

The ongoing migration from traditional circuit-switched voice services to packet-switched communications services poses a number of challenges to the existing universal service regime. Some of these challenges are not new; for example, we have been considering changes to the contribution methodology (how we collect funding) and distribution rules for years.[2] But the accelerating emergence of IP-enabled services brings many of the challenges we face into sharper focus.

I will begin with some background information about the FCC's universal service support mechanism, and then discuss some of the key public policy issues affected by the migration to broadband networks and IP-enabled services.

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* This article is adapted from a speech delivered by FCC Commissioner Kathleen Q. Abernathy at the Silicon Flatirons Telecommunications Program conference on "Universal Service and E-911 Policy in an Age of Convergence" held at the University of Colorado School of Law October 21, 2004.

1. *See, e.g.*, Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities, *Notice of Proposed Rulemaking*, 17 FCC Rcd. 3019 (2002); Inquiry Concerning High-Speed Access to the Internet Over Cable & Other Facilities, *Declaratory Ruling & Notice of Proposed Rulemaking*, 17 FCC Rcd. 4798 (2002), *aff'd in part, vacated in part by* Brand X Internet Servs. v. FCC, 345 F.3d 1120 (9th Cir. 2003), *cert. granted* Nat'l Cable & Telecomm. Ass'n v. Brand X Internet Servs., 125 S. Ct. 654 (2004); IP Enabled Servs., *Notice of Proposed Rulemaking*, 19 FCC Rcd. 4863 (2004).

2. *See e.g.*, Fed.-State Joint Bd. on Universal Serv., *Report & Order & Second Notice of Proposed Rulemaking*, 17 FCC Rcd. 24,952 (2002) [hereinafter *Contribution Methodology Order*].

I. UNIVERSAL SERVICE

To start with, what exactly do policymakers mean by the phrase "universal service"? Section 254 of the Communications Act provides an answer: universal service means ensuring that high-quality telecommunications services are available at affordable rates to all Americans, including low-income consumers and those living in rural, insular, and other high-cost areas.[3] It also means that the types of services and the rates for those services should be reasonably comparable in urban and rural areas.[4]

The Telecommunications Act of 1996 was a watershed event for many reasons, one of which was that it changed the way we think about how to preserve and advance universal service. In the past, when local telephone companies enjoyed legally protected monopolies, regulators could promote universal service by setting rates in rural areas well below cost, and allowing the carriers to make up the difference by charging above-cost prices in urban areas.[5] Regulators also supported universal service by building significant subsidies into business rates and into the interstate access charges imposed on long distance carriers.[6]

The introduction of competition into local markets changed all of this. Competition meant that implicit subsidies would be eroded as new entrants undercut rates that were set well above cost, such as business rates in urban areas.[7] Accordingly, Congress directed the FCC to adopt *explicit* support mechanisms that would be sufficient to ensure that rates remain affordable and reasonably comparable throughout the nation.[8] In response to this mandate, the FCC has developed several explicit support mechanisms for carriers that provide service in high-cost areas. Collectively, these funds provide over $3.25 billion annually.[9]

The 1996 Act also expanded the scope of universal service by directing the FCC to establish support mechanisms for schools and libraries and for rural health care facilities. The schools and libraries program (often called the e-rate), provides up to $2.25 billion in annual support, and has enabled millions of school children and library patrons to gain access to advanced telecommunications and Internet services.[10]

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3. 47 U.S.C. § 254(b) (2000).
4. *Id.*
5. Qwest Corp. v. FCC, 258 F.3d 1191, 1196 (10th Cir. 2001).
6. *Id.*
7. Jim Chen, *Subsidized Rural Telephony and the Public Interest: A Case Study in Cooperative Federalism and its Pitfalls*, 2 J. ON TELECOMM. & HIGH TECH. L. 307, 318 (2003).
8. 47 U.S.C. § 254(e) (2000).
9. UNIVERSAL SERVICE ADMINISTRATIVE COMPANY, 2003 Annual Report 2 (2003), *available at* http://www.universalservice.org/download/pdf/2003AnnualReport.pdf.
10. *Id.* at 31.

The rural health care mechanism is increasingly being used to fund high-speed connections that are used to provide telemedicine services.

In addition to the high-cost support mechanisms (high-cost carriers) and the programs supporting schools, libraries, and rural health clinics, the FCC's Lifeline and LinkUp programs provide discounts off monthly service charges and connection fees to ensure that low-income consumers have access to basic telephone service.[11] Last year, these programs provided over $ 700 million in support.[12]

Shortly after Congress enacted the 1996 Act, the FCC adopted rules regarding the collection and distribution of universal service support.[13] Now, with several years of experience under our belts, we are engaged in a reexamination of many aspects of the program to ensure that each component is administered as efficiently and effectively as possible. A host of marketplace and technological developments have already prompted some course corrections, and may ultimately cause us to reassess certain fundamental policy choices made in the initial implementation period. As I mentioned earlier, the rise of Voice-over-Internet-Protocol (VoIP) and other IP-enabled services highlight and intensify the challenges confronting the program.

II. CONTRIBUTION METHODOLOGY

One of the most significant problems confronting policymakers is how to continue collecting sufficient funds for universal service without placing unreasonable burdens on the services that pay into the system. Today, the FCC determines the demand for funding under each program on a quarterly basis, and then sets a "contribution factor" that is applied to interstate telecommunications services.[14] The current contribution factor is just under nine percent.[15] Though not technically a tax, it operates in much the same way in that it is applied to all of your retail charges for interstate telecommunications services. The burden is primarily borne by the long distance carriers.[16]

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11. Lifeline and Link-Up, *Report & Order & Further Notice of Proposed Rulemaking*, 19 FCC Rcd. 8302 (2004).

12. UNIVERSAL SERVICE ADMINISTRATIVE COMPANY, *supra* note 9 at 29.

13. Fed.-State Joint Bd. on Universal Serv., *Report & Order*, 12 FCC Rcd. 8776 (1997).

14. Fed.-State Joint Bd. on Universal Serv., *Further Notice of Proposed Rulemaking & Report & Order*, 17 FCC Rcd. 3752, ¶¶ 5-7 (2002).

15. Press Release, Federal Communications Commission, Proposed Fourth Quarter 2004 Universal Service Contribution Factor (Sept. 16, 2004), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DA-04-2976A1.doc.

16. John T. Nakahata, *Regulating Information Platforms: The Challenge of Rewriting Communications Regulations From the Bottom Up*, 1 J. ON TELECOMM. & HIGH TECH. L. 95, 125 (2002).

Several trends have combined to put upward pressure on the contribution factor, and in turn, increase the funding burden on consumers. When the program first began, long distance revenues which constitute the largest category of interstate telecommunications services were on the rise. Since 1997, however, they have been flat or in decline as a result of price competition and substitution of wireless services and e-mail.[17] But because federal universal service contributions by law may be assessed only on interstate revenues, this shrinking of the revenue base has caused the contribution factor to rise steadily.[18]

Another important trend has been the increasing prevalence of bundled service plans. For years, wireless carriers have offered buckets of any-distance minutes at flat rates, and now wireline carriers are offering packages that include local and long distance for a single price. In addition, many carriers offer business customers bundles that include local and long distance voice services, Internet access, and customer premises equipment.[19] Such bundling is a boon for consumers, but it creates difficulties when it comes to isolating the revenues from interstate telecommunications services. And the problem is likely to get worse as bundling becomes more and more popular.

The rise of IP-enabled services will only intensify the pressures on the universal service contribution methodology. Some categories of Voice over Internet Protocol (VoIP) including peer-to-peer services such as Free World Dialup and Skype have already been declared to be information services.[20] Thus, because they are not statutorily defined as telecommunications services, they are not assessed universal service charges. As minutes migrate from traditional telecommunications platforms to unregulated Internet platforms, the shrinking revenue base will continue to push the contribution factor higher. The FCC has yet to classify VoIP services that are initiated over cable and DSL connections, but if these services also are classified as information services, that will greatly accelerate the migration of minutes away from the buckets that are assessed for universal service purposes.

In December 2002, the Commission adopted a number of measures to stabilize the universal service contribution factor in an effort to mitigate the growing funding burden on consumers resulting from this technological climate.[21] But we all know that more fundamental reform

17. *Contribution Methodology Order*, *supra* note 2, at ¶ 3.

18. Fed.-State Joint Bd. on Universal Serv., *Further Notice of Proposed Rulemaking & Report & Order*, 17 FCC Rcd. 3752, ¶¶ 5-12 (2002).

19. *Id.*

20. Petition for Declaratory Judgment Ruling that Pulver.com's Free World Dialup is Neither Telecommunications Nor a Telecommunications Serv., *Memorandum Opinion & Order*, 19 FCC Rcd. 3307, ¶ 9 (2004).

21. *Contribution Methodology Order*, *supra* note 2.

will be necessary to ensure the sustainability of universal service funding in the long term.

There are two primary reform options. One would be to expand the revenue assessment to cover other services, such as cable modem services and VoIP, thereby expanding the pool of contributors. However, while broadening the contribution base makes some sense, its implementation likely will be difficult for several reasons. First, the extent of the FCC's authority is subject to dispute, and the issue certainly would be litigated. Second, even assuming the FCC has authority to assess contributions on the "telecommunications" portion of information services, exercising that authority would require complex cost allocations that would be hard for regulators to monitor and burdensome for service providers. Third, it is unclear how the FCC could collect universal service contributions from VoIP providers that are located overseas, even if it wanted to do so.

In my view, the second reform concept is simpler and more straightforward: replace revenue-based charges with flat charges that would be assessed on every physical network connection to the customer or, alternatively, on every telephone number. The elegance of such an approach is that once a flat charge is imposed based on the network connection or telephone number, it no longer matters whether a particular service is interstate or intrastate, or classified as a telecommunications service or an information service. And, because the number of connections or telephone numbers is far more stable than the amount of revenues from interstate telecommunications services, the contributions would be more predictable over time. The system would be far less vulnerable to gaming, as there would be no point in misallocating revenues to some service categories instead of others. Many proponents of reform estimate that total funding demand could be met by a charge of a little more than a dollar per connection or number.[22] Like the expanded revenue methodology, moving to a system based on connections or telephone numbers would entail legal risk. But I believe the FCC may be forced to take action in 2005 because it is increasingly difficult and anachronistic to collect funds based on a single category of services when the marketplace is eroding the boundaries between the interstate and intrastate jurisdictions, and between telecommunications services and information services.

22. *Id.* at ¶ 17.

III. DISTRIBUTION OF HIGH-COST SUPPORT

In addition to reviewing the contribution methodology, the FCC also has been considering various reforms regarding the *distribution* of high-cost support. Here, too, many of the key issues are complicated by the emergence of broadband networks and IP-enabled services.

Last year, the FCC reviewed the list of services that are eligible for universal service support.[23] Currently, supported services include voice-grade local service, access to 911, access to interexchange services, and other basic local services. The key question in recent years has been whether the list should be expanded to include broadband services.

Many advocates argue that the FCC should use universal service funding to support broadband deployment. Leaving aside the questionable wisdom of this policy, and whether it would be affordable, it presents a complex legal problem in light of the way the 1996 Act is written. First, universal service support may be provided only for telecommunications services.[24] Thus, to the extent that broadband access services or IP-enabled services are deemed to be information services, they do not appear to be eligible for funding.

Second, even assuming that obstacle can be overcome, the statute does not appear to contemplate that funds will be provided *until* a service has become widely available, even if a case can be made that subsidies are needed to arrive at that point. Specifically, the statute directs the FCC to consider, among other things, whether a service has been subscribed to by a "substantial majority of residential customers," and also whether it is "essential to education, public health, or public safety."[25] The FCC concluded last year that these standards are not yet met when it comes to broadband access services, but that is just a matter of time.[26] And, of course, Congress may someday revise the standard. But even if it does not, I would not be surprised if broadband penetration increases to the point at which the existing statutory standard is satisfied. For the time being, however, universal service subsidies are unlikely to be made available to broadband providers in light of the framework set forth in section 254 of the Communications Act.

Finally, the FCC and the Federal-State Joint Board on Universal Service, which I chair, have been considering the intersection of competition and universal service in rural areas. In particular, federal and

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23. Fed.-State Joint Bd. on Universal Serv., *Recommended Decision*, 19 FCC Rcd. 10,812 (2004).

24. 47 U.S.C. § 254(c)(1) (2000).

25. *Id.*

26. Fed.-State Joint Bd. on Universal Serv., *Order & Order on Reconsideration*, 18 FCC Rcd. 15,090, ¶ 8 (2003).

state regulators have been considering the rules that should govern the ability of new competitors to become eligible to receive universal service funding.[27] Before the advent of local telephone competition in 1996, incumbent local exchange carriers (ILECs) were the only entities eligible for support. In recent years, however, many wireless carriers and a smaller number of competitive local exchange carriers (CLECs) have become eligible. In the future, I would expect that some cable operators providing VoIP similarly will seek to become eligible.

This raises a number of hard questions for policymakers. First, we need to ensure that any expanded funding is devoted to infrastructure investment, rather than simply padding the bottom line. To this end, the Federal-State Joint Board has recommended a number of minimum standards, including build-out requirements that regulators should employ in considering applications to receive support.[28] The FCC is reviewing these standards and should arrive at a decision in early 2005.

Second, the FCC and the Joint Board have been considering the appropriate basis for funding eligible carriers.[29] Currently, the largest telephone companies that qualify for the universal service fund receive support based on a forward-looking economic cost model, and smaller rural carriers receive support based on their embedded or historical costs.[30] For years, the FCC has been considering whether to harmonize the two systems, and that effort remains underway today.[31] Some advocates contend that universal service funding will spiral out of control unless all carriers, including rural carriers, receive support based on estimates of forward-looking economic costs. Otherwise, the argument goes, there is no incentive for rural carriers to become more efficient. Opponents argue that this would leave rural carriers with a shortfall that would dramatically drive up rural telephone rates and undermine universal service. The Joint Board is considering comments and will recommend a decision some time in 2005.[32]

A related issue concerns the basis of support for competitive carriers. Currently, competitors such as wireless carriers receive support

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27. *See, e.g.*, Fed.-State Joint Bd. on Universal Serv., *Recommended Decision*, 19 FCC Rcd. 10,812, ¶¶ 26-28 (2004).

28. Fed.-State Joint Bd. on Universal Serv., *Recommended Decision*, 19 FCC Rcd. 4257, ¶ 24 (2004).

29. Fed.-State Joint Bd. on Universal Serv., *Order*, 19 FCC Rcd. 11,538 (2004).

30. Fed.-State Join Bd. on Universal Serv., Multi-Ass'n Group (MAG) Plan for Regulation of Interstate Serv. for Non-Price Cap Incumbent Local Exchange Carriers and Interexchange Carriers, *Fourteenth Report & Order, Twenty-Second Order on Reconsideration, & Further Notice of Proposed Rulemaking*, 16 FCC Rcd. 11,244 (2001).

31. Fed.-State Joint Bd. on Universal Serv. Seeks Comment on Certain of the Comm'n's Rules Relating to High-Cost Universal Serv. Support, *Public Notice*, 19 FCC Rcd. 16,083, ¶¶ 20-34 (2004).

32. *Id.*

in rural areas based on the ILEC's costs.[33] Rural LECs decry this "identical support" rule because it produces a windfall for wireless carrier, since their costs are often lower.[34] Wireless carriers counter that providing them with a lower amount of support than wireline carriers would produce an uneven playing field favoring incumbents, and would eliminate any incentive for incumbents to become more efficient. This debate remains underway in front of the Joint Board, and will probably be resolved in tandem with the question of how to harmonize the separate mechanisms for larger and smaller carriers.

Finally, the FCC is considering the appropriate scope of support in areas with competition.[35] Currently, the rules do not limit how many carriers may receive support in high-cost areas, nor the number of supported connections each provides to a customer.[36] For example, it is possible that the universal service fund will be used to subsidize two wireline connections and four wireless connections, all for a single household. Many have argued, myself included, that this unconstrained approach could eventually bankrupt the system and, just as importantly, goes well beyond the statutory goal of ensuring that all consumers are connected to the network.[37] Defenders of the status quo argue that limiting federal subsidy support to a single connection per customer would undermine investment in rural areas, leave rural customers with fewer choices, and would be difficult to manage from administratively.[38]

These criticisms have some force, but I believe that regulators must find some way to constrain the growth of the fund and to rein in the flow of subsidies. As new wireless and IP technologies drive down the cost of serving rural areas, our goal should be to reduce reliance on subsidies, rather than to expand the flow of dollars exponentially. This will require some hard choices and political compromises, but it is a challenge we will have to confront to prevent the universal service system from collapsing under its own weight.

There is no question that our universal service system has been, and continues to be a critical component of U.S. telecom success. The question we must ask ourselves today is where do we go from here? How do we update the rules and the distribution mechanisms to keep pace with the ever-changing technologies used for communications?

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33. *Id.* at ¶¶ 35-37.

34. *Id.*

35. Fed.-State Joint Bd. on Universal Serv., *Notice of Proposed Rulemaking*, 19 FCC Rcd. 10,800 (2004).

36. Fed.-State Joint Bd. on Universal Serv., *Recommended Decision*, 19 FCC Rcd. 4257, ¶ 58 (2004).

37. *Id.* at ¶¶ 62-71.

38. Fed.-State Joint Bd. on Universal Serv., *Notice of Proposed Rulemaking*, 19 FCC Rcd. 10,800, ¶ 116 (2004).

EMERGING COMMUNICATIONS TECHNOLOGIES:

WIRELESS DEVELOPMENTS AND BEYOND

JENNIFER A. MANNER*

It is a very exciting time to be in the telecommunications industry as we are seeing the development of many new emerging technologies, including several that have the potential to deliver a third competitive broadband service to the home. While technological innovation must come from industry, I believe that regulators must ensure that the Federal Communications Commission (FCC) adopts and implements rules and policies that provide a framework that allows that to happen or, at the very least, does not provide disincentives to innovation. As demonstrated by many of the FCC's most recent wireless items, I believe that such regulatory restraint is necessary in order to allow the competitive marketplace to foster technological innovations. Accordingly, the FCC must place its faith in the competitive marketplace, and where it has the discretion, refrain from regulation.

As counsel to FCC Commissioner Kathleen Abernathy, I am keenly interested in the development of new technologies for a number of reasons. First, one of the Commissioner's central objectives is to facilitate the deployment of broadband services to all Americans. Second, Commissioner Abernathy and I fundamentally believe that the FCC can best promote consumer welfare by relying on market forces, rather than heavy-handed regulation. The development of many of the technologies that are being considered today, such as broadband over powerline and WiFi networks will serve both of these key goals. These services will not only bring broadband to previously un-served communities, but the introduction of a new broadband pipeline into the home will foster the kind of competitive marketplace that will eventually enable the Commission to let go of its regulatory reins. Consumers

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* This article is adapted from a speech given by Jennifer Manner at the Silicon Flatirons Telecommunications Program conference on "Emerging Communications Technologies: Wireless and Beyond" held at the University of Colorado Law School October 28, 2003. At the time of the speech, Ms. Manner served as Senior Counsel to FCC Commissioner Kathleen Q. Abernathy. Ms. Manner is currently the Vice President of Regulatory Affairs at Mobile Satellite Ventures, LP.

should have a choice of multiple, facilities-based providers, including not only cable and DSL, but also powerline, wireless, and satellite services. Such a robustly competitive and diversified marketplace is something we should aim for.

In order to achieve the long-term objective of a robustly competitive marketplace that is free of regulatory distortions, the FCC must engage in regulatory restraint. It is tempting for regulators to take every new technology or service that comes along and apply the same rules that govern incumbent services. After all, regulatory parity and a level playing field are intuitively appealing concepts. But it would be a huge mistake to carry forward legacy regulations whenever new technology platforms are established. Many of our regulations are premised on the *absence* of competition, and when that rationale is eroded, we must not reflexively hold on to regulations that no longer serve their intended purpose and in some cases, actually stifle the development of new services. That is why I also believe that it is necessary for the FCC to regularly review its regulations to see whether changes are necessary in light of evolving technology and other considerations.

I. THE NASCENT SERVICES DOCTRINE

This policy of restraint is something that has been described as the Nascent Services Doctrine.[1] By avoiding the imposition of anachronistic regulations, regulators can best allow new technologies and services to flourish. Once facilities-based competition has taken root, regulators can begin to dismantle legacy regulatory regimes, rather than extend those regimes to include the new platforms. This is not a matter of picking winners and losers; it is about creating an environment conducive to investment in new infrastructure. New platform providers create competition and innovation that ultimately benefits consumers far more than prescriptive regulation. In essence, short-term regulatory disparities are tolerated in order to generate long-term facilities-based competition.

Incubating new technologies and platforms helps establish new facilities-based competitors, and the increased competition ultimately delivers benefits to consumers, including lower prices, better service quality, more innovation, and more choice. Regulatory restraint is a necessary part of fostering such competition, because there is little doubt that overregulation can do substantial damage to nascent technologies and platforms. As the recent turbulence in the capital markets has shown, companies take enormous risks when they invest heavily in

1. *See* Kathleen Q. Abernathy, Remarks Before the Federal Communications Bar Association New York Chapter (July 11, 2002) *at* http://www.fcc.gov/Speeches/Abernathy/2002/spkqa217.pdf.

communications networks — such as the broadband networks being built today. To avoid creating disincentives to investment, beyond those risks that are inherent in the marketplace, we must resist the reflexive tendency to apply legacy regulations to new platforms.

Regulatory parity is an important *long-term* goal, because applying different regulations to providers in a single market inevitably causes marketplace distortions and leads to inefficient investment. As a *short-term* policy, however, accepting some degree of disparity is not only tolerable, it is essential. For example, when the Direct Broadcast Satellite (DBS) platform was created, it was appropriately exempted from most of the legacy regulations imposed on cable operators.[2] This regulatory restraint allowed those nascent platforms to develop into effective competitors. Today, as electric utilities, wireless carriers, and satellite operators strive to bring new broadband platforms to the market, it will be equally important to avoid stifling these nascent platforms with the heavy-handed broadband regulations associated with the wireline telecom platform.

There are two distinct applications of this doctrine. First, it applies to *nascent technologies*, which appear in the market without any clear sense of the services they will ultimately support or the markets in which they will ultimately compete. Second, it applies to *nascent platforms*, which Commissioner Abernathy and I think of as new competitors to incumbents in already-defined markets. Ultra-wideband is an example of a nascent technology. We do not know precisely how this technology will be used, but we do know that it has tremendous potential and we should approach it in a restrained manner. Broadband over Powerline (BPL) is the quintessential example of a nascent platform. There is little question that BPL services will compete with more-established cable modem and DSL services and in some markets, satellite and fixed wireless services.[3]

The FCC has a pretty good track record of adhering to these principles. When wireless voice services were first developed, the Commission refrained from imposing common carrier price and service-quality regulations, despite many calls to do so in order to establish parity with wireline regulation.[4] Similarly, the Commission generally took a hands-off approach to DBS services as they emerged as competitors to

2. *See* Nat'l Ass'n of Broadcasters v. FCC, 740 F.2d 1190, 1195 (D.C. Cir. 1984).

3. *See* Carrier Current Systems, including Broadband over Power Line Systems; Amendment of Part 15 regarding new requirements and measurement guidelines for Access Broadband over Power Line Systems, *Notice of Proposed Rulemaking*, 19 FCC Rcd. 3335 (2004).

4. *See* 47 U.S.C. § 332(c)(1) (2000); *see also* Implementation of Sections 3(n) & 332 of the Communications Act, Regulatory Treatment of Mobile Services, *Second Report & Order*, 9 FCC Rcd. 1411, ¶¶ 124-219 (1994).

cable in the Multi-channel Video Programming Distributor's (MVPD) market.[5]

Of course, the interest in nurturing nascent platforms cannot justify preserving regulatory disparities forever. While the Nascent Services Doctrine calls for tolerating short-term disparities, it also recognizes that the *benefit* of such disparities is that they provide the impetus to reconsider the appropriateness of our regulation of incumbent providers. If we succeed in spurring investment in new platforms — and robust facilities-based competition takes hold — we can then begin to dismantle regulations imposed on incumbent providers and replace them with more appropriate rules. In this way, the Nascent Services Doctrine provides a laboratory to assess the necessity of our regulatory intervention on the incumbent provider when compared with its nascent competitor. In contrast, if we were to extend legacy regulations immediately in a reflexive drive toward symmetry, that would assume the ongoing need for the underlying regulation and never allow us to assess deregulation in the real world. Indeed, reflexive symmetry actually institutionalizes the legacy regulation by imposing it on more providers across all platforms, ultimately making it all the more difficult to remove regulations from the books even after they have outlived their usefulness. The Nascent Services Doctrine places the burden on the regulator to re-institutionalize the regulations after a new competitor has established itself in the marketplace.

We are seeing this process unfold right now as we review the rules applied to wireline broadband services offered by incumbent local exchange carriers (LECs).[6] The emergence of cable operators as the leading providers of mass market broadband services makes clear that applying more stringent regulations to wireline providers at a minimum must be reconsidered. As other platforms, including BPL and wireless, become more widely available, that will further undermine the justification for regulating incumbent LECs' broadband services as if they were the only available offerings. When the Commission completes this rulemaking, I expect that we will eliminate many existing rules and substantially modify others; the central question is the degree of regulation that will remain during the transition to a more robustly competitive market.

Finally, it is important to recognize that although the emergence of new platforms like WiFi will eliminate the need for many *competition-related* regulations, *other* types of regulation may well remain necessary.

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5. *See* Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming, *Third Annual Report*, 12 FCC Rcd. 4358, ¶ 4 (1997).

6. *See* Appropriate Framework for Broadband Access to the Internet over Wireline Facilities, *Notice of Proposed Rulemaking*, 17 FCC Rcd. 3019 (2002).

For example, the FCC must implement public policy goals unrelated to competition, or even at odds with competition. Universal service and access for persons with disabilities are examples of this kind of regulation. These public policy goals generally should be applied to *all* service providers, to the extent permitted by the Communications Act. The FCC also must intervene to prevent competitors from imposing externalities on one another and to protect consumers where market failures are identified. Although, as I have noted, the Commission was right to refrain from imposing heavy-handed price and service-quality regulations on PCS services when they were originally introduced, it was also right to adopt strict interference rules to prevent competitors from externalizing their costs.[7] The same principle will apply to BPL. The key point is that, while some degree of regulation is both inevitable and desirable, we should ensure that it is narrowly tailored to the particular governmental interests at stake.

II. NEXT STEPS

I believe that there are three primary tasks that the FCC should focus on.

First, the Commission should continue to promote the development of additional broadband platforms. While the growth in cable modem and DSL subscribership is encouraging, consumers will benefit most if other facilities-based providers enter the market. Economists agree that duopoly conditions generally are not sufficient to ensure the benefits associated with a robustly competitive marketplace including choice, a high degree of innovation, improved services, and lower prices.[8] The emergence of new broadband platforms will enable the Commission to minimize regulation in this arena, and thus fulfill Congress's goal of developing a pro-competitive, deregulatory framework.

That is why I am very excited by the proceeding the Commission launched on powerline broadband systems.[9] As many have noted, nearly every consumer has electric power and in the not-so-distant future may be able to obtain broadband service through ordinary power outlets. The Commission should expeditiously resolve any signal interference issues that arise and ensure that we have removed regulatory obstacles to the deployment of this exciting new service.

By the same token, the Commission is striving to facilitate the development of broadband platforms via wireless technologies. In

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7. *See* Revision of the Commission's Rules Regarding Ultrawideband Systems, *First Report &Order*, 17 FCC Rcd 7435, 7491 (2002). *See also* 47 C.F.R. § 24.3 (2004).

8. RICHARD POSNER, ANTITRUST LAW 307 (2d ed. 2001).

9. Carrier Current Systems, including Broadband over Power Line Systems, *Notice of Inquiry*, 18 FCC Rcd. 8498 (2003).

November, in cooperation with National Telecommunications and Information Administration (NTIA), the FCC allocated 90 Megahertz of spectrum for 3G services, and is working on licensing and service rules.[10] In addition, the deployment of WiFi systems in the 2.4 Gigahertz unlicensed bands has been rightly hailed as a tremendously promising development. Thus far, WiFi systems complement, rather than compete with, last mile technologies. But experiments underway demonstrate that the next generation of WiFi systems may have much greater range, and eventually may serve as a last-mile replacement. I strongly support the Commission's plan to make 250 Megahertz of additional unlicensed spectrum available in the 5 Gigahertz bands. I also support granting providers flexibility to provide new services in existing bands, such as the ITFS and MMDS bands, and developing secondary markets so that consumers more rapidly will get the benefits of the explosion of innovation that is underway.

Satellite operators also are striving to be part of the broadband future. To date, satellite broadband providers have lagged far behind cable operators and wireline providers in most markets. But some companies and joint ventures are preparing to launch a new generation of satellites that will be capable of providing more robust broadband services, and such offerings might be particularly attractive in rural areas. I also believe that the Order adopted last week reforming the satellite licensing process will eventually help speed the delivery of new services to consumers.[11]

A second area of focus for the Commission is clarifying the regulatory framework that governs the provision of broadband services. In the *Triennial Review* proceeding, the FCC decided how to regulate the wireline *facilities* that are used to provide broadband; now it must complete its review of the statutory classification of broadband *services* and the appropriate regulatory requirements.[12] The Commission is likely to adopt orders this summer in the *Wireline Broadband* and *Cable Modem* proceedings.[13] These proceedings should determine which services fall under Title I and which fall under Title II. The Commission also should address the extent to which regulations are necessary to prevent cable operators and incumbent LECs from

10. Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands, *Report & Order*, 18 FCC Rcd. 25,162, 25,165 (2003).

11. Amendment of the Comm'n's Space Station Licensing Rules & Policies, *First Report & Order & Further Notice of Proposed Rulemaking*, 18 FCC Rcd. 10,760 (2003).

12. Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, *Report & Order & Order on Remand & Notice of Proposed Rulemaking*, 18 FCC Rcd. 16,978 (2003).

13. *See* Inquiry Concerning High-Speed Access to the Internet over Cable and Other Facilities, *Declaratory Ruling & Notice of Proposed Rulemaking*, 17 FCC Rcd. 4798 (2002).

discriminating against unaffiliated Internet service providers (ISPs) or content providers, as well as questions about whether and how broadband service providers should contribute to universal service.

Finally, apart from unbundling rules and our regulatory framework for broadband services, the Commission should remain vigilant in its efforts to remove any *other* regulatory impediments to broadband deployment. For example, service providers have argued that right-of-way regulation can be a significant barrier to entry.[14] Carriers and cable operators assert that some municipalities have subjected them to long processing delays and overly burdensome application processes, and some have charged excessive fees. The Commission held a right-of-way forum last year to bring stakeholders together and encourage cooperative solutions.[15] National Association of Regulatory Utility Commissioners (NARUC) also has been active on this front, and Nancy Victory has shown great leadership at NTIA, both in her initiation of a comprehensive review of right-of-way management on *federal* lands and in her attempts to bring state and local officials together to develop best practices.[16]

In sum, I believe it is imperative that the FCC continue to create a market-based regulatory regime so that innovators will be able to provide the services that consumers demand. To do so, the FCC, as a regulator, needs to continue down this path of letting go and having faith in the marketplace as it drafts its rules and policies. Such faith requires the Commission to refrain from regulating where the market can do a better job and afford sufficient flexibility to its licensees to allow innovation. In the long run, this approach will best serve the public interest by getting out to consumers the largest selection of technologies and services.

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14. *See, e.g.*, Comments of the Nat'l Ass'n of Telecomms. Officers & Advisors & the Alliance for Cmty. Media at i, Annual Assessment of the Status of Competition in the Mkt. for the Delivery of Video Programming, *Notice of Inquiry*, FCC MM Dkt. No. 04-227 (filed July 23, 2004), *available at* http://www.natoa.org/public/articles/NATOA_Comments_No._04-227_(04-23-04).pdf.

15. *See* Commission Public Forum on Rights-of-Way Issues to be Held on October 16, 2002, *Public Notice*, DA 02-1832 (rel. July 29, 2002).

16. *Id.*

DIGITAL CONTENT PROTECTION AND FAIR USE: WHAT'S THE USE?

BEN FERNANDEZ*

ABSTRACT

It was October of 2010, on a Saturday afternoon. Tom and Kelly sat down and ordered a recently released blockbuster smash hit from their digital cable television pay-per-view system. Halfway through the movie, Tom's text-enabled wireless phone alerted him of a problem at his office. "Looks like they're going to need me at work for a few hours. I'm really sorry. I've got to go. How about we record this on our PVR[1] and watch it together later?"

"No, Tom, we can't do that. This is one of those 'copy never' movies, remember? It's either watch it now, or pay for it all over again later."

"What a rip off! Well, let's just hook up our old VCR. It won't be as crisp as the digital PVR, but at least we'll get something for our money."

"I hate to tell you this, Tom, but our VCR won't work either. I tried the other day, but the television won't allow 'copy never' digital programs to travel out of unprotected analog outputs. Looks like we just threw away our ten dollars."

* Ben graduated from the University of Colorado School of Law in May 2004, and currently works as an associate in the Intellectual Property group at the law firm of Faegre & Benson, LLP. The author would like to thank Andy Johnson and Phil Weiser for their insightful comments on various drafts of this paper.

1. PVR means personal video recorder.

INTRODUCTION

Along with the transition from analog content distribution to digital content distribution comes a transition in the fair use doctrine of copyright law. As Tom experienced in the above example, many consumers of analog content have grown accustomed to having certain uses of content characterized as "fair uses." But these "fair uses" of *analog* content should not and will not take root in the world of *digital* content

access control, because digital content owners, rather than consumers, will have the ability to decide who makes copies and when.

Put simply, in today's world, Tom can record a program with his VCR because (a) the VCR is technically able to do so, (b) there is no way for the program's copyright owner to know if Tom records it, and (c) the program's copyright owner would encounter prohibitively high transaction costs to enforce its copyright against each program recorder. For these reasons, the law has granted Tom the right to make a recording. Due to such economic and practical effects, even if the copyright owner sued Tom, courts would likely find fair use (or noninfringement).

In the world of 2010, however, Tom cannot record the program because all three factors have changed: (a) the manufacturer of his receiving device built it so that it cannot physically record "copy never" content, (b) content protected with digital rights management reveals to its owner exactly who is using it, and (c) copyright enforcement is as simple as maintaining a usage rights database. Furthermore, the copyright owner would have no need to sue Tom because Tom (unless he is an electronics/computer expert) cannot figure out how to make his electronics "break the rules." As soon as the latest "crack"[2] for each digital content output trickles down to ordinary users, the content provider disables the particular output or fixes the protection technology.

The possible architectures of digital content distribution are changing the face of copyright law, specifically fair use. Ironically, both Congress and the Federal Communications Commission (FCC)[3] continue to tell themselves that their efforts to regulate a transition from analog to digital have no impact on fair use. In enacting the Digital Millennium Copyright Act (DMCA), Congress stated, "Nothing in this section shall affect rights, remedies, limitations, or defenses to copyright infringement, including fair use . . . ."[4] In its recent decision to mandate "plug and play" compatibility between consumer electronics devices and the cable system, including "encoding rules," the FCC stated: "Our decision herein is not intended in any way to change or affect existing

2. To "crack" means to "copy commercial software illegally by breaking (cracking) the various copy-protection and registration techniques being used." *What is crack?*, WEBOPEDIA.COM, *at* http://www.webopedia.com/TERM/c/crack.html (last modified Oct. 21, 2002).

3. The FCC "is an independent United States government agency, directly responsible to Congress. The FCC was established by the Communications Act of 1934 and is charged with regulating interstate and international communications by radio, television, wire, satellite and cable." *About the FCC*, FEDERAL COMMUNICATIONS COMMISSION, *at* http://www.fcc.gov/aboutus.html (last updated Sept. 14, 2004).

4. 17 U.S.C. § 1201(c)(1) (2004).

copyright law."[5] Finally, in its recent decision regarding a broadcast flag for broadcast digital content, the FCC again stated: "Furthermore, the scope of our decision does not reach existing copyright law. . . . [T]he underlying rights and remedies available to copyright holders remain unchanged."[6]

These important statements seek to pre-empt a major upheaval in copyright law, but they have no relevant impact on their accompanying laws. Although technically true, these statements mislead. The statements signal a departure from traditional fair use thinking in an age of digital content. They tell only half of the story. Here is the other half: although these new digital rules do not change existing fair use defenses, consumers will have neither the ability nor the need to invoke such defenses because the decision about when, where, and how copies may be made will rest solely with the copyright owner.

This paper will explain why the analog fair use rubric need not and should not be applied to the digital content distribution arena. A consumer who cannot copy digitally protected content cannot invoke a fair use defense based on consumer copying. Economic models of fair use and consumer copying fail to bridge the gap between traditional analog content and digitally protected future content. A content owner's ability to apply near-perfect control to digital content, through Digital Rights Management (DRM)[7] or encoding rules, changes the very nature of the content goods. The market for digitally locked goods will no longer need a fair use doctrine, because the market failures and high transaction costs associated with non-protected content will disappear.

Section I will introduce copyright law, explain the different rights traditionally associated with the fair use doctrine, and set forth the economic rationale for allowing a fair use exception. Section II will describe the different ways digital content is protected through law and technology and will summarize the FCC's encoding and broadcast flag rules. Section III will examine how, under DRM or encoding rules protection, the "uses" of digital content both resemble and differ from "fair uses" of analog content. Section V will conclude that the high level of control permitted by DRM and encoding technologies eliminates the need for as broad a fair use exception as is found in the current regime.

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5. Implementation of § 304 of the Telecomms. Act of 1996, *Second Report & Order & Second Further Notice of Proposed Rulemaking*, 18 FCC Rcd. 20,885, ¶ 9 (2003) [hereinafter *Plug & Play Decision*].

6. Digital Broadcast Content Protection, *Report & Order & Further Notice of Proposed Rulemaking*, 18 FCC Rcd. 23,550, ¶ 9 (2003) [hereinafter *Broadcast Flag Decision*].

7. *See infra* Part II.B.

I. BACKGROUND OF THE FAIR USE DOCTRINE

An understanding of the fair use doctrine requires an understanding of the basic tenets of copyright law. After introducing copyright law in general, this section will elaborate on the first sale doctrine as well as some rights traditionally associated with fair use, such as: time-shifting, space-shifting, educational use, and critical use. The analysis does not describe every fair use, but only those most relevant to a discussion of digital content distribution. Finally, this section will present economic theories that justify the current fair use doctrine.

A. Introduction to Copyright Law

Copyright vests as soon as an author fixes a particular idea into a tangible medium of expression; therefore, it vests in a writer upon putting pen to paper, a singer upon writing the song, a filmmaker upon capturing the subject on film, and a photographer upon taking a picture.[8] Registering the copyright with the U.S. Copyright Office may occur later, but is not required; an author owns a copyright without ever registering it.[9] To be copyrighted, a work must "possess[] at least some minimal degree of creativity. . . . the requisite level of creativity is extremely low; even a slight amount will suffice."[10]

Pursuant to its constitutional mandate,[11] Congress promotes creativity by granting an author an exclusive right over his work for a limited time after which the public may freely use the work.[12] A copyright owner has six exclusive rights: the right to make copies,[13] the right to make derivative works,[14] the right to distribute copies to the public,[15] the right to publicly perform the work,[16] the right to publicly display the work,[17] and the right to send a copyrighted song through a digital audio transmission.[18]

If anyone but the copyright owner exercises one of the six exclusive rights, that person infringes the copyright.[19] Copyright owners can sue the infringers to obtain an injunction,[20] monetary damages, profits, and

8. *See* 17 U.S.C. §§ 102, 201(a).
9. *Id.* § 408(a).
10. Feist Publ'ns, Inc. v. Rural Tel. Serv. Co., 499 U.S. 340, 345 (1991).
11. *See* U.S. CONST. art. I, § 8, cl. 8.
12. *See* 17 U.S.C. § 302(a).
13. *Id.* § 106(1).
14. *Id.* § 106(2).
15. *Id.* § 106(3).
16. *Id.* § 106(4).
17. *Id.* § 106(5).
18. 17 U.S.C. § 106(6).
19. *Id.* § 501(a).
20. *Id.* § 502.

sometimes even statutory damages and attorneys' fees.[21] To win a copyright infringement action, the copyright owner must prove that: (a) it owns the copyright to the work, (b) the work is original, (c) the alleged infringer has copied the work, and (d) a "substantial degree of similarity [exists] between the two works."[22]

Although the Copyright Act of 1976 only explicitly places liability with direct infringers, courts have recognized liability of both contributory infringers and vicarious infringers.[23] To prove contributory infringement, a copyright owner must show that the defendant, "with knowledge of the infringing activity, induces, causes or materially contributes to the infringing conduct of another."[24] To prove vicarious liability, a copyright owner must show that the defendant is responsible for the infringer's infringement under a theory of respondeat superior, where the "defendant 'has the right and ability to supervise the infringing activity and also has a direct financial interest in such activities.' "[25] These two indirect theories of liability have become more important in digital distribution industries due to the difficulty of pursuing individual direct infringers. The U.S. Court of Appeals for the Ninth Circuit (Ninth Circuit) found Napster liable under these two theories of indirect copyright infringement.[26]

Copyright law permits these causes of action. But due to the sometimes harsh application of copyright law, the equitable doctrine of fair use emerged in the common law.

B. Explanation of Selected Fair Use and First Sale Rights

"From its beginning, the law of copyright has developed in response to significant changes in technology."[27] For instance, in 1908 the U.S. Supreme Court held that copying copyrighted music onto player piano rolls did not violate the copyright in the music itself.[28] The next year, Congress passed the Copyright Act of 1909, which set up a license requirement for copying music onto player piano rolls.[29] And so the

21. *Id.* §§ 504, 505.

22. Selle v. Gibb, 741 F.2d 896, 900 (7th Cir. 1984).

23. Fonovisa, Inc. v. Cherry Auction, Inc., 76 F.3d 259, 261 (9th Cir. 1996).

24. A&M Records, Inc. v. Napster, Inc., 239 F.3d 1004, 1019 (9th Cir. 2001) (quoting Gershwin Publ'g Corp. v. Columbia Artists Mgmt., Inc., 443 F.2d 1159, 1162 (2d Cir. 1971)).

25. *Id.* at 1022 (quoting *Fonovisa, Inc.*, 76 F.3d at 262 (quoting *Gershwin Publ'g Corp.*, 443 F.2d at 1162)).

26. *Id.* at 1022, 1024.

27. Sony Corp. of Am. v. Universal City Studios, Inc., 464 U.S. 417, 430 (1984).

28. White-Smith Music Publ'g Co. v. Apollo Co., 209 U.S. 1, 18 (1908).

29. Adriel Bettelheim, *Hill Contemplates Copyrights: Does Innovation Trump Piracy?*, 60 CQ WEEKLY 894, 896 (2002).

cycle goes: with each new technological breakthrough, Congress and the courts struggle to extend old copyright law to new uses of content.

Judges originally created the fair use doctrine at common law, and Congress attempted to codify it in 1976. When a copyright owner sues an alleged infringer for copyright infringement, the alleged infringer can assert fair use as an affirmative defense.[30] If the court finds fair use, then the infringer is not liable for infringement.[31] The statute delineates four factors for courts to use in considering whether a particular use is fair use:

> (1) the purpose and character of the use, including whether such use is of a commercial nature or is for nonprofit educational purposes;
>
> (2) the nature of the copyrighted work;
>
> (3) the amount and substantiality of the portion used in relation to the copyrighted work as a whole; and
>
> (4) the effect of the use upon the potential market for or value of the copyrighted work.[32]

However, fair use "is an equitable rule of reason, no generally applicable definition is possible, and each case raising the question must be decided on its own facts."[33] The factors, "though in no case definitive or determinative, provide some gauge for balancing the equities."[34] This section will next look at selected applications of the fair use doctrine to consumer copying.

1. Time-Shifting

In one of the cases most relevant to this paper, the U.S. Supreme Court decided in *Sony Corporation of America v. Universal City Studios, Inc.*[35] that home time-shifting (whether authorized or unauthorized) of television programs constituted fair use.[36] "Time shifting" refers to "the practice of recording a program to view it once at a later time, and thereafter erasing it."[37] In that case, Universal Studios, the owner of a large percentage of copyrights covering television content,

30. *See* 17 U.S.C. § 107.
31. *See id.*
32. *Id.*
33. H.R. REP. NO. 94-1476, at 65 (1976).
34. *Id.*
35. 464 U.S. 417 (1984).
36. *See id.* at 454-55.
37. *Id.* at 423.

sued Sony, the manufacturer of the Betamax video tape recorder, alleging contributory infringement.[38]

The Court recognized that when the statute is silent about new uses of copyrighted content, it must weigh the incentive for authors to create against the benefit of augmenting the public domain. In that case, the Court adopted the following test: "[t]he sale of copying equipment, like the sale of other articles of commerce, does not constitute contributory infringement if the product is widely used for legitimate, unobjectionable purposes. Indeed, it need merely be capable of substantial noninfringing uses."[39] In emphasizing the application of two fair use factors, the Court found that the use was private and noncommercial, and that Universal Studios failed to show how the market for its copyrighted works would be harmed by the Betamax.[40] The Court held private time-shifting to be a "substantial noninfringing use," and even found that Universal benefited from a wider television audience due to time-shifting.[41]

2. Space-Shifting

The concept of space-shifting addresses the right of a consumer to make copies of rightfully-acquired content for the sole purpose of watching or listening to the content in another physical place. For instance, a consumer space-shifts a program by recording it on his living room VCR and watching it across town on his parents' VCR. In *Recording Industry Association of America v. Diamond Multimedia Systems*,[42] the Ninth Circuit held that the Diamond Rio MP3 player did not fall under the requirements of the Audio Home Recording Act of 1992 (AHRA), and thus did not need a Serial Copy Management System.[43] How did the court's AHRA analysis relate to a copyright fair use analysis? Although the case did not technically consider a fair use defense, the court's conclusions regarding noncommercial use of digital home recording devices under the AHRA would, by analogy, lead to similar implications under the "purpose and character of the use" fair use factor of copyright law. The court looked to the statute and the legislative history of the AHRA, finding that Congress did not intend to prohibit "*noncommercial* use by a consumer of" a digital audio recording device.[44] The court introduced the concept of "space-shifting": "The Rio

38. *See id.* at 419-21.
39. *Id.* at 442.
40. *See id.* at 456.
41. *Id.* at 421, 456.
42. 180 F.3d 1072 (9th Cir. 1999).
43. *See id.* at 1075, 1081. A Serial Copy Management System "sends, receives, and acts upon information about the generation and copyright status of the files that it plays." *Id.* at 1075 (citing 17 U.S.C. § 1002(a)(2)).
44. 17 U.S.C. § 1008 (emphasis added).

merely makes copies in order to render portable, or 'space-shift,' those files that already reside on a user's hard drive. . . . Such copying is paradigmatic noncommercial personal use entirely consistent with the purposes of the Act."[45] A fair use analysis of space-shifting (especially of the "purpose and character of the use" factor) would by analogy lead to the same result: that space-shifting content remains a "noncommercial personal use."[46]

3. Educational Use

Teachers and schools that allegedly infringe a copyright have a bonus: Congress wrote the fair use statute in their favor. The first fair use factor looks at "whether such use . . . is for nonprofit educational purposes."[47] An infringing school's nonprofit status also suggests that its infringing use will not overly harm the copyright owner's market under the fourth fair use factor.[48] However, one court held that a school district's "highly organized and systematic practice of making off-the-air videotapes of plaintiffs' copyrighted works for use in later years and the making of numerous derivative copies of plaintiffs' copyrighted works does not constitute fair use under the copyright laws."[49] As with any other quasi-equitable doctrine, the doctrine of fair use has its limits.

4. Critical Use

Courts also recognize the right of reviewers and critics to quote portions of a copyrighted work. The fair use statute also characterizes criticism and comment as fair uses.[50] In many cases, such quoting meets the approval of the four factors of fair use. Although the critics make money from their reviews, the reviews tend to be creative in and of themselves and the copying is usually confined to small bits of the original. However, a reviewer who substantially quotes the most important part of a misappropriated copy of an unreleased manuscript will not be given fair use protection.[51] On the other hand, "[c]ourts have found fair use in cases where a reclusive billionaire acquired the

45. *Diamond Multimedia Sys.*, 180 F.3d at 1079.

46. *Cf. id.*; MELVILLE B. NIMMER & DAVID NIMMER, NIMMER ON COPYRIGHT § 8B.07[C][4] (2004).

47. 17 U.S.C. § 107(1).

48. *See id.* § 107(4).

49. Encyclopaedia Britannica Educ. Corp. v. Crooks, 542 F. Supp. 1156, 1185 (W.D.N.Y. 1982).

50. 17 U.S.C. § 107.

51. *See, e.g.*, Harper & Row Publishers, Inc. v. Nation Enters., 471 U.S. 539, 569 (1985).

copyrights in articles written about him and sued when a biographer sought to publish a book that borrowed from these articles."[52]

5. First Sale Doctrine

Although not legally a part of the fair use rights, the first sale doctrine works hand-in-hand with them. The first sale doctrine creates an exception to the copyright holder's exclusive right of distribution.[53] Under the first sale doctrine, a copyright owner has no further control of a particular copy once it has left her hands.[54] In other words, once a consumer buys a particular copy of a DVD, the copyright owner cannot use the exclusive right of distribution to prevent the consumer from reselling the DVD for whatever price, giving it away, or even throwing it away.[55] However, the doctrine applies only to the particular copy, not to the copyright itself; therefore, buying a DVD does not give the buyer a right to copy it and then distribute the copies.

The fair use rights of time-shifting and space-shifting, along with the first sale doctrine, remain highly relevant to a discussion of digital content distribution. The fair use rights of educational use and critical use, though not directly related to digital content distribution, provide helpful illustrations of how things will be different in the discussion below. The economic theories underlying the fair use doctrine, addressed in the next subsection, are more important than the rights themselves.

C. Economic Rationale for the Fair Use Doctrine

A discussion about the economic rationale for the fair use doctrine merits a brief mention about the deceptive precision of the fair use factors. The four statutory fair use factors may seem objective and straightforward, but are highly subjective in reality. David Nimmer informally analyzed and summarized fair use cases between 1994 (when the Supreme Court decided *Campbell v. Acuff-Rose Music, Inc.*[56]) and 2003.[57] He found that "judges who uphold fair use almost always find that three, if not four, of the factors incline in its favor; judges who deny

52. Paul Goldstein, *Fair Use in a Changing World*, 50 J. COPYRIGHT SOC'Y U.S.A. 133, 141 (2003) (citing Rosemont Enters., Inc. v. Random House, Inc., 366 F.2d 303 (2d Cir. 1966)).

53. *See* 17 U.S.C. § 109(a).

54. *See id.*

55. *See id.*

56. 510 U.S. 569 (1994) (last Supreme Court case discussing a fair use defense to copyright infringement).

57. *See* David Nimmer, *"Fairest of Them All" and Other Fairy Tales of Fair Use*, 66 LAW & CONTEMP. PROBS. 263, 267-68 (2003).

the fair use defense almost always find that three, if not four, of the factors incline against it."[58] Accordingly, Nimmer surmised that "[c]ourts tend first to make a judgment that the ultimate disposition is fair use or unfair use, and then align the four factors to fit that result as best they can,"[59] and that "the four factors fail to drive the analysis, but rather serve as convenient pegs on which to hang antecedent conclusions."[60] If the four factors fail to drive the fair use analysis, then what drives it? One answer: economic considerations.

In 1982, Wendy Gordon wrote what would become one of the definitive frameworks for discussing consumer copying and the fair use doctrine in economic terms.[61] Although written before the U.S. Supreme Court reversed the Ninth Circuit in the *Betamax* case, the article seeks to show "how a market approach can serve as a means for applying fair use to newly emerging uses of copyrighted works made possible by developing technologies."[62]

Gordon's model assumes that most copyrighted works are "public goods."[63] Public goods have two primary characteristics. First, one person's use of the good does not diminish anyone else's use of the same good; the good does not become depleted by additional users.[64] Second, anyone can use the good whether or not they paid for access.[65] Therefore, without an artificially-created right, a work of authorship would be freely distributed for the equal enjoyment of all as soon as the first copy was released, providing no return on the author's investment of creativity. Thus, the problem that Congress addresses with the copyright laws: a constitutional balance between incentivizing authors' creation and adding to the public domain. Gordon's concept of fair use comes into play precisely when this congressionally-drafted structure fails in the marketplace.

Instead of the four part fair use test codified by Congress and applied by the courts, Gordon set forth a three part test focusing on market failure. Gordon stated that courts should find fair use when: "(1) market failure is present; (2) transfer of the use to defendant is socially desirable; and (3) an award of fair use would not cause substantial injury to the incentives of the plaintiff copyright owner."[66] As the threshold

58. *Id.* at 280.
59. *Id.* at 281.
60. *Id.*
61. *See* Wendy J. Gordon, *Fair Use as Market Failure: A Structural and Economic Analysis of the Betamax Case and Its Predecessors*, 82 COLUM. L. REV. 1600 (1982).
62. *Id.* at 1601-02.
63. *Id.* at 1610.
64. *Id.* at 1610-11.
65. *Id.* at 1611.
66. *Id.* at 1614.

first factor, market failure, Gordon would require that "the possibility of consensual bargain has broken down in some way."[67] For instance, the market could suffer from huge transaction costs: either the consumer does not have the necessary resources to find and contact the content owner to negotiate a license, or the content owner does not have the resources to track down and enforce its copyright against every infringer.[68]

Even if market failure exists, the court must look to the second factor to "determine if the use is more valuable in the defendant's hands or in the hands of the copyright owner."[69] "[F]air use implies the consent of the copyright owner by looking to whether the owner would have consented under ideal market conditions."[70] Courts may have trouble with the second factor because of the difficulties associated with pinning a value on intangible rights like copyrights.[71]

Finally, even if market failure exists and the use serves society best in the hands of the defendant, courts should hesitate to find fair use if it would "cause substantial injury to the incentives of the plaintiff copyright owner."[72] This third factor ensures the maintenance of an incentive aspect of copyright law, compensates for courts' imprecision in valuing copyright rights, and assuages copyright owners that fair use will not "put them at an intolerable disadvantage" if "their injury is substantial."[73] The inquiry into substantial harm should also look at smaller infringements that might cumulatively pose a problem to the copyright owner's incentive.[74] Gordon also recognized the different implications of total market failure and "intermediate market failure," realizing that some cases may warrant additional time for market solutions to develop or for court intervention with a licensing scheme.[75]

Gordon's application of her test to the facts of the Betamax case foreshadowed the outcome of the Court's decision. Gordon remarked that "[h]ome users might well find transaction costs prohibitively high if they were required to bargain individually with copyright owners over the right to tape each desired program"[76] and that "prohibitions against home taping might be impossible to enforce."[77] Gordon also stated that if the Court resolved factors two and three in favor of the consumers (which it

67. Gordon, *supra* note 61, at 1615.
68. *See id.* at 1628-29.
69. *Id.* at 1615.
70. *Id.* at 1616.
71. *See id.* at 1631.
72. *Id.* at 1614.
73. Gordon, *supra* note 61, at 1619.
74. *See id.* at 1620.
75. *Id.* at 1618, 1621.
76. *Id.* at 1655.
77. *Id.*

did implicitly – the Court found that the use was private, noncommercial and that the time-shifting did not hurt the copyright owner and thus the advertising[78]), then it should grant fair use.[79]

More recently, another economic theorist named Raymond Shih Ray Ku has criticized Gordon's model and proposed another model.[80] Instead of Gordon's market failure theory, Ku proposes a "creative destruction" theory of fair use, adapting Schumpeter's theories.[81] Ku points out that a "funny thing happens . . . as the costs of copying approach zero. Consumers begin to invest in distribution directly."[82] Instead of paying for distribution of copies, consumers begin to pay for the equipment necessary to do so, such as computers, broadband access, and video recorders.[83] Ku therefore argues that courts should find fair use when two conditions are met: "1) the copy is made by the consumer of the work; and 2) the creative endeavor does not depend upon funding derived from the sale of copies."[84]

Applying his theory to the Betamax case, Ku points out that consumers were the ones making copies. Instead of buying the copies directly from the content broadcasters, they bought VCRs, cassette tapes, cable subscriptions and cords to make the copies themselves.[85] Also, Ku points out that the content owners' creative endeavor did not depend on selling copies of their transmissions; instead, their remuneration came from selling advertising and theater tickets.[86]

Gordon's and Ku's theories help provide a framework for determining the role that digital rights management and encoding technologies will play in assessing the need for fair use in digital content distribution. However, applying each of these theories to a highly effective content control regime highlights the lack of economic necessity for a fair use doctrine in such situations.

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78. *See* Sony Corp. of Am. v. Universal City Studios, Inc., 464 U.S. 417, 456 (1984).

79. *See* Gordon, *supra* note 61, at 1656.

80. *See* Raymond Shih Ray Ku, *Consumers and Creative Destruction: Fair Use Beyond Market Failure*, 18 BERKELEY TECH. L.J. 539 (2003).

81. *Id.* at 564. "Because copyright is largely irrelevant to the creation of music and is not necessary to ensure digital distribution, I have argued that the Internet and digital technology have creatively destroyed copyright as it pertains to the protection of music." *Id.* at 567.

82. *Id.* at 565.

83. *See id.* at 565-66.

84. *Id.* at 567-68.

85. *Id.* at 568.

86. *Id.* at 570.

II. DIGITAL RIGHTS MANAGEMENT, ENCODING RULES, AND OTHER CONTENT PROTECTION MECHANISMS

Before applying different economic theories to content control technologies, it is important to understand how those technologies work. This section will first describe one way in which the law protects content. Then, this section will give a cursory overview of how content is protected through technology: digital rights management, encoding rules, and the broadcast flag.

A. Anticircumvention and the DMCA

Congress passed the DMCA in 1998. The DMCA creates both civil[87] and criminal[88] liability for those who engage in three kinds of circumvention activities. First, the DMCA prohibits the *circumvention* of "a technological measure that effectively controls access to a [copyrighted] work."[89] Second, the DMCA prohibits the *trafficking* of technology designed to circumvent an *access control* system.[90] Finally, it also forbids the *trafficking* of technology designed to circumvent a *copy control* system.[91]

A person need not actually infringe a copyright to violate the DMCA; the statute is concerned with circumvention, not infringement. The constitutionality of the DMCA has been upheld against Due Process Clause, Copyright Clause, and First Amendment challenges.[92] In a well-known application of the DMCA, members of a motion picture association obtained a preliminary injunction against a web site that distributed DeCSS[93] software code.[94] The motion picture industry used an encryption algorithm called CSS to encrypt the movie content on DVDs.[95] In October of 1999, a Norwegian teenager broke the encryption and wrote the DeCSS algorithm to circumvent the DVD access control technology.[96] The court found that the web site's distribution of the DeCSS code violated the access control circumvention

87. *See* 17 U.S.C. § 1203(a).
88. *See id.* § 1204(a).
89. *Id.* § 1201(a)(1)(A).
90. *See id.* § 1201(a)(2).
91. *See id.* § 1201(b)(1).
92. *See* United States v. Elcom Ltd., 203 F. Supp. 2d 1111 (N.D. Cal. 2002).
93. "DeCSS is a computer program capable of decrypting content on a DVD video disc encrypted using the Content Scrambling System (CSS)." *DeCSS Definition Meaning Information Explanation*, FREE-DEFINITION.COM, *at* http://www.free-definition.com /DeCSS.html (last visited Sept. 26, 2004).
94. Universal City Studios, Inc. v. Reimerdes, 82 F. Supp. 2d 211 (S.D.N.Y. 2000).
95. *Id.* at 214.
96. *Id.*

method anti-trafficking provision of the DMCA.[97] In addition, the court held that the affirmative defense of fair use did not apply because the DMCA concerns *circumvention*, not copyright infringement; also, Congress did not explicitly provide a fair use exception for the DMCA.[98]

B. How Does Digital Rights Management Work?[99]

In addition to the legal content protection afforded by Congress through the DMCA, the technological measures themselves go to great lengths to protect content. One such technological measure is DRM. A common DRM system has three main components: a rights authority, a content player, and encrypted content.[100] The content player is usually a software application installed on a particular physical device. The content player utilizes an application-specific or device-specific identification.[101] The content player needs a specific license (or digital certificate) from the rights authority to obtain the ability to play each piece of encrypted content.[102] This license confers specific rights over the encrypted content, such as the right to play it a certain number of times within a certain time span, or the right to make a certain number of copies, or the right to play on certain devices.[103]

Each time the user requests a license, the rights authority communicates with the content player to authenticate that the content player is a valid, compatible application and that the content player has authenticated its connection to a specific physical device.[104] Then, at the time the user downloads content, the rights authority sends along a digital license specifying the rights to that content.[105] Sometimes the license accompanies the content file, and sometimes it is obtained as a

97. *Id.* at 217.

98. *Id.* at 219.

99. The following brief DRM explanation comes from the author's accumulated experience and is meant only as a general overview of what the author understands to be DRM. Different DRM systems work differently. For some other brief explanations of DRM, or, as one author refers to it, "ARM," see Tom W. Bell, *Fair Use vs. Fared Use: The Impact of Automated Rights Management on Copyright's Fair Use Doctrine*, 76 N.C. L. REV. 557, 564-67 (1998); Brett Glass, *What Does DRM Really Mean?*, PC MAG. (Apr. 8, 2003), *at* http://www.pcmag.com/article2/0,1759,1164013,00.asp; *What is Windows Media DRM*, MICROSOFT.COM, *at* http://web.archive.org/web/20040214160034/http://www.microsoft.com/windows/windowsmedia/WM7/DRM/what.aspx (last visited Dec. 28, 2004).

100. *See What is Windows Media DRM*, *supra* note 99, at ¶ 3.

101. Glass, *supra* note 99, at ¶ 12.

102. *See What is Windows Media DRM*, *supra* note 99 at ¶ 3.

103. *See id.* at ¶¶ 1-3.

104. *See How to Deploy Windows Media DRM*, MICROSOFT.COM, ¶¶ 2-3, *at* http://web.archive.org/web/20040304005145/http://www.microsoft.com/windows/windowsmedia/WM7/DRM/how.aspx (last visited Dec. 28, 2004).

105. *See id.*

separate file in a location where the content player can find it.[106] In this way, the content owner can "manage" the digital rights of each copy it distributes, through its rights authority.

The content owner does not care how many copies of the encrypted content are made or distributed, because each user must obtain a license from the rights authority in order to use the content.[107] If a particular device is compromised, the rights authority can revoke that particular license.[108] And although no encryption system is flawless, the inevitable security breaches caused by professional pirates who violate the DMCA fall beyond the scope of this paper. Similarly, the distribution of unencrypted, circumvented copies by these pirates also falls outside this paper's scope. Due to the ease with which content owners will encrypt each piece of content with an asymmetric key,[109] breaking the encryption on a large scale will become prohibitively expensive for most would-be pirates; completely effective content control will be the norm, not the exception.

C. How Do the Encoding Rules Work?

In October of 2003, the FCC, pursuant to its statutory mandate "to assure the commercial availability, to consumers of multichannel video programming . . . of converter boxes . . . not affiliated with any multichannel video programming distributor,"[110] adopted much of a "Memorandum of Understanding . . . reached by representatives of the cable television and consumer electronics industries."[111] This decision, widely-known as the Plug and Play Agreement, essentially allowed for the manufacturers of TVs and set-top boxes to build in one-way digital compatibility with the cable system, eliminating the need to rent a digital set-top box directly from the cable company. The Plug and Play Agreement requires cable companies to "separate out conditional access or security functions from other functions and make available modular

106. *See id.*

107. *See Why is Windows Media DRM Important*, MICROSOFT.COM, ¶ 2, *at* http://web.archive.org/web/20040304005150/http://www.microsoft.com/windows/windowsmedia/WM7/DRM/why.aspx (last visited Dec. 28, 2004).

108. *See Features of Windows Media Rights Manager*, MICROSOFT.COM, ¶ 7, *at* http://web.archive.org/web/20040218032957/http://www.microsoft.com/windows/windowsmedia/wm7/drm/features.aspx (last visited Dec. 28, 2004).

109 "An asymmetric encryption system uses two keys: one public and one private. The public key is not kept secret and allows anyone to encrypt a message, but the message can only be decrypted by the intended recipient who holds the private (secret) key." Aaron Perkins, Comment, Encryption Use: Law and Anarchy on the Digital Frontier, 41 Hous. L. Rev. 1625, 1628 n.16 (2005).

110. 47 U.S.C. § 549(a) (2004).

111. *Plug and Play Decision*, *supra* note 5, at ¶ 2.

security components, also called point of deployment ('POD') modules."[112]

Under this agreement, the coaxial cable cord would plug directly into a standardized POD, and the POD would plug into a standardized socket in a consumer electronics-manufactured TV or receiver. Cable customers would need to obtain PODs directly from their cable provider, because each POD is registered to a specific user and decrypts the digital cable signal from the cable plant. But when the signal leaves the POD unencrypted and enters the receiving device, what prevents the user from making perfect digital copies of the digital cable content? This is where the encoding rules come into play.

The encoding rules set caps on the levels of copy restriction based on currently defined business models.[113] The devices built to accept PODs must recognize and comply with the encoding rules.[114] Digitally encoded content can signal four different copy restriction states: (1) copy never, (2) copy once, (3) copy freely, and (4) copy no more.[115] The currently defined business models, along with the FCC-imposed limits on copy restrictions, are:

> (1) Unencrypted broadcast television – no copy restrictions may be imposed;
>
> (2) Pay television, non-premium subscription television, and free conditional access delivery transmissions – one generation of copies is the most stringent restriction that may be imposed; and
>
> (3) [Video on Demand] VOD, [Pay-Per-View] PPV, or Subscription-on-Demand transmissions – no copies is the most stringent restriction that may be imposed, however, even when no copies are allowed, such content may be paused up to 90 minutes from its initial transmission.[116]

CableLabs, a consortium of cable operators, designed the POD interface and certifies all one-way digital receiving device designs (at least once) to determine if they meet the specification and comply with the encoding rules.[117] And in each consumer home, every receiving device will be

112. *Id.* at ¶ 5. PODs are also known as CableCARDS. *Id.* at ¶ 19 n.45. They are the same size and shape as a PCMCIA card.

113. 47 C.F.R. § 76.1904(b) (2004).

114. *Plug and Play Decision*, *supra* note 5, at ¶ 38.

115. *Digital Content Protection, Part II*, EXTREMETECH ¶ 4, *at* http://www.extremetech.com/article2/0,3973,1231547,00.asp (last visited Mar. 21, 2004).

116. *Plug and Play Decision*, *supra* note 5, at ¶ 65.

117. *Id.* at ¶ 38.

authenticated by checking for a digital certificate that verifies that the device is approved.

A receiving device cannot record 'copy never' content, but it can pause it for up to 90 minutes.[118] A receiving device can make one copy of 'copy once' content, and thereafter it can only send the content out of approved outputs after changing the copy restriction to 'copy no more.' Finally, 'copy freely' content may be copied without restriction. This combination of encryption, encoding, and device certification and authentication allows content owners to prevent unauthorized distribution of their content.

D. How Does the Broadcast Flag Work?

Because unencrypted broadcast content must be marked 'copy freely' under the encoding rules, the FCC also devised a method for preventing the widespread distribution of high-quality digital broadcast content through the Internet. "[R]edistribution control is a more appropriate form of content protection for digital broadcast television than copy restrictions."[119] For example, primetime news broadcasts must be unencrypted according to the encoding rules of the Plug and Play Agreement;[120] this is the kind of content for which viewers need no special decryption setup to view. Although Tom or Kelly or any other information consumer may, by default, receive a free and unencrypted digital broadcast of ABC Nightly News *from* ABC, ABC may not want Tom and Kelly to have the ability to make a perfect digital copy of the ABC Nightly News and distribute it to everyone else on the Internet. The solution was to insert an ATSC[121] standard flag, or "broadcast flag," into such content.[122] In principle, digital TV receivers would all be manufactured to recognize and effectuate the broadcast flag to prevent the content from being distributed over the Internet.[123] The details of the broadcast flag implementation have yet to be decided.[124]

118. 47 C.F.R. § 76.1904(b)(2) (2004).
119. *Broadcast Flag Decision*, *supra* note 6, at ¶ 5.
120. *Plug and Play Decision*, *supra* note 5, at ¶ 65.
121. "The Advanced Television Systems Committee, Inc., is an international, non-profit organization developing voluntary standards for digital television." *About ATSC*, ADVANCED TELEVISION SYSTEMS COMMITTEE, *at* http://www.atsc.org/aboutatsc.html (last visited Sept. 26, 2004).
122. *Broadcast Flag Decision*, *supra* note 6, at ¶¶ 12-21.
123. *Id.* at ¶ 39.
124. *Id.* at ¶¶ 53-55.

III. DIGITAL CONTENT CONTROL AND FAIR USE

This paper has described fair use in the analog world, and also how technology and law can protect content in the digital world. Now this paper will proceed to argue that the fair use doctrine is no longer necessary as applied to controlled digital content. First, DRM or encoded content no longer fits the definition of a pure public good. Applying either Gordon's or Ku's fair use tests weighs against a finding of fair use. And although a comparison of yesterday's fair use rights with tomorrow's reality highlights many differences, fair use remains an affirmative defense, not a direct cause of action. Therefore, there is rarely a need or ability to invoke fair use privilege for DRM or encoded content.

A. Encrypted or Encoded Copyrighted Digital Goods Will No Longer Be "Public Goods"

As mentioned above,[125] a public good has two main characteristics: the good's value does not diminish with each additional user of the good, and the good is available to all whether or not they help offset the costs associated with the good.[126] However, DRM-protected or encoded digital content exhibits neither of these characteristics.

First, under a DRM regime, each copy of a particular piece of content works as a separate good. Whereas unencrypted digital content may be perfectly copied and freely enjoyed by many, each piece of DRM content can be enjoyed only by the original user. Any uses beyond the original use are eliminated by the need to acquire additional usage rights. Because each good is useless without a license, its value *does* diminish for each user beyond the original.

Second, DRM and encoding rules prevent the widespread availability of digital content. DRM can allow only those who pay for the content to use the content through licenses, no matter how many copies of the encrypted content are widely distributed. Complementarily, encoding rules prevent the copying and further distribution of the encoded content beyond the original user, accomplishing the same result. Even content as commonplace as unencrypted broadcast digital content will be protected from Internet distribution with the broadcast flag. In other words, technology solves the free-rider problems associated with public goods by transforming them into private or quasi-private goods.

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125. *See infra* Part I.C.
126. Gordon, *supra* note 61, at 1610-11.

B. Gordon's Market Failure Fair Use Test Is Not Met

Applying Gordon's market failure test suggests against finding a fair use right for digital content subject to access and copy control systems. Specifically, DRM and encoding greatly reduce the chance of market failure by placing the power (to allow or disallow the copying or sharing of content) in the hands of the copyright owner, instead of the content consumer. This significantly reduces transaction costs because the copyright owner can license and enforce its rights through an *automated* system. The copyright owner can obtain near-perfect information about the market for such digitally-locked works by tracking the monetary value of the rights granted in a database. And consumers will know that if they want to access certain content, they must do so through the content owner's rights authority. Of course, this assertion makes one primary assumption: that these digital locks will work. If an experienced hacker wants free access to certain content, she will have it; it is only a matter of time. But given the fact that such locks are becoming more sophisticated and are being built into not only the content and applications, but also into the physical devices, they will likely work for most of the world. Again, this proposition rests on the plausible but broad assumption that digital locks will become so easy to use that they will deter not only technologically, but also economically, any would-be pirates.

Because DRM and encoding rules will pre-empt the market failure problem for digital content, the second and third factors need not be considered in order to conclude against recognizing fair use. But even if market failure were somehow to occur in the digital content distribution markets, the potential harm to the content producers weighs strongly against recognizing fair use for protected digital content. All it takes is one copy, free and clear both technologically and legally, to strip content owners of necessary revenue. The logic applied to content broadcasters and music producers does not apply in every area of copyright. For instance, in movie making, the creative endeavor rests with the copyright owners. If all movies become instantly free in perfect quality, then movie makers will not bother to put together the creative effort to hire actors, write a script, and film a movie. This is in contradistinction to the music industry where the artists (the creative entities) make very little from selling the copyright for their works to big studios, or the broadcast industry where revenues come from advertising.[127] Even if the market failed, the copyright owners would only need a small amount of time to patch their protection methods or revoke the necessary certificates. This

127. *See* Ku, *supra* note 80, at 570.

makes any potential market failure only an intermediate market failure.[128] This argues against court intervention and imposition of traditional analog fair use rights to digital content controlled by DRM or encoding.

C. Ku's Creative Destruction Fair Use Test Is Not Met

Ku's creative destruction test also comes out negative in the context of digital content access control. As with the market failure test, DRM and encoding rules prevent the realization of the creative destruction test's first factor.[129] Specifically, consumers have no independent ability to make copies of the content.[130] Consumers cannot make additional copies of 'copy never' or 'copy once' encoded content, and cannot make additional copies of DRM-protected content without a license from the rights authority. Ku argues that the market for copying equipment and services has, in many instances, creatively destroyed the traditional market in copyrights; consumers buy the equipment instead of the content.[131] But with content protected by DRM and encoding rules, the opposite occurs: consumers usually get the content player applications for free but pay for the content (or license) itself. Therefore, the Ku creative destruction test also fails to require the same set of traditional fair use rights for the world of digital content access and copy control as exist in the world of analog content.

D. Non-Economic Fair Use Rationale

Not only *can* digital content owners eliminate traditional fair use rights through the use of digital content protection, but they *should be allowed* to as well. This paper focuses primarily on fair use viewed through an economic lens. Fair use does not fit into the Gordon or Ku economic fair use models when applied to digital content protection, but some would argue that this analysis should view copyright law primarily through a democratic lens and only secondarily through an economic lens. In his article *Copyright and a Democratic Civil Society*,[132] Neil Netanel advances a view that treats copyright as more than just an economic "allocative efficiency."[133]

Netanel would classify the views advanced in this paper, based on market failure theories such as those espoused by Gordon, as a neoclassicist economical approach that ignores important "democracy-

128. *See* Gordon, *supra* note 61, at 1618, 1620.
129. *See* Ku, *supra* note 80, at 567-68.
130. *See id.* at 568.
131. *Id.* at 565-66.
132. Neil Weinstock Netanel, *Copyright and a Democratic Civil Society*, 106 YALE L.J. 283 (1996).
133. *Id.* at 288.

enhancing goals" of copyright law.[134] According to Netanel's "democratic paradigm[,] . . . while copyright may operate in the market, copyright's fundamental goals are not of the market."[135]

> Copyright is a limited proprietary entitlement through which the state deliberately and selectively employs market institutions to support a democratic civil society. Copyright law provides this support in two fundamental ways. First, through its production function, copyright encourages creative expression on a wide array of political, social, and aesthetic issues. . . . Second, through its structural function, copyright serves to further the democratic character of public discourse.[136]

Netanel expressly disagrees with "Professor Gordon's adherence to neoclassicist economics," saying that it "leads her to treat fair use as an anomalous deviation from copyright's marketplace norm, available only in occasional cases of incurable market failure."[137]

Despite Netanel's assertion that neoclassicist "intellectual property scholars make a careful [yet 'ultimately unsuccessful'] attempt to cabin their analysis within a framework that recognizes copyright's democracy-enhancing goals,"[138] this paper's ultimate conclusion that digital content protection vitiates the need for fair use rights does not ignore "copyright's democracy-enhancing goals."[139] The near-perfect control allowed by digital content protection will not stamp out the non-economic functions of copyright. This paper does not argue that *all* future content will digitally lock out fair use rights, but only that *some* digital content owners who choose to leave out fair use rights should not be burdened with the obsolete analytical fair use paradigms of the analog world.

As in the analog world, the digitally-protected content world will feature different kinds of content protected in different ways. A creative and opinionated citizen may exercise his democratic rights to share thoughts with the rest of the world by posting content to the Internet, free and clear of copy restrictions. On the other hand, the owner of a popular song may strike a different democratic bargain by sharing pieces of content only for a price. Just as any individual may freely choose between recording her communications in a personal diary or sharing them through a public newspaper column, a digital content owner's

134. *Id.* at 324-31.
135. *Id.* at 341.
136. *Id.* at 347.
137. *Id.* at 330.
138. Netanel, *supra* note 132, at 290-91.
139. *Id.*

decision about how much of his creation to share and at what price constitutes an exercise of democracy in and of itself.

Other commentators have raised non-economic issues with digital content protection mechanisms. For instance, the Center for Democracy and Technology (CDT) argues that mandated protections such as the broadcast flag "raise[] copyright policy and First Amendment concerns."[140] The CDT points out, consistently with this paper, that "it is extremely difficult to 'code' the legal principle of fair use comprehensively into any copy protection scheme,"[141] and that to do so might stifle innovation in the field of fair use by "hard-wiring" it immutably into the content.[142] But the CDT also expresses worry that broadcast content with educational or newsworthy value will be "flagged" in a way that might interfere with traditional fair use rights, such as by interfering with newsworthy content that loses most of its value upon initial publication or with public domain content: "concerns about fair use are acutely felt for news and public affairs."[143]

However, arguing that content owners should retain the ability to eliminate traditional fair use rights for specific digital content (as advocated by this paper) differs significantly from arguing for the abolishment of all fair use rights, including analog fair use rights. Furthermore, the CDT's stance relies on the incorrect premise that "'[f]air use' is a specific legal category, protected under the First Amendment."[144] Contrary to the CDT, the United States Court of Appeals for the Second Circuit has recognized that "the Supreme Court has never held that fair use is constitutionally required, although some isolated statements in its opinions might arguably be enlisted for such a requirement."[145] Aside from a lack of constitutional basis, fair use remains an affirmative defense to infringement, not its own cause of action;[146] the question of which uses (if any) should be classified as "fair" for content stripped of its digital locks falls outside the scope of this paper. This paper does not argue against traditional fair uses of content; instead, it merely argues that consumers must first get past private digital content protection before infringement (and eventually fair use) could occur, and that private parties should not be forbidden to set these locks.

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140. Center for Democracy and Technology, *Implications of the Broadcast Flag: A Public Interest Primer (version 2.0)*, at 25 (2003), *at* http://www.cdt.org/copyright/031216broadcastflag.pdf (last visited May 14, 2004).

141. *Id.*

142. *See id.*

143. *Id.*

144. *Id.*

145. Universal City Studios, Inc. v. Corley, 273 F.3d 429, 458 (2d Cir. 2001).

146. *See infra* Part III.F.

E. Old vs. New: How the Old Fair Use Rights Will Look Under A New Content Control Regime

Old analog fair use rights do not necessarily correspond with the rights and possibilities of the digital content world. A closer look reveals, however, that analog fair use rights do not matter as much in that world because DRM and encoding rules change the very nature of the market.

1. Time-Shifting

In today's analog world, a consumer who must leave the house or who receives a phone call halfway through an ordered pay-per-view movie can hit the "record" button on his VCR and watch it later. Time-shifting is commonplace and taken for granted; some recording devices even allow content modification by skipping commercials. However, time-shifting of DRM-protected or encoded content will not remain so easy.

Under the FCC's encoding rules, pay-per-view content may, at most, be encoded as "copy never."[147] "[A]s a practical matter the negotiating power of content providers will force the marketplace adoption of the most restrictive treatment possible under each cap."[148] Therefore, pay-per-view content will likely be transmitted as "copy never." To mitigate the harsh effects of copy never content, and as a "throwback" to current fair use rights, the FCC mandated that consumers be able to pause copy never content for at least 90 minutes.[149] Unlike copy never content, neither copy once nor copy freely content will have a significant impact on time-shifting practices.

Under a DRM regime, the consumer's ability to use the content at different times will depend entirely on the usage rights granted for the copy. These rights could range from "watch only once" to "watch any number of times within 7 days." The most abrupt change? It will no longer be the consumer, but the copyright owner, who makes this decision (subject to the copyright owner's economic considerations).

2. Space-Shifting

The rationale for space-shifting states that a consumer who rightfully acquires content should be able to privately, noncommercially use that content whether in the living room, the kitchen, the gym, or on the go. A consumer can tape the *X-Files* on the living room VCR and watch it later in the bedroom VCR or even the minivan VCR.

147. 47 C.F.R. § 76.1904(b)(1)(i) (2004).
148. *Plug and Play Decision*, *supra* note 5, at ¶ 73.
149. 47 C.F.R. § 76.1904(b)(2).

Under the encoding rules, "copy never" content cannot be space-shifted for the same reasons that it cannot be time-shifted. Space-shifting requires making a copy, which cannot be done with "copy never" content. "Copy once" encoding also hinders space-shifting, because the output from the sole copy of the content from the original recording/receiving device will be marked "copy no more." Even the broadcast flag protection for unencrypted "copy freely" content may hinder space-shifting, particularly for consumers who like to space-shift their content from one device to another over a Wi-Fi connection or the Internet. However, the FCC has solicited comments about how to make the broadcast flag work within a well-defined personal digital network environment.[150]

Under a DRM regime, a consumer's ability to space-shift will also depend on the rights license acquired from the content owner. Perhaps, when a consumer buys a content license from the rights authority, the consumer could pay an extra fee to list all consumer-owned devices and obtain a license to cover use of the content with each device.

3. Educational Use / Critical Use

Though not as directly affected, educational and critical uses may also differ under DRM and encoding rules. For instance, whether or not the use falls under educational fair use, a teacher has the ability to tape record a biology special on the Discovery Channel and show it to his students the next day. But under the encoding rules, the Discovery Channel could be encoded "copy once."[151] In that case, the teacher could record the program, but to show it to his students he would need to bring a really long output wire or unplug and bring in the recording device itself. Under a DRM regime, the teacher would be subject to the same prices and usage rights as non-teachers for the program, unless the rights authority were to authenticate noncommercial educational devices and offer discounted licenses for such uses.

Critical uses will probably not differ much under DRM and encoding rules. But it may be more difficult for the critic to obtain a copy of content to watch or listen to over and over again for evaluation purposes. And some DRM-type applications, such as eBook, have settings that do not allow the cutting and pasting of excerpted content.

4. First Sale Doctrine

In the analog world, content owners engage in many levels of price discrimination. In the movie context, the content owners first collect

150. *See Broadcast Flag Decision*, *supra* note 6, at ¶ 10.
151. 47 C.F.R. § 76.1904(b)(1)(ii).

from theater audiences. Then they charge a little less for the pay-per-view release. Then they charge a little less for the premium channel release. Finally, they reap their last profits through selling copies of the movie on DVD. Historically, this has been the last threshold of price discrimination, because at the point of sale of the DVD the first sale doctrine steps in to relieve the copyright owner of the right to further control the transfer of that copy. The buyer of the DVD can then resell it for more, less, or give it away for nothing.[152]

"Digital technologies offer an unprecedented means for perfecting the pricing of creative works."[153] Arguably, the first sale doctrine will not apply to future digital content because consumers will purchase a *license* to use the content instead of a *copy* of the content. Though copyright owners could preserve the first sale doctrine by making these licenses transferable, they may derive a greater benefit from requiring all potential content users to go through the central rights authority. The different prices charged for the content could vary as drastically as the different temporal and spatial usage rights that could be assigned. In fact, DRM could even reduce the cost of "buying" an unlimited use copy, because removing the buyer's ability to resell the copy makes it less valuable to the buyer.[154] But this could also raise the prices for old-fashioned unencumbered physical copies of the DVD.[155] And "[i]f copyright owners make their works available solely by digital transmission, those who want to buy copies will simply be out of luck."[156]

F. Why Carry Fair Use Forward? Fair Use as Affirmative Defense, Not Cause of Action

Some commentators argue that fair use rights should be embedded in any future DRM or encoding architectures.[157] Although technologically feasible, why would content owners carry forward traditional fair use rights into a system that inherently prevents the market failures and creative destruction that would warrant applying a fair use doctrine in the first place? If embedding fair use rights into DRM or encoding rules would increase transaction costs, then content owners will likely leave them out. If Congress determines that the social benefits of "fair use" outweigh these saved transaction costs, then it

152. *See* 17 U.S.C. § 109 (2004).

153. PAUL GOLDSTEIN, COPYRIGHT'S HIGHWAY 200 (rev. ed. 2003). *See also* R. Anthony Reese, *The First Sale Doctrine in the Era of Digital Networks*, 44 B.C. L. REV. 577, 625 (2003).

154. *See* Reese, *supra* note 153, at 620.

155. *See id.*

156. *Id.* at 621.

157. *See, e.g.*, Dan L. Burk & Julie E. Cohen, *Fair Use Infrastructure for Rights Management Systems*, 15 HARV. J.L. & TECH. 41, 55-58 (2001).

should require fair use rights for digital content copy and access control systems. However, these social and psychological considerations (such as the public being accustomed to a certain set of historical fixed use rights) remain distinct from economic considerations (the focal point of this paper). Labeling these extra rights "fair use" rights, when the relevant market exigencies no longer exist, serves as a euphemism for consumer pleas to maintain the free and unregulated copying status quo. In sum, "fair use" in the digital world will mean an artificially created set of rights, whereas the "fair use" of the analog world arose out of necessity.

That is why fair use remains an affirmative defense, not an independent cause of action. A consumer cannot sue a copyright owner for fair use. Thus, a licensee of DRM-protected content cannot sue the content owner under copyright law for failing to permit time-shifting of that particular content. The licensee could only assert a fair use defense if it copied the content and was sued for infringement by the content owner. But DRM does not allow the licensee to copy the content outside of the license, so the licensee will have neither the need nor the ability to invoke fair use against the content owner. In this way, digital content copy and access control methods eliminate the need for a fair use doctrine. "Indeed, the economic logic of the celestial jukebox, when superimposed on the text of the Copyright Act, might produce a law that contains no exemptions from liability at all."[158]

CONCLUSION

In the year 2010, Tom and Kelly disdain the abrupt transition between a "copy freely" analog content regime and a tightly controlled DRM and encoding rules regime. In the analog world, they could record their pay-per-view movie and watch it later or elsewhere. In the world of digital content locks and encoding, Tom and Kelly have no such right or ability. Evolving technological norms change social and legal norms. The economic and technological factors that gave rise to a fair use exception for analog consumer copying will no longer exist under a digital lock regime.

The high level of digital content control made possible through DRM and encoding rules transforms copyrighted works from public goods into private goods. Digitally controlling access to these goods eliminates the market failure that often necessitates application of the fair use doctrine. Content owners no longer face prohibitively high transaction costs in negotiating digital usage rights with consumers

158. GOLDSTEIN, *supra* note 153, at 207. Goldstein describes the concept of a "celestial jukebox" as one "invok[ing] the image of a technology-packed satellite orbiting thousands of miles above earth, awaiting a subscriber's order – like a nickel in the old jukebox, and the punch of a button – to connect him to a vast storehouse of entertainment." *Id.* at 187.

because of the automation of this process. Consumers no longer possess the choice to make copies or not; instead, they must acquire a license to use content from the content owner. These qualities of DRM and encoding technologies render the doctrine of fair use less than necessary in the world of digitally-protected content.

"NOT QUITE DEAD YET":

THE NEAR FATAL WOUNDING OF THE EXPERIMENTAL USE EXCEPTION AND ITS IMPACT ON PUBLIC UNIVERSITIES

JENNIFER L. OWENS*

ABSTRACT

While federal legislators have given universities increased freedom to protect new inventions created at their institutions through the Bayh-Dole Act, the judicial branch has restricted universities' use of patented inventions to produce additional innovations. This paper discusses the problems resulting from the decision in *Madey v. Duke University*, which reduced the breadth and applicability of the experimental use exception defense to patent infringement claims. Limiting the accessibility of novel intellectual property to research universities jeopardizes scientific progress and weakens the educational experience. Possible solutions exist on many fronts: sovereign immunity may be an adequate defense to many infringement claims at public universities; other potential solutions may address the dilemma through the courts, supplementary legislation, or private settlement of infringement disputes.

* J.D. Candidate 2005, University of Colorado School of Law; B.S. Chemical Engineering, University of Mississippi, 1997; M.S. Chemical Engineering, University of Colorado, 2000; Ph.D. Chemical Engineering, University of Colorado, 2002. The author would like to thank Ben Fernandez and Bryan Smith for their careful editing, outstanding support, and encouragement. Thanks also to the outstanding members of the JTHTL for their helpful assistance and incomparable editing skills. Finally, the author wishes to thank the fine filmmakers of MONTY PYTHON AND THE QUEST FOR THE HOLY GRAIL (Columbia Tri-Star 1975) and Phil Weiser who provided the inspiration for the title.

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INTRODUCTION

Jason is a twenty-two year old student who just finished his first semester of graduate school in biomedical engineering at a top research university. Jason chose a dissertation project that involves the development of a novel synthetic bone replacement, a material that would biodegrade in the body at a rate similar to that of bone re-growth, provide a host to appropriate cell types to stimulate the regrowth, and allow the inclusion of therapeutic agents to promote bone regeneration. Although Jason's faculty advisor has outlined the project in the funding proposal, the actual synthesis path, composition, and properties of this new material remain undiscovered, presumably to be clarified by Jason, who will work on the project for the next four or five years.

Jason is unleashed in the lab with little previous laboratory experience and virtually no supervision by his advisor who manages a full-time teaching load, participates in a variety of departmental and campus-wide activities, frequently writes and reviews funding proposals, and manages a research lab with twenty-five undergraduate students, graduate students, and post-doctoral researchers. Jason does what most novice researchers do in the beginning: he reads a great deal of the existing literature and begins to learn the synthesis and characterization techniques that he will need for the development of the novel materials for his dissertation project. Jason finds a journal article by Professor Gikos, director of a well-known lab at another state university, whose research combines the fields of biomedical and bone tissue engineering. With no thought to existing patents, possible infringement, or potential liability, Jason follows the experimental section of the article to learn the details of the organic syntheses, produces many of the materials described

in the article, and experiments with the materials to learn of their suitability as bone replacements. He finds novel ways to alter the syntheses developed in, and patented by, the Gikos lab to produce more versatile materials that are better suited as bone replacements.

This microcosm represents the course of research in major universities worldwide, where experimentation with published research provides a learning tool for budding scientists and a base for "standing on the shoulders of giants."[1] The scientific process requires that research be checked and duplicated and this process is commonly followed in research laboratories globally. Two hundred years of case law supports the common law doctrine of experimental use, which allows the experimental use of patented material so long as the use is not for commercial purposes. By allowing university researchers widespread access to fundamental research by exempting experimental uses from liability, a great deal of basic research has produced myriad important discoveries in university research laboratories. Additionally, universities produce tangential research, which stems from extending and innovating concepts in previously discovered and developed ideas. The experimental use doctrine, coupled with widespread federally funded research, has for many years stimulated innovation and promoted the transfer of knowledge.

However, these universal goals for research advancement are threatened by the recent solidification of *Madey v. Duke University*, a modern case that very narrowly limits the experimental use exception as a defense to patent infringement.[2] Furthermore, recent legislation has stimulated federally funded university research and facilitated commercialization, while at the same time, has paradoxically allowed widespread protection of intellectual property created by university laboratories, thereby hindering the transfer of knowledge of these new inventions outside the originating university.

This paper discusses the pitfalls of both the narrowing of the experimental use exception and the problems created by the increased freedom universities have to protect new inventions created in their institutions. Limiting widespread availability of novel intellectual property threatens scientific progress and limits the educational experience that students, the future creators of novel intellectual property, receive. Possible solutions exist on many fronts, the most viable contender being sovereign immunity as a possible defense to public

1. Isaac Newton in a 1676 letter to Robert Hooke *available at* http://freespace.virgin.net/ ric.martin/vectis/hookeweb/roberthooke.htm (last visited Mar. 16, 2004).

2. *See* Madey v. Duke Univ., 307 F.3d 1351 (Fed. Cir. 2002), *cert. denied*, 539 U.S. 958 (2003).

institution infringement problems. Other possible solutions may address the problem via the courts, additional legislation, or private parties settling infringement disputes.

Section I of the paper discusses the background of experimental use and Section II delves into an analysis of the decision in *Madey v. Duke University*. The effect of the Bayh-Dole Patent and Trademark Amendments Act (Bayh-Dole Act) on university research and the implications of the Bayh-Dole Act when coupled with a narrowed experimental use exception to patent infringement are explored in Section III. One potential remedy for public universities to the problem of the narrowed experimental use exception, as discussed in Section IV, lies in state sovereign immunity. Finally, Section V covers other possible solutions involving the judicial system, Congress, and private parties.

I. HISTORY OF THE EXPERIMENTAL USE EXCEPTION

The power to regulate the patent system was bestowed upon Congress by Article I of the United States Constitution: "The Congress shall have the power. . . . [t]o promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries."[3] Congress defined patent infringement more specifically in the United States Code: "whoever without authority makes, uses, offers to sell, or sells any patented invention . . . infringes the patent."[4] Numerous cases have interpreted this definition broadly, often allowing unfettered use where the use resulted in no profits or other commercial benefits. Judicially acceptable non-infringing experimental use first occurred in 1813 regarding the use of a machine that manufactured cotton and wool cards.[5] The court opined "it could never have been the intention of the legislature to punish a man, who constructed such a machine merely for philosophical experiments, or for the purpose of ascertaining the sufficiency of the machine to produce its described effects."[6] Thus, the experimental use exception was born.

Subsequent cases molded and shaped the experimental use exception established in *Whittemore v. Cutter*.[7] In the same year that *Whittemore* was decided, the Massachusetts district court further expanded the doctrine instituted in *Whittemore* suggesting that an intent to infringe must exist and the infringer must "deprive the owner of

3. U.S. CONST., art. I, § 8, cl. 8.
4. 35 U.S.C. § 271 (2004).
5. Whittemore v. Cutter, 29 F. Cas. 1120 (D. Mass. 1813) (No. 17,600).
6. *Id.* at 1121.
7. *Id.* at 1120.

the lawful rewards of his discovery."[8] In *Poppenhusen v. Falke*, another court further broadened the experimental use exception, expanding it to include those uses employed "for the sole purpose of gratifying a philosophical taste, or curiosity, or for mere amusement" as non-infringing uses.[9] Another case from the nineteenth century more explicitly allowed an experimental use of a patented invention, as long it was not utilized for "commercial purposes."[10]

In more recent times, a defendant invoked the experimental use exception against a claim of possible university infringement, and the results echoed the sentiments of the established doctrine holding that use for educational purposes was not infringement.[11] The U.S. District Court for the District of Colorado in *Ruth v. Stearns-Roger Manufacturing Co.* found that the experimental use doctrine applied when the infringing user of the patented machinery was an educational institution, the Colorado School of Mines.[12] The court held that "the making or using of a patented invention merely for experimental purposes, without any intent to derive profits or practical advantage therefrom, is not infringement."[13]

While some commentators suggest that the experimental use exception is justified in the realm of university research,[14] others believe the exception is not appropriate in these circumstances precisely because a school has a legitimate commercial interest in its research, even if the experimental use is for educational purposes.[15] The overarching concern is that university labs will exploit the experimental use exception by experimenting with patented inventions in the laboratory and will subsequently bring novel but tangential research to commercialization. Some would argue that this course of events follows exactly what the framers of the patent laws anticipated and intended in drafting the legislation that introduces published patents into the public domain.[16] It remains unclear whether free universal access to new inventions or strict patent protection of these new discoveries will better promote scientific

8. Sawin v. Guild, 21 F. Cas. 554, 555 (D. Mass. 1813) (No. 12,391).

9. Poppenhusen v. Falke, 19 F. Cas. 1048, 1049 (S.D.N.Y. 1861) (No. 11,279).

10. Bonsack Mach. Co. v. Underwood, 73 F. 206, 211 (E.D.N.C. 1896).

11. *See* Ruth v. Stearns–Roger Mfr., 13 F. Supp. 697, 713 (D. Colo. 1935), *rev'd on other grounds*, 87 F.2d 35, 42 (10th Cir. 1936).

12. *See id.*

13. *Id.*

14. *See* Ronald D. Hantman, *Experimental Use as an Exception to Patent Infringement*, 67 J. PAT. & TRADEMARK OFF. SOC'Y 617, 633 (1985).

15. *See* Richard E. Bee, *Experimental Use as an Act of Patent Infringement*, 39 J. PAT. & TRADEMARK OFF. SOC'Y 357, 371-72 (1957).

16. *See* Steven J. Grossman, *Experimental Use or Fair Use as a Defense to Patent Infringement*, 30 IDEA 243 (1990).

progress[17] and universities seem to be walking a fine line between both paths.

Courts' interpretations of experimental use have not always been so generous. In a dispute over a patented mechanism for diverting jet engine combustion gases, the U.S. Court of Claims limited the experimental use exception by prohibiting the exception where the use was "in keeping with the legitimate business of the using agency."[18] Even when the experimental use benefits the public, use of a patented invention infringes despite the invention serving "a valuable governmental purpose."[19] In *Roche Products, Inc. v. Bolar Pharmaceuticals Co.*, the U.S. Court of Appeals for the Federal Circuit (CAFC) further narrowed the exception when it found infringement due to FDA testing of a generic drug prior to the patent expiration. The court held that the experimental use exception was not so broad as to include infringement under "the guise of 'scientific inquiry' when that inquiry has definite cognizable, and not insubstantial commercial purposes."[20] The U.S. Claims Court solidified the decision in *Roche,* stating in a subsequent infringement dispute: "At no time were the accused devices used for amusement, to satisfy idle curiosity, or for philosophical inquiry; to the contrary, each use was in keeping with the legitimate business of the using agency and served a valuable governmental and public purpose."[21] In 2002, however, the well-established experimental use doctrine changed drastically with the decision in *Madey v. Duke University.*[22]

II. THE DECISION AND IMPLICATIONS OF *MADEY V. DUKE UNIVERSITY*

The United States Supreme Court recently denied Duke University's Writ of Certiorari,[23] thereby confirming the CAFC's decision in *Madey v. Duke University*.[24] The result in *Madey* severely limits the experimental use exception that previously protected

17. *See* Rebecca S. Eisenberg, *Patents and the Progress of Science: Exclusive Rights and Experimental Use*, 56 U. CHI. L. REV. 1017, 1046-60 (1989) (an excellent discussion of the conundrum).

18. Douglas v. United States, 181 U.S.P.Q. 170, 177 (Ct. Cl. 1974).

19. Pitcairn v. United States, 547 F.2d 1106, 1126 (Ct. Cl. 1977).

20. Roche Prods, Inc. v. Bolar Pharms. Co., 733 F.2d 858, 863 (Fed. Cir. 1984).

21. Deuterium Corp. v. United States, 19 Cl. Ct. 624, 631 (1990).

22. *See* Madey v. Duke Univ., 307 F.3d 1351, 1351 (Fed. Cir. 2002), *cert denied*, 539 U.S. 958 (2003).

23. Duke Univ. v. Madey, 539 U.S. 958 (2003).

24. *See Madey*, 307 F.3d at 1351.

universities from patent infringement liability resulting from university research.[25]

The dispute arose after Duke University removed Professor Madey from his position as director of the Free Electron Laser (FEL) Lab.[26] Madey, previously a professor at Stanford University, became the sole owner of several patents resulting from his FEL research at Stanford.[27] Madey brought his inventions to Duke after the university offered him directorship of a newly constructed lab that would house his research and he supervised the new FEL lab at Duke for ten years.[28] After his removal from the FEL lab, Professor Madey resigned from Duke and the university continued to manage the FEL lab, including Professor Madey's equipment.[29] Professor Madey sued Duke claiming patent infringement[30] and Duke asserted the experimental use defense.[31]

The CAFC held that only exploitations of patents "solely for amusement, to satisfy idle curiosity, or for strictly philosophical inquiry" satisfy the narrow experimental use exception.[32] Furthermore, according to the case, whether or not the user maintains non-profit or for-profit status matters little and is not a determining factor in the experimental use analysis.[33] The court specifically relied on the educational and research motivations for "major research universities" like Duke, where even research that comes to no commercial fruition "further[s] the legitimate business objectives, including educating and enlightening students and faculty."[34] The decision suggests that university research, whether or not the research is commercially viable, furthers the university's "legitimate business objectives" of attracting students, faculty, and research grants, and is therefore not covered by the experimental use exception. As one commentator explains, "[s]cientific research in academia is no longer independent or idle enough to merit special dispensation from the law."[35]

The impact of this decision on university research is considerable. The narrow interpretation of the experimental use exception means universities should obtain licenses to use any external intellectual

25. *See id.*
26. *Id.* at 1352.
27. *Id.*
28. *Id.*
29. *Id.* at 1353.
30. *Madey*, 307 F.3d at 1353.
31. *Id.* at 1355.
32. *Id.* at 1362.
33. *Id.*
34. *Id.*
35. Matt Fleisher-Black, *Schools Dazed*, THE AM. LAW., Oct. 3, 2003, at 61, *available at* http://www.law.com/servlet/ContentServer?pagename=OpenMarket/Xcelerate/Preview&c=LawArticle&cid=1063212099232.

property in conjunction with university research. The ensuing negotiations for license agreements will slow the progress of research and scientific exploration within university systems. Furthermore, this new requirement elevates the overall cost (*e.g.*, literature searches, licensing fees, transactional expenses, litigation costs, attorneys' fees) to perform research in a university setting, thereby inhibiting both the amount and the pace of progress made by universities. It proves very difficult for a university to comply with this licensing policy when budgets must include licensing fees for as yet unspecified technologies. Additionally, this decision may cause the exportation of research to educational and research institutions in other countries, and in so doing, potentially cripple the production of domestic inventions and limit the educational experiences of university students.[36]

Some worry about the practical effect the decision in *Madey* will have on the day-to-day happenings in research laboratories where some researchers "may be forced to stop in the middle of a project upon the realization that a new patent has been implicated in the course of their experimentation."[37] Some courses of research may be abandoned altogether.[38] However, both of these arguments suggest some cognizance by the scientists regarding the perils of patent infringement and potential liability that is unlikely to be present. Under the current system, most universities do not typically have patent attorneys on-hand to help guide researchers through the quagmire of patent law, to make certain they do not infringe on others' patents, and to ensure the research developed fits the criteria for patentability.[39] Regardless of the current system, scientists would now be wise to consult with counsel to protect themselves from being the cause of university liability for patent infringement.[40]

Whichever of these possible scenarios appropriately applies, the decision in *Madey* is significant for universities. Communications must now be opened between scientists, university attorneys, and technology transfer offices to make sure that universities obtain licenses and scientists design around patented work or refrain from using it at all. These new transaction costs make it increasingly difficult to appropriately fund and execute research proposals and projects occurring

36. Stephen B. Maebius & Harold C. Wegner, *Ruling on Research Exemption Roils Universities: Finding of No Academic Privilege from Infringement May Lead to New Legislation*, NAT'L L.J., Dec. 16, 2002, at C3.

37. Jennifer Miller, *Sealing the Coffin on the Experimental Use Exception*, 2003 DUKE L. & TECH. REV. 12, 19.

38. *Id.*

39. Maebius & Wegner, *supra* note 36, at C3.

40. Todd E. Garabedian, *Recent Developments in Intellectual Property Law: Avoiding Traps in the Pursuit of University Research*, RES. MGMT. REV., Winter/Spring 2002, at 7.

in universities. New scientists, like Jason, can no longer simply read a journal article or patent and perform the experiments described therein without thoughts of license agreements, possible infringement, and potential liability. However, other aspects of the law may influence *Madey's* impact on public universities.

III. THE BAYH-DOLE ACT: FRIEND OR FOE TO THE TRANSFER OF KNOWLEDGE?

The Bayh-Dole Act significantly affects *Madey's* impact on university research. Federal funding of research has increased in recent times, both in total expenditures and in research funds given to universities.[41] Because of this large financial commitment by the government, the government desired a rapid transfer to the public domain of the intellectual property resulting from this funding. The motivation for this quick transfer of new technology to market occurred during World War II when it was necessary to rapidly develop and commercialize cutting-edge technology for wartime defense.[42] The speedy production of new inventions created with federal research money required the federal government to develop a patent policy that would facilitate the distribution of inventions made from federal funding.[43] Early attempts at forming patent policy to deal with federally funded inventions created in universities involved Institutional Patent Agreements (IPAs) which would sometimes result in the government agency waiving its rights to any resulting inventions.[44] However, the government failed to apply IPAs ubiquitously to all institutions receiving monies, which created general ignorance as to the ownership of the resulting intellectual property.[45]

Dealing with the federal government regarding federally funded research created impediments to developing, and offering to the public, commercially viable products due to confusion regarding ownership and

41. Between 1993 and 1999, federal expenditures for basic research increased from $15 billion to $17.4 billion, an increase of almost 17%. Overall research expenditures by the federal government increased by 12% over the same period. Between 1993 and 1999, federal funding of university research from the six largest funding agencies increased 20% from $11 billion to $13 billion; BOARD ON SCIENCE, TECHNOLOGY, AND ECONOMIC POLICY, TRENDS IN FEDERAL SUPPORT OF RESEARCH AND GRADUATE EDUCATION 13 (2001) [hereinafter TRENDS].

42. Howard W. Bremer, Presentation to National Association of State Universities and Land-Grant Colleges (Nov. 11, 2001) (transcript available at http://www.nasulgc.org/COTT/Bayh-Dohl/Bremer_speech.htm).

43. *Id.*

44. *Id.*

45. *Id.*

licensing of the resulting intellectual property.[46] In 1980, Congress enacted the Bayh-Dole Act to, among other things, stimulate the exploitation of inventions stemming from federally funded research.[47] To achieve this end, the Bayh-Dole Act bestowed a number of benefits on universities and small businesses that receive federal grant money, such as allowing universities to obtain patent rights for inventions stemming from federally funded research.[48] In return, the federal agencies require universities receiving funds to disclose the subject of the intellectual property to the appropriate funding agency,[49] patent the invention in a timely manner,[50] give a non-exclusive right to the funding agency,[51] commercialize and bring into public use the novel technologies giving preference to small businesses,[52] and share license revenues with university inventors.[53] It also requires the University to support its "research, development, and education."[54]

The impact of the Bayh-Dole Act on universities has been observed in both the patenting and licensing arenas. In the period between 1969 and 1979, patenting in universities increased by 40%.[55] Post Bayh-Dole Act, in the period between 1984 and 1994, patenting in American universities increased 223%[56] compared to a 52% increase for all patenting in the United States for the same time period.[57] Furthermore, the percentage of U.S. patents obtained by universities increased from 1% to 2.5% in the period from 1975 to 1990.[58] Additionally, the number of university technology transfer offices increased by 700% between 1980 and 1990 and the ratio of patents to research and development spending approximately doubled over the period from 1975 to 1990.[59]

Licensing revenue increased after the implementation of the Bayh-Dole Act as well. In the period between 1970 and 1980, the University

46. David C. Mowery et al., *The Growth of Patenting and Licensing by U.S. Universities: An Assessment of the Effects of the Bayh-Dole Act of 1980*, 30 RESEARCH POL'Y 99, 102 (2001).

47. Bayh-Dole University and Small Businesses Patent Procedure Act (Bayh-Dole Act), Pub. L. 96-517, 94 Stat 3019 (codified at 35 U.S.C. §§ 200 *et seq.*).

48. 35 U.S.C. § 202(a) (2004).

49. *Id.* § 202(c)(1).

50. *Id.* § 202(c)(3).

51. *Id.* § 202(c)(4).

52. *Id.* § 202(c)(7)(D).

53. *Id.* § 202 (c)(7)(B).

54. *Id.* § 202 (c)(7)(E)(i).

55. Calculated from Mowery, *supra* note 46, at 104.

56. *Id.*

57. Calculated from UNITED STATES PATENT AND TRADEMARK OFFICE, PATENT COUNTS BY COUNTRY/STATE AND YEAR: ALL PATENTS ALL TYPES 4 (Feb. 2002), *at* www.uspto.gov/web/offices/ac/ido/oeip/taf/cst_all.pdf (last visited Mar. 19. 2004).

58. *Id.*

59. *Id.*

of California at Berkeley and Stanford University increased their licensing income by 135%, while in the period between 1980 and 1990, licensing income increased by 775%, and increased further by 1995 to 2850% of the 1980 revenue.[60]

However, experts are loathe to claim that the Bayh-Dole Act is responsible for the boom in the patenting and licensing of university intellectual property. Some experts argue that the trend of university patenting and licensing increased prior to the Bayh-Dole Act and attribute this growth to greater industrial funding of academic research.[61] Others note that the sharp increase in biomedical related patents near the time of the Bayh-Dole Act could account for the increases in patenting and licensing after 1980.[62] Additionally, significant portions of the increases in patenting and licensing might have resulted from participation by universities that had never before been active in protecting intellectual property resulting from their university research.[63] Regardless of the impetus, universities now increasingly patent inventions stemming from both basic and tangentially developed research.[64]

Nevertheless, although a number of factors may have contributed to the increase in university patenting and licensing after 1980, it is clear that the Bayh-Dole Act facilitated universities' abilities to obtain ownership rights to their inventions resulting from federally funded research. Because universities perform substantial amounts of basic research,[65] the death of the experimental use doctrine may not be so detrimental. Universities should theoretically allow exploitation of their own patents within the inventing department as well as throughout their university system. Culturally, however, this does not happen because collaboration between university researchers rarely extends outside a given department. Sharing of information would benefit both universities and the public by allowing prior inventors to continue with tangential discoveries to perhaps invent additional useful and commercializable intellectual property. This does not happen either; researchers have niches and they tend to stay there, not integrating vertically into steps towards commercialization. However, many inter-institution licenses have minimal transaction costs and protect all intellectual property interests of universities and inventors. This could

60. *Id.*

61. *See* R. Henderson et al., *Universities as a Source of Commercial Technology: A Detailed Analysis of University Patenting, 1965-1988*, 80 REV. ECON. & STAT. 119 (1998).

62. *See* Mowery, *supra* note 46, at 117.

63. *Id.* at 104.

64. *See* Arti K. Rai, *Engaging Facts and Policy: A Multi-Institutional Approach to Patent System Reform*, 103 COLUM. L. REV. 1035, 1126 (2003).

65. *See* TRENDS, *supra* note 41.

potentially ease the transfer of information between university entities, which in turn might stimulate the production of additional novel intellectual property. Some commentators believe that the Bayh-Dole Act actually stimulates knowledge transfer because technology is best transferred through the patent system "since it offers protection to the intellectual property base while at the same time providing an incentive to the industrial partner because of the right it conveys to exclude other than the licensee from practicing the invention patented."[66]

The passage of the Bayh-Dole Act also created a number of problems with respect to the transfer of knowledge that it was designed to promote[67] and is in conflict with the policies underlining the experimental use doctrine. First, The Bayh-Dole Act does not distinguish between basic research and more specific (and commercializable) research.[68] The inability to distinguish between basic and commercializable research proves especially difficult in biomedical fields, where small amounts of basic research (*i.e.*, delivery methods of therapeutics, novel DNA/RNA sequences, and methods of processing proteins) can often result in larger, more socially and commercially significant discoveries.[69] Prior to the Bayh-Dole Act, these fundamental but significant discoveries became part of the vast public domain, but now, these discoveries are recognized as valuable to tangential research and are quickly patented by universities.[70] Because the language of the Bayh-Dole Act neglects to distinguish between basic research and other types of research, nor does it recognize certain disciplines that may need special provisions, the Bayh-Dole Act may limit the transfer of knowledge that the drafters originally intended to encourage,[71] especially in a world without the experimental use exception. This rapid intellectual property protection by universities coupled with the narrow application of experimental use seems now set to stymie the novel fundamental research that the combination of university research and federal funding was originally intended to promote.

Second, the government was not required to create patent rights for universities within the realm of publicly funded research. University research is a uniquely collegial environment where collaboration has historically flourished not only between laboratories within a given university, but also between extrinsic university institutions. Prior to the enactment of Bayh-Dole, the experimental use exception was

66. Bremer, *supra* note 42.
67. 35 U.S.C. § 200.
68. Arti K. Rai & Rebecca S. Eisenberg, *The Public Domain: Bayh-Dole Reform and the Progress of Biomedicine*, 290 LAW & CONTEMP. PROBS. 289, 290 (2003).
69. *Id.*
70. *Id.*
71. 35 U.S.C. § 200.

unnecessary because federally funded research results quickly traveled to the public domain via conference presentations and journal papers. The increased ability of the university to patent has changed this practice, and if the collegiality of university research is to be sustained and control over intellectual property preserved, maintaining the experimental use façade necessitates the use of inter-institution licenses. University technology transfer offices have often swapped Material Transfer Agreements with each other, even prior to the Bayh-Dole Act. However, with the post-Bayh-Dole Act desire to protect university intellectual property, and no safe experimental use of patented inventions, there will be an increased cost of creating unique license agreements to perpetuate the idyllic transfer of knowledge that universities desire to maintain and still protect university interests in any ideas or inventions that are shared with other entities.

Third, there is a distinct difference between commercialization-driven and academic research. The incentive to "patent it, or lose it" driven by the Bayh-Dole Act may result in a departure from producing the significant fundamental research created with the combination of federal funding and research freedom that the university atmosphere provides. No longer will university research labs be incentivized to produce speedy publication, thereby providing the research results to the public domain; instead, commercialization of a tangible product is often the emphasis, because the inventors share in any licensing revenue.[72] In fact, it may be in a university's interest to keep a new invention out of the public domain for as long as possible so that it may patent, license, and create a product before sharing the technology. Historically, universities have not had the same level of commitment to commercial research because universities have been uniquely able to pursue socially beneficial research that may lack commercial appeal. For example, medical technology and pharmaceutical companies have little interest in curing chronic diseases since they make their profits through treatment, whereas universities are in the position to explore these research issues without the financial pressures that researchers in companies face. The Bayh-Dole Act, by promoting patenting and licensing that otherwise would wind up in the public domain, "in effect redistributes some of the gains from innovation back upstream, charging the firms that develop commercial products and paying the universities and government agencies that made early discoveries related to the product. . . . [This method] would appear more likely to retard product development than to

72. *See id.* § 202 (c)(7)(B).

promote it."[73] Driving university research to commercialization while the experimental use doctrine is simultaneously crippled may result in a void where socially useful fundamental research once flourished.

Finally, the Bayh-Dole Act tends to blur the line between academia and commercial endeavors, possibly refocusing academia's general goal to that of patenting and commercialization instead of "the principle of sharing knowledge"[74] historically adopted in the universities. Universities have recently begun creating small start-up companies from their newly acquired intellectual property.[75] The companies benefit from not spending excessively on research because they may be able to purchase the possibly undervalued intellectual property from the universities.[76] This bargain of university intellectual property exists because inventions spawned in university labs are difficult to appraise appropriately.[77] Adoption of the Bayh-Dole Act has served as a subsidy to industry that may eventually move the ideals of education, primary research, and knowledge transfer into the background in favor of research geared solely towards commercialization and the ability to make a lucrative product.

The Bayh-Dole Act generally benefits universities by allowing them to patent inventions paid for by federal tax funds. However, it may also inhibit a university's research progress by encouraging protectionism instead of the propagation of knowledge generally promoted by research universities. Technologies that were once freely disseminated through rapid publication will now be patented following a delay while protection is obtained. The resulting environment is a considerable departure from traditional collegiality toward that of business models requiring manufacture of a marketable product.

IV. PATENT INFRINGEMENT AND SOVEREIGN IMMUNITY

Although the experimental use doctrine suffered drastic curtailment with the *Madey* decision and universities increasingly protect their IP rights from one another under the Bayh-Dole Act, another affirmative defense to patent infringement exists in state sovereign immunity.

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73. Rebecca S. Eisenberg, *Symposium on Regulating Medical Innovation: Public Research and Private Development: Patents and Technology Transfer in Government-Sponsored Research*, 82 VA. L. REV. 1663, 1712 (1996).

74. Clovia Hamilton, *University Technology Transfer and Economic Development: Proposed Cooperative Economic Development Agreements Under the Bayh-Dole Act*, 36 J. MARSHALL L. REV. 397, 407 (2003).

75. *Id.* at 409. The number of start-up companies resulting from university research has exceeded 1500 since 1980. *University Technology Transfer of Government-Funded Research Has Wide Public Benefits*, ASS'N AM. U. (June 2, 1998), *at* http://www.aau.edu/research/TechTrans6.3.98.html. Bremer puts the number of startups from university technology at 2922 in 2001. Bremer, *supra* note 42.

76. *See* Hamilton, *supra* note 74, at 406-07.

77. *See id.*

A patent gives its owner exclusive rights to the utilization of the invention for twenty years from the date the patent was filed.[78] Patent infringement claims are solely the jurisdiction of federal district courts,[79] which have the power to "grant injunctions in accordance with the principles of equity to prevent the violation of any right secured by patent"[80] and may "award the claimant damages adequate to compensate for the infringement."[81]

However, federal legislation limits the areas in which infringement can occur. For example, it is not infringement to exploit a patent for the purpose of obtaining and submitting information required under Federal law.[82] This provision allows FDA clinical trials, drug manufacturing and testing, medical device experimentation and development[83] of patented inventions to occur without the users facing possible infringement liability. This narrowly tailored exception requires a "reasonable relationship" between the research performed and the collected information necessary to meet the legal requirements,[84] and does not always result in a finding of non-infringement even when the research in question might "at some point, however attenuated, . . . lead to an FDA approval process."[85] The government also limits private party liability for patent infringement when the private party makes or uses goods for the United States government.[86] In all of these cases, the motivation for the infringement exception partially rests on the social benefit resulting from the facilitation of the suspect research and the desire to bring the research to rapid fruition. This policy suggests that university research could eventually be statutorily exempt from patent infringement if a vital use that merited exemption was shown.

The strongest argument that the *Madey* case will not terribly impinge on the progress made in university research is the issue of sovereign immunity. Under the Eleventh Amendment: "The Judicial Power of the United States shall not be construed to extend to any suit in law or equity, commenced or prosecuted against one of the United States. . . ."[87] The U.S. Supreme Court interpreted this to mean that (1)

78. 35 U.S.C. § 154(a)(2).
79. 28 U.S.C. § 1338 (2004).
80. 35 U.S.C. § 283.
81. *Id.*
82. *Id.* § 271 (e)(1).
83. *See* Intermedics Inc. v. Ventritex Co., 775 F. Supp. 1269 (N.D. Cal. 1991), *aff'd*, 991 F.2d 808 (Fed. Cir. 1993); Teletronics Pacing Sys., Inc. v. Ventritex, Inc. 982 F.2d 1520 (Fed. Cir. 1992).
84. 35 U.S.C. § 271 (e)(1).
85. Integra Lifesciences I, Ltd. v. Merck KGaA, 331 F.3d 860, 867 (Fed. Cir. 2003).
86. *See* 28 U.S.C. § 1498(a); Crater Corp. v. Lucent Techs.. Inc., 255 F.3d 1361, 1364 (Fed. Cir. 2001).
87. U.S. CONST. amend. XI.

States have sovereign immunity against suits and (2) States can waive sovereign immunity and consent to being sued.[88] Although sovereign immunity applies to solely public institutions, much of the fundamental research in the U.S. comes from public institutions;[89] therefore, this defense may be applicable in patent infringement suits against public universities.

In 1994, Congress enacted the Patent and Plant Variety Protection Remedy Clarification Act (Patent Remedy Act)[90] and modified the language of the patent laws which held previously that "whoever without authority makes, uses, offers to sell, or sells any patented invention, . . . infringes the patent."[91] The language contained in the Patent Remedy Act specifically abrogated state sovereign immunity, maintaining that

> [a]ny State, any instrumentality of a State, and any officer or employee of a State or instrumentality of a State acting in his official capacity, shall not be immune, under the Eleventh Amendment of the Constitution of the United States or under any other doctrine of sovereign immunity, from suit in Federal court by any person.[92]

Pursuant to this new legislation, College Savings Bank sued Florida Prepaid Postsecondary Education Expenses Board (Florida Prepaid) for infringement of College Savings' patented financing system designed to help investors plan for the financial burden of college tuition.[93] Florida Prepaid, created by the State of Florida, sold a similar financing program to Florida citizens and College Savings claimed willful infringement, relying on the provisions in the Patent Remedy Act.[94]

The Supreme Court analyzed the Patent Remedy Act provisions under the constitutional standard from *Seminole Tribe of Fla. v. Florida* to decide if "Congress has unequivocally expressed its intent to abrogate the immunity" and if Congress operated "pursuant to a valid exercise of its power."[95] The Court determined that the language of the act "could not be any clearer" in showing Congress's intent to abrogate the State's sovereign immunity.[96] On the second issue of Congressional power to

88. *See* Seminole Tribe of Fla. v. Florida, 517 U.S. 44, 54 (1996).

89. *See* 15 U.S.C. § 3701(3) (2000).

90. Patent and Plant Variety Protection Remedy Clarification Act (Patent Remedy Act) of 1994, Pub. L. 102-560, 106 Stat 4230 (codified in title 7 and 35 U.S.C.).

91. 35 U.S.C. § 271(a).

92. *Id.* § 296(a).

93. Fla. Prepaid Postsecondary Educ. Expenses Bd. v. Coll. Sav. Bank, 527 U.S. 627, 631 (1999) [hereinafter *Fla. Prepaid*].

94. *Id.* at 632-33.

95. *Seminole Tribe of Fla.*, 517 U.S. at 55 (*quoting* Green v. Mansour, 474 U.S. 64, 68 (1985)).

96. *Fla. Prepaid*, 527 U.S. at 635.

effect this abrogation, the Court examined three possible sources for this power: the Patent Clause,[97] the Commerce Clause,[98] and the Fourteenth Amendment.[99] Under *Seminole Tribe of Fla.*, Congress is prohibited from abrogating state sovereignty under its Article I powers.[100] Furthermore, the Fourteenth Amendment prevents States from denying "any person of life, liberty, or property, without due process of law" and gives Congress the power to implement this provision with legislation.[101] The Court interpreted this provision to require Congress to recognize and identify the conduct that affronts the constitutional provisions and to narrowly tailor the remedy or prevention measures employed to assuage the offending conduct.[102] In examining whether the Patent Remedy Act was a sufficient remedial or preventative measure, the Court relied heavily on the fact that in the 110 years prior to 1990, states were sued for patent infringement only eight times.[103] The Court found that the dearth of cases of patent infringement against the States suggested "little support for the proposition that Congress sought to remedy a Fourteenth Amendment violation in enacting the Patent Remedy Act" and, therefore, the legislation was too broad and sweeping to solve such a minimal problem.[104] Additionally, states' generally innocent infringement did not elevate the patent infringement problem to a level of "widespread and persisting deprivation of constitutional rights."[105]

A Fourteenth Amendment violation occurs only if deprivation of a constitutionally protected interest occurs without due process.[106] In *Fla. Prepaid*, the Court held that wronged patent owners have redress under other causes of action such as tort, unfair competition, and conversion[107] and that less convenient remedies than a patent infringement suit litigated in federal court did not equate to a violation of due process under the Fourteenth Amendment.[108]

The decision in *Fla. Prepaid* is far reaching. Sovereign immunity abrogation by Congress was struck down in both the trademark[109] and

97. U.S. CONST., art. I, § 8, cl. 8.
98. U.S. CONST., art. I, § 8, cl. 3.
99. U.S. CONST., amend. XIV, § 5.
100. *Fla. Prepaid*, 527 U.S. at 636; *see also Seminole Tribe of Fla.*, 517 U.S. at 72-73.
101. U.S. CONST., amend. XIV, § 5.
102. *Fla. Prepaid*, 527 U.S. at 639.
103. *See* Coll. Sav. Bank v. Fla. Prepaid Postsecondary Educ. Expenses Bd., 148 F.3d 1343, 1353-54 (Fed. Cir. 1998); *Fla. Prepaid*, 527 U.S. at 640.
104. *Fla. Prepaid*, 527 U.S. at 642.
105. *Id.* at 645 (quoting City of Boerne v. Flores, 521 U.S. 507, 526 (1997)).
106. *Id.* at 643.
107. *Id.*
108. *Id.* at 644.
109. Trademark Remedy Clarification Act, 15 U.S.C. §§ 1122, 1125(a) (2000); *Fla. Prepaid*, 527 U.S. at 666.

copyright[110] areas under reasoning similar to that in *Fla. Prepaid* (*i.e.*, lack of evidence of a pattern, no deprivation of a protected property right, remedy overly broad).[111] These results allow intellectual property infringement to occur "with impunity until it rises to a level deserving of 'remedial' action by Congress."[112] This line of cases directly conflicts with *Madey*, which finds that any non-experimental use by public university researchers, even if innocent infringement, creates liability.[113] However, under *Fla. Prepaid*, patent owners suing a public university for infringement are forced to find remedies in state court on grounds not ordinarily applied to intellectual property disputes.[114] This is a particularly unusual form of redress since patent law was designed so that the federal government, through the CAFC, has sole appellate jurisdiction.[115]

Given these decisions, what effect does sovereign immunity have on university liability for patent infringement and how will it impact Jason and other university researchers? Courts may find that employees acting within the scope of their employment duties as scientists and researchers can cause university liability for patent infringement,[116] although some courts may be reluctant to identify a lowly first-year graduate student as a state actor. However, some university employees have been held accountable for their actions as state actors resulting in abrogation of sovereign immunity for the university.[117] Other universities, because of their minimal ties to the state, are held to be autonomous, and fail to qualify for the protection of sovereign immunity,[118] although university

110. Copyright Remedy Clarification Act, 17 U.S.C. §§ 501, 511 (2000); Chavez v. Arte Publico Press, 204 F.3d 601 (5th Cir. 2000) [hereinafter *Chavez II*].

111. *Chavez II*, 204 F.3d at 601; *Fla. Prepaid*, 527 U.S. at 666.

112. John C. O'Quinn, *Protecting Private Intellectual Property from Government Intrusion: Revisiting SmithKline and the Case of Just Compensation*, 29 PEPP. L. REV. 435, 476 (2002).

113. Madey v. Duke Univ., 307 F.3d 1351, 1351 (Fed. Cir. 2002), *cert denied*, 539 U.S. 958 (2003).

114. Peter S. Menell, *Symposium on New Directions in Federalism: Economic Implications of State Sovereign Immunity From Infringement of Federal Intellectual Property Rights*, 33 Loy. L.A. L. REV. 1399, 1452 (2000).

115. 28 U.S.C. § 1498 (2000).

116. Robert C. Wilmoth, *Toward a Congruent and Proportional Patent Law: Redressing State Patent Infringement After Florida Prepaid v. College Savings Bank*, 55 SMU L. REV. 519, 554 (2002).

117. *See* Chavez v. Arte Publico Press, 59 F.3d 539, 546 (5th Cir. 1995), *vacated by* Univ. of Houston v. Chavez, 517 U.S. 1184 (1996), *superceded by* 157 F.3d 282 (5th Cir. 1998), *vacated by* 178 F.3d281 (5th Cir. 1998), *remanded to* 204 F.3d 601 (5th Cir. 2000) [hereinafter *Chavez I*] (Congress compels states to waive sovereign immunity where university employee violates the Copyright and Lanham Acts); Kashani v. Purdue Univ., 813 F.2d. 843, 848 (7th Cir. 1987) (allowing suits against university employees, despite a finding of sovereign immunity for the university, in their official capacities for prospective injunctive relief).

118. Kovats v. Rutgers, 822 F.2d 1303, 1307-12 (3d Cir. 1987) (finding Rutgers University is not entitled to Eleventh Amendment sovereign immunity).

autonomy is not mutually exclusive from a university operating as an "arm of the state."[119] A significant disconnect exists between what occurs in the laboratory and what activities university officials are reasonably aware of. This disconnect creates not only an enforcement problem, but also a lack of coordination between infringement offenses and the appropriate university officials, which may preclude the use of sovereign immunity as a viable defense. Perhaps the problem of preventing infringing experimental use is best left to the universities, because the possible lack of immunity may implore university officials to better communicate with researchers and counsel to prevent liability.

And what of the effect on the policy that motivates the Bayh-Dole Act and other legislation that encourages university patenting and licensing? Some commentators suggest state university sovereign immunity could be devastating for the ideals of stimulating federally funded inventions though the likes of the Bayh-Dole Act. Sovereign immunity protection may discourage corporations from licensing technology from a university "if it knows in advance that there is no easy way to hold the university accountable for patent infringement disputes that might ensue"[120] because of companies' reluctance to face potential litigation.

The sovereign immunity issue, as it pertains to enforcing now infringing experimental uses of patented material, is a complex one. No clear answers exist as to whether the problem will become widespread enough to merit courts' renewed attention. Furthermore, it is unclear what level of university researchers' illegal experimentation using patented inventions is necessary for the research to be considered a sufficient exercise of state power as to invoke the protection of sovereign immunity. However, the decision in *Madey* has put university officials on notice regarding the illegality of the previously acceptable experimental use of patented material.

V. PROPOSAL

Jason's predicament is perplexing, however, remedies for this dichotomous problem exist on many levels. Courts may realize the difficult situation facing universities after the narrowing of the experimental use exception and move towards a broadening of the exception based on policy reasons to solve the problem. Congress can assuage the problem through further legislation in the patent code,

119. Kelly Knivila, Note, *Public Universities and the Eleventh Amendment*, 78 GEO. L.J. 1723, 1742 (1990).

120. Jennifer Polse, *Holding the Sovereign's Universities Accountable for Patent Infringement After Florida Prepaid and College Savings Bank*, 89 CAL. L. REV. 507, 529 (2001).

amendments to the Bayh-Dole Act, or via new legislation. Finally, universities themselves can take steps to minimize the problem by instituting better communication between their researchers and legal counsel and by finding more efficient ways to implement licensing agreements.

A. Courts

What is the purpose of distributing intellectual property to the public domain through the publishing of patents if the discoveries cannot even be used in university research, which at least before the Bayh-Dole Act was fairly innocuous with respect to threat of commercialization? What began in the courts several hundred years ago as a gift to curious researchers, the experimental use doctrine evolved into a specific common law rule: commercial use of patented technologies was prohibited, while non-commercial use, including use by universities, was acceptable. However, due to increasing commercialization of universities and their research, "what might have once been a bright-line rule has become difficult to implement without inquiring into the details of the research at issue."[121] Following suit, courts have shifted their position as well, as evidenced by the *Madey* decision, to forbid the commercialized university institution to experimentally employ patented technology because it is not free from industrial entanglements.

However, other policy considerations may influence courts to again broaden the experimental use exception. Strong public policy for the advancement of science and new technology exists. With recent patent legislation shifting university research in the direction of commercialization, courts may find that university experimental use is necessary and justified to stimulate the production of basic and fundamental discoveries in university research. Important cost considerations persist regarding developing new research infrastructure instead of exploiting university resources. If most university research becomes economically driven, the government may be forced to establish additional resources to produce basic fundamental research instead of relying, as in the past, on expensive university facilities. Courts may also realize that the absence of experimental use of patented ideas hinders the rapid pace of technological advancement. Technological advancement may be hindered because minimal amounts of research funds are available due to both (a) the commercialization of university research (including the goals of protectionism and bringing products to market, instead of publication to the public domain), and (b) the absence of basic fundamental research generally, because such research may not coincide

121. Rai, *supra* note 64, at 1109.

with corporate goals. Finally, the courts may examine the impact on new faculty, who may be most disadvantaged by the narrowing of the experimental use doctrine. As a condition for receiving money under the Bayh-Dole Act, the statute requires universities to reinvest portions of invention royalties in university research.[122] New faculty are likely most in need of the experimental use exception to have a chance at developing the viable research program necessary to survive in academia. By emphasizing commercialization instead of promoting fundamental research, universities threaten to drive intelligent and ambitious students like Jason to other endeavors.

Perhaps courts will neglect to follow the decision in *Madey*, and instead follow the opinion in *Ruth*,[123] which refused to recognize university experimental use of a patented invention as infringement. The collective impact of the now-narrowed experimental use exception, although unknown, has the potential to change the course of research in ways that may result in hindering the advancement of American technology.

B. Congress

One way around the problems with the now-limited experimental use doctrine is to amend the Bayh-Dole Act to account for experimental use within the university system. The federal government supplies funds for much of the research undertaken in the university system and through the Bayh-Dole Act, it gives most of the intellectual property rights to the institutions receiving money. The government could institute an experimental use clause that would allow non-commercial use of inventions patented under the Bayh-Dole Act by the numerous universities and small businesses that receive federal funding. This would only be a partial fix since most patents are not a result of federal funding.

Amending the patent code to explicitly include experimental use by universities without opening the door to widespread use of patented intellectual property is an equally viable solution. Currently, the patent code allows an experimental use of patented "biological products" in anticipation of expiration of the patents. This experimental use is permitted so that FDA approval can be submitted on biologic inventions, such as a generic drug, enabling generic drug availability as soon as the patent on the primary drug expires.[124] This policy driven

122. 35 U.S.C. § 200.

123. *See supra* notes 11-13 and accompanying text (discussing the application of the experimental use exception to eliminate a university's infringement liability).

124. 35 U.S.C. § 271 (e)(1). This overrules *Roche Products, Inc. v. Bolar Pharms. Co. See supra* note 20 and accompanying text.

exception to patent infringement allows generic drugs to reach the marketplace earlier than would be expected under traditional infringement rules. Our nation's legislature may deem the transfer of knowledge and stimulation of innovation an equally worthy goal and allow a narrow exception for experimental use of patents in university research.

Additionally, exceptions have been proposed for research that pertains to mapping genomes. The Genomic Research and Diagnostic Accessibility Act of 2002 endeavors to exempt "for the purposes of research" the use of patent protected genomic sequences.[125] This legislation would allow university researchers to effectively "experimentally use" patented genome sequences for creating, among other things, diagnostic tests, furthering disease research, and advancing genetic engineering.[126] This potential legislation's exemption contrasts sharply with the principles outlined in *Madey* and suggests a shift by federal legislators toward reviving the experimental use exception, especially where it directly benefits the public.

However, instead of protecting state universities' experimental use of intellectual property, some members of Congress have recently endeavored to do the opposite by introducing the Intellectual Property Protection Restoration Act (IPPRA)[127] that would accompany the patent code with respect to remedies for infringement.[128] In the IPPRA, Congress attempts to equate intellectual property rights with real property rights, which would cause infringement liability to be considered a taking by the state (the offending public university being an agent of the state).[129] The IPPRA would force universities to choose between losing the right to protect their intellectual property or waiving their sovereign immunity protection against being sued for violations of copyright, trademark, and patent laws.[130] Universities would generally be loathe to open themselves up to the costs of litigation and damages that the waiver of sovereign immunity may incur, but under this provision, they could be forced instead to give up protection of their own

125. Genomic Research and Diagnostic Accessibility Act of 2002, H.R. 3967, 107th Cong. (2002).

126. *Id.*

127. Intellectual Property Protection Restoration Act of 2003, H.R. 2344, 108th Cong. (2003).

128. 35 U.S.C. § 284.

129. Himanshu Vyas, *Federal Intellectual Property Law v. State Sovereignty: Can Congress Win?*, 2 J. MARSHALL L. REV. 159, 168 (2002).

130. Intellectual Property Protection Restoration Act of 2003, H.R. 2344, 108th Cong. (2003).

intellectual property,[131] causing the universities to forfeit what would otherwise be a large source of revenue for higher education.

This legislation appears to "attempt to level a perceived uneven playing field"[132] between universities and industry. But Congress confuses the issue, because much enacted and proposed patent legislation stimulates universities' participation with industry, while other legislation condemns it. Legislators should decide how best to define the role the university should take in research in terms of commerciality and enact legislation consistent with the goals and ideals of that role, striking a balance between being completely commercial and being completely non-commercial, instead of trying to push the university to either extreme with conflicting legislation.

C. Individual Parties

It seems unlikely that any policy implemented by a public university could minimize the impact of the ruling in *Madey*. In *Madey*, Duke argued that its patent policy stated that its primary objective was that of knowledge transfer, but the CAFC recognized that this was not Duke's only objective and noted that "Duke, however, like other major research institutions of higher learning, is not shy in pursuing an aggressive patent licensing program from which it derives a not insubstantial revenue stream."[133] This ruling suggests that any university that maintains a patenting and licensing program from which it derives "not insubstantial" revenue will be prevented from having its use of unlicensed intellectual property fall within the narrow experimental use exception.

However, it is unclear how much delay or litigation would result from a university using unlicensed intellectual property in its research. The Bayh-Dole Act, which allows universities to patent inventions stemming from federally funded research, may assuage some of the hurdles created by *Madey* because the Act enables a university to possess much of the intellectual property created during externally funded research. If university research does utilize unlicensed intellectual property, it is unlikely that any litigation will result unless significant revenue is produced from the research. Some organizations may actually encourage the use of intellectual property (by not litigating infringement

131. *Colleges Oppose New Intellectual Property Act*, HIGHER EDUC. & NAT'L AFF., Vol. 52, No. 12, June 30, 2003.

132. *H.R. 2344, the "Intellectual Property Protection Restoration Act of 2003": Hearings on H.R. 2344 Before the Subcomm. on Courts, the Internet and Intellectual Property of the House Comm. on the Judiciary*, 108th Cong. (2003) (testimony of Leslie J. Winner, Vice-President and Gen. Counsel, Univ. of N. Carolina).

133. Madey v. Duke Univ., 307 F.3d 1351, 1363 (Fed. Cir. 2002), *cert denied*, 539 U.S. 958 (2003).

claims or providing cost-free licensing) by a university as the resulting research may produce new inventions or applications that would require the purchase or licensing of the intellectual property in question.

Can a university rely on lack of infringement enforcement as a sufficient reason to ignore *Madey*? The dearth of sovereign immunity cases (eight in 110 years) suggest that either public university infringement is not a problem, or that it is difficult to police. Having spent a great deal of time in the university laboratories, the author believes the latter to be more plausible. Given the threat of treble damages, "it may be foolhardy for nonprofit researchers to rely on the forbearance of patent holders."[134] Others argue that patents do not severely financially affect university researchers because patent owners favor working with nonprofit researchers.[135] Companies implement this strategy by not bringing infringement suits against these non-profit researchers for what is essentially experimental use.[136]

CONCLUSIONS

Let us revisit Jason and examine his fate under the new, narrowed experimental use exception. Under historical common law, Jason would have been protected in his attempts to use patented work in his university laboratory to help sharpen his experimental skills and stimulate new ideas. With the decision in *Madey*, Jason faces a dilemma of choosing willful infringement or suffering educationally from the lack of exposure to practical laboratory experience. Jason may find safety in his state university's sovereign immunity claim or in lack of enforcement, but he still takes a great risk in exposing either himself or his employer to infringement liability.

The best avenue for a permanent solution is likely in the hands of the legislature, which could make a profound difference if it could decide the extent to which prodding universities to commercialization is a productive endeavor. Although the courts seem fixed in their course of narrowing exceptions to infringement liability, public policy may eventually dictate that experimental use of patented inventions is necessary for the development of new technology and the production of basic fundamental research. One thing is clear: university administrators must begin to clearly communicate with researchers regarding the practicalities and perils that this shift in patent policy signifies.

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134. Rai & Eisenberg, *supra* note 68, at 296.

135. *See generally* J.P. Walsh et al., *Patenting and Licensing of Research Tools and Biomedical Innovation*, *in* INNOVATION IN A KNOWLEDGE-BASED ECONOMY (S. Merrill et al., eds., forthcoming 2004), *available at* http://tigger.uic.edu/~jwalsh/BioIPNAS.pdf.

136. *Id.*