



The Spectrum Commons in Theory and Practice

JERRY BRITO*

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INTRODUCTION

¶1 The radio spectrum is a scarce resource that has been historically allocated through command-and-control regulation. Today, it is widely accepted that this type of allocation is as inefficient for spectrum as it would be for paper or land. Many commentators and scholars, most famously Ronald Coase, have advocated that a more efficient allocation would be achieved if government sold the rights to the spectrum and allowed a free market in radio property to develop.

¶2 A new school of scholars, however, has begun to challenge the spectrum property model. While they agree with Coase that command-and-control spectrum management is highly inefficient, they instead propose to make spectrum a commons. They claim that new spectrum sharing technologies allow a virtually unlimited number of persons to use the same spectrum without causing each other interference and that this eliminates the need for either property rights in, or government control of, spectrum.

¶3 This Article aims to show that, despite the rhetoric, the commons model that has been proposed in the legal literature is not an alternative to command-and-control regulation, but in fact shares many of the same inefficiencies of that system. In order for a commons to be viable, someone must control the resource and set orderly sharing rules to govern its use. If the government is the controller of a commons—as proponents of a spectrum commons suggest it should be—then in allocating and managing the commons the government will very likely employ its existing inefficient processes.

¶4 Recently the FCC designated a 50 MHz block of spectrum in the 3650 MHz band as a commons. This Article looks at that proceeding and finds that in creating a commons, the government has not escaped the inefficiencies of command-and-control regulation.

I. A “THIRD WAY” FOR SPECTRUM?

¶5 In his seminal 1959 article, *The Federal Communications Commission*, Ronald Coase exploded the notion that government control of the radio spectrum was necessary to prevent airwave chaos.¹ Until then it was widely assumed that because spectrum was a uniquely scarce resource, the government had to ration its use.² Coase noted that almost all resources are scarce and that this does not

* Senior Research Fellow, Mercatus Center at George Mason University. The author would like to thank Tom Hazlett, Tom Whitehead, Lisa Sockett, and Jerry Ellig for their guidance, help, and support.

¹ Ronald H. Coase, *The Federal Communications Commission*, 2 J.L. & ECON. 1 (1959). Coase was inspired by then-law student Leo Herzel who preceded him in proposing that rights to the broadcast spectrum be sold. Leo Herzel, Comment, “Public Interest” and the Market in Color Television Regulation, 18 U. CHI. L. REV. 802 (1951).

² See *Red Lion Broad. Co. v. Fed. Comm’n Comm’n*, 395 U.S. 367, 388 (1969) (upholding restrictions on otherwise protected speech on the basis of scarcity) (“Where there are substantially more individuals who want to broadcast than there are frequencies to allocate, it is idle to posit an unabridgeable First Amendment right to broadcast comparable to the right of every individual to

necessitate government control, which inevitably leads to rent-seeking and inefficient allocations.³ Instead he proposed private ownership of spectrum in order to ensure more economically efficient results.⁴

¶6 Today, Coase's indictment of government spectrum management has largely been vindicated. The FCC has acknowledged the inefficiencies inherent in command-and-control spectrum regulation and has pledged to steer spectrum policy in a more flexible and market-oriented direction.⁵ However, Coase's vision of private rights in spectrum has been challenged by the idea that new technologies make *any* control of spectrum unnecessary.

¶7 Early radio technology relied on a strong transmission signal that could be properly recognized and rendered by a receiver.⁶ Receivers were dumb and could not distinguish one strong signal from another if the two came too close to each other.⁷ Today, receivers can be quite smart thanks to embedded computational power.⁸ This means that—using a number of different technologies—more communications capacity can be eked from the same amount of spectrum.⁹

¶8 Spread spectrum is one of these technologies.¹⁰ Instead of transmitting a signal at high power over one frequency, it transmits at low power across a wide band of frequencies.¹¹ A smart receiver is able to distinguish the very low power transmission from other low power transmissions and render the message encoded in it.¹² This has the effect of allowing many users to use the same frequencies at the same time, thus increasing the communications capacity of spectrum.

¶9 Other technologies that allow multiple use of the same spectrum include time-division multiple access (TDMA) and spectrum use etiquettes such as “listen before talk” (LBT). TDMA allows several users to share the same frequency by dividing the frequency's use into different time slots. Each user is then allowed to transmit in rapid succession, one after the other, using their own timeslot and thereby avoiding interfering with each other even though they are using the same frequency. LBT etiquette is simply a rule, programmed into a transmitting device, which would require it to listen in on a frequency before it transmits and then transmit only if it found that it would not cause interference to other devices.

¶10 Because these technologies allow multiple users to efficiently share the same spectrum, some scholars and commentators have suggested that not only is government control over the spectrum not necessary, but also that neither is private control necessary to manage the resource.¹³ Instead,

speak, write, or publish.”); Stuart Minor Benjamin, *The Logic of Scarcity: Idle Spectrum as a First Amendment Violation*, 52 DUKE L.J. 1, 38-45 (2002) (discussing scarcity rationale). *But cf.* Thomas W. Hazlett, *The Rationality of U.S. Regulation of the Broadcast Spectrum*, 33 J.L. & ECON. 133, 134 (1990) (arguing that policymakers did not mistakenly overlook scarcity, that they were quite aware of it, and that “decision making under the ‘public interest, convenience, or necessity’ licensing standard was a compromise designed to generate significant rents for each constituency influential in the process”).

³ Coase, *supra* note 1, at 14.

⁴ *Id.* at 17-40.

⁵ FEDERAL COMMUNICATIONS COMMISSION, SPECTRUM POLICY TASK FORCE REPORT, ET Docket No. 02-135 (released November 15, 2002), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-228542A1.pdf [hereinafter Spectrum Policy Task Force Report]. “In most instances, a flexible use approach is preferable to the Commission’s traditional ‘command-and-control’ approach to spectrum regulation, in which allowable spectrum uses are limited based on regulatory judgments.” *Id.* at 16.

⁶ Yochai Benkler, *Some Economics of Wireless Communications*, 16 HARV. J.L. & TECH. 25, 38-41 (2002) [hereinafter Benkler, *Some Economics*].

⁷ *Id.*

⁸ *Id.* at 41-45; Yochai Benkler, *Overcoming Agoraphobia: Building the Commons of the Digitally Networked Environment*, 11 HARV. J.L. & TECH. 287, 394-400 (1998) [hereinafter Benkler, *Agoraphobia*].

⁹ See Benkler, *Some Economics*, *supra* note 6, at 41-45; Benkler, *Agoraphobia*, *supra* note 8, at 394-400. It should be noted, however, that radios have been getting “smarter” since Marconi perfected the technology. Martin Cooper, *The Myth, the Law, and the Spectrum*, IEEE SPECTRUM, Jan. 2001, at 62.

¹⁰ Gerald R. Faulhaber & David J. Farber, *Spectrum Management: Property Rights, Markets, and the Commons* 14-16 (AEI-Brookings Joint Ctr. for Regulatory Studies, Working Paper No. 02-12, 2002).

¹¹ *Id.*

¹² *Id.*

¹³ LAWRENCE LESSIG, THE FUTURE OF IDEAS 76, 84, 219 (Random House 2002) (2001) [hereinafter LESSIG, FUTURE OF IDEAS]; Benkler, *Agoraphobia*, *supra* note 8, at 321-22 (explaining that central control, the “shared assumption” of government licensing and private property, is no longer necessary); Benkler, *Some Economics*, *supra* note 6, at 28; Stuart Buck, *Replacing Spectrum*

these scholars and commentators propose a “commons” or an “open spectrum” regime in which anyone could use any bit of the spectrum and avoid interference using the new technologies.¹⁴ As technologist George Gilder has put it, “You can use the spectrum as much as you want as long as you don’t collide with anyone else or pollute it with high-powered noise or other nuisances.”¹⁵

¶11 However, although spectrum’s capacity may have been increased, its scarce nature has not been repealed. More persons in total may now be able to make transmission thanks to new technologies, but the number of transmissions that can be made without interference is still finite. If a resource is finite, and thus scarce, the resource must be allocated among alternative competing uses.¹⁶

¶12 Proponents of a spectrum commons understand what Coase explained: that government distribution of spectrum is fraught with inefficiency.¹⁷ As Professor Lawrence Lessig wrote in his popular book, *The Future of Ideas*:

Liberating spectrum from the control of government is an important first step to innovation in spectrum use. On this point there is broad agreement, from those who push for a spectrum commons to those, like [Thomas] Hazlett, who push for a fully propertized spectrum market. All agree that the only thing that government-controlled spectrum has produced is an easy opportunity for the old to protect themselves against the new. Innovation moves too slowly when it must constantly ask permission from politically controlled agencies. The solution is to eliminate the need to ask permission, by removing these controllers at least.¹⁸

¶13 However, proponents of a commons reject the idea that property rights in spectrum should replace government control.¹⁹ They instead paint a picture of an unfettered spectrum open to all and loosed from the grip of either government or private control.²⁰

¶14 Commons advocates portray such a regime as a “third way” beyond private or state control of spectrum.²¹ For example, Professor Lessig writes in *The Future of Ideas* that the conventional view

Auctions with a Spectrum Commons, 2002 STAN. TECH. L. REV. 2, ¶¶ 9-11, 22, http://sclr.stanford.edu/STLR/Articles/02_STLR_2/index.htm; Kevin Werbach, *Supercommons: Toward a Unified Theory of Wireless Communication*, 82 TEX. L. REV. 863, 865 (2004) (“The ‘commons’ position holds that private property rights in spectrum are as unnecessary as government-issued licenses.”) [hereinafter Werbach, *Supercommons*]; Lawrence Lessig, *Code Breaking: Spectrum for All*, CIO INSIGHT, Mar. 14, 2003, <http://www.cioinsight.com/article2/0,1397,1662524,00.asp> (“Like a freeway, or a public park, use of a spectrum commons would neither be regulated nor propertized.”).

¹⁴ LESSIG, FUTURE OF IDEAS, *supra* note 13, at 76-79, 230-31; Kevin Werbach, *Open Spectrum: The New Wireless Paradigm*, (New Am. Found., Spectrum Series Working Paper No. 6, 2002), available at http://www.newamerica.net/publications/policy/open_spectrum (click on Open Spectrum Working Paper link at bottom). [hereinafter Werbach, *Paradigm*]. See Benkler, *Agoraphobia*, *supra* note 8, at 321-22; Buck, *supra* note 13; 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 (1998).

¹⁵ George Gilder, *Auctioning the Airways*, FORBES, Apr. 11, 1994, at 98.

¹⁶ Noam, *supra* note 14, at 769. The Spectrum Policy Task Force Report recognized that the new technologies could not eliminate scarcity altogether:

An important caveat must accompany any recommendation for a commons model: although there are indications that technology can go a long way to forestall scarcity concerns, if scarcity eventually does arise in particular spectrum bands in the future, then the commons model may need to evolve to address the problem. Because there is no price mechanism in the commons model to use as a tool for allocating scarce resources among competing users, there is always the risk that free access will eventually lead to interference and over-saturation, i.e., the “tragedy of the commons.” These problems can be overcome to some extent through regulatory guidance, requirements such as power and emission limits, and sharing etiquettes. But if actual spectrum scarcity still occurs, rights may need to be redefined and market mechanisms (e.g. band managers) introduced because without them there are insufficient incentives to avoid overuse.

Spectrum Policy Task Force Report, *supra* note 5, at 40-41.

¹⁷ Werbach, *Supercommons*, *supra* note 13, at 877.

[C]ommons advocates accept the economists’ diagnosis of the problem, just not their solution. The commons critique acknowledges that scarcity does not justify government control of spectrum, but is, in fact, exacerbated by it. It concurs that spectrum should be managed through market forces rather than government dictates. But, it shifts the debate. It highlights the common assumption of exclusivity between government licensing and property rights, and opposes it with lightly controlled forms of shared access.

Id.

¹⁸ LESSIG, FUTURE OF IDEAS, *supra* note 13, at 84, 87.

¹⁹ Benkler, *Agoraphobia*, *supra* note 8, at 324, 340-66; Werbach, *Supercommons*, *supra* note 13, at 877.

²⁰ See *supra* note 13 for representative views of the proponents of a commons.

considers only two ways to allocate spectrum: “One regime (the FCC’s) relies upon the government; the other (Coase’s) relies upon the market. Both presume that spectrum must be controlled. They differ only in the controller. Both thus reject a model of spectrum as a commons.”²² Similarly, Professor Yochai Benkler has written: “While the answer may be that we should permit a commons to develop alongside proprietary allocations, we will fail to permit that development if we continue to misperceive the choice at hand as one between [government] licensing and exhaustive privatization.”²³

¶15 Whether property rights in a market system would be a more efficient way to allocate spectrum use than would a commons has been expertly addressed elsewhere and is beyond the scope of this Article.²⁴ What this Article aims to ascertain is whether a commons, if created and managed in the manner proposed by advocates in the legal literature, would in fact be free of government control and its attendant inefficiencies.

A. *The Tragedy of the Taxonomy*

¶16 The ideas of “open access” and “commons” are often conflated in the spectrum debate.²⁵ Often the words are used interchangeably.²⁶ But they are two separate concepts with distinct meanings. To mix them is known as the “open-commons confusion.”²⁷

¶17 A commons is a resource that is owned or controlled jointly by a group of individuals.²⁸ It “is characterized by restrictions on who uses the resource, and when and how.”²⁹ The person or group of persons that establishes and enforces these restrictions is the controller of the commons. For our purposes, we can treat “owning” and “controlling” as synonyms. In some cases the controller of a commons will have legal title over the commons. For example, a group of ranchers may together purchase some grazing land and administer it for their mutual benefit. In that case, the ranchers have clear legal title to the real property and we say that they together are the owners and controllers of their commons. On the other hand, the same ranchers may all agree to manage their use of a local river so as to make its use sustainable. In that case they act in concert to control the resource even though they do not jointly or individually own the entire river.³⁰ Nevertheless, if they can effectively

²¹ Benkler, *Agoraphobia*, *supra* note 8, at 290 (“This article analyzes a third alternative: regulating wireless transmissions as a public commons, as we today regulate our highway system and our computer networks.”).

²² LESSIG, *FUTURE OF IDEAS*, *supra* note 13, at 75.

²³ Benkler, *Agoraphobia*, *supra* note 8, at 292-93.

²⁴ See generally Benkler, *Some Economics*, *supra* note 6; Timothy J. Brennan, *The Spectrum as Commons: Tomorrow’s Vision, Not Today’s Prescription*, 41 J.L. & ECON. 791 (1998); Thomas W. Hazlett, *Spectrum Tragedies*, 22 YALE J. ON REG. 242 (2005) [hereinafter Hazlett, *Spectrum Tragedies*]; Thomas W. Hazlett, *The Wireless Craze, the Unlimited Bandwidth Myth, the Spectrum Auction Faux Pas, and the Punchline to Ronald Coase’s “Big Joke”: An Essay on Airwave Allocation Policy*, 14 HARV. J.L. & TECH. 335 (2001) [hereinafter Hazlett, *Wireless Craze*]; Thomas W. Hazlett, *Spectrum Flash Dance: Eli Noam’s Proposal for “Open Access” to Radio Waves*, 41 J.L. & ECON. 805 (1998); Noam, *supra* note 14.

²⁵ For an insightful discussion of the distinction between the two terms and the confusion surrounding them, see Buck, *supra* note 13, notes 66-86 and accompanying text.

²⁶ Spectrum Policy Task Force Report, *supra* note 5, at 35 (listing both terms as synonyms in its definition of a spectrum commons).

²⁷ James A. Swaney, *Common Property, Reciprocity, and Community*, 24 J. ECON. ISSUES 451, 451-53 (1990). Swaney explains:

Common property is not synonymous with open access. Open access (*res nullius*) refers to resources that can be exploited by anyone without limit. . . . Common property (*res communes*) means a group of owners or users share use rights to the resource. Common property is characterized by restrictions on who uses the resource, and when and how. . . . To treat common property as open access is the “open-commons confusion,” and has been chronic at least since . . . [1954]. This confusion was further entrenched with Garret Hardin’s “The Tragedy of the Commons.”

Id. at 451-52. See also David D. Haddock & Lynne Kiesling, *The Black Death and Property Rights*, 31 J. LEGAL STUD. S545, S556 (2002) (explaining that the term “commons” has been misleadingly used to refer to what really is “open access”).

A representative example of the confusion can be seen in 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, 314 (2004) (“A commons is a resource open to all: the example that Garrett Hardin gives in his famous essay, *The Tragedy of the Commons*, is that of a pasture open to herdsmen.”).

²⁸ Swaney, *supra* note 27, at 452.

²⁹ *Id.*

³⁰ See Buck, *supra* note 13, at ¶ 56.

limit “who uses the resource, and when and how,” then we can say that they are the de facto, if not de jure, “owners” of the commons.

¶18 Open access, on the other hand, is a regime under which anyone has access to an unowned resource without limitation; no one controls access to the resource under open access.³¹ Access to sunshine, for example, is open, and this is unproblematic because sunshine is not scarce. However, a scarce resource subject to open access is susceptible to free riding and thus, in Garrett Hardin’s famous phrase, “the tragedy of the commons.”³² That phrase, however, sowed the seeds of decades of open-commons confusion.

¶19 The tragedy of the commons is a metaphor for the over-exploitation and degradation of a finite resource the users of which have no incentive to preserve.³³ To illustrate the concept, Hardin used in his article the example of an English Commons where anyone could graze her livestock.³⁴ In fact, however, there was not open access to common grazing land in medieval England.³⁵ Access to a grazing commons was open only to a limited class of users and its use was closely monitored and regulated by that group in order to preserve the resource, much the same as our ranchers above.³⁶ As Hardin later understood, tragedy does not befall commons generally but rather “unmanaged commons.”³⁷

¶20 Thus, the important distinction is that in a commons regime private owners or some other controlling authority—which can be the government—regulate use of the commons. First, a controller theoretically has an incentive to manage the resource in order to prevent its degradation, especially if they are self-interested.³⁸ The owner of a commons internalizes the cost of its actions and therefore makes efforts to avoid the type of tragedy that affects open access regimes.³⁹ Second, common owners—given definite rights over the resource—have the power to manage the resource by setting and enforcing rules and excluding others from its use.

¶21 Ownership, or at the very least legal control, is therefore a prerequisite to a commons. That is, in order for a commons to be a commons—and not an open access regime subject to overexploitation—an owner, a group of joint owners, or the government must control it and set rules that restrict how the resource is used.⁴⁰ These owner-set rules are what permit sharing of a scarce resource to be efficient.

³¹ Haddock, *supra* note 27; Swaney, *supra* note 27, at 452.

³² Garrett Hardin, *The Tragedy of the Commons*, 162 *SCIENCE* 1243 (1968).

³³ *Id.* at 1244.

³⁴ *Id.*

³⁵ Susan Jane Buck Cox, *No Tragedy on the Commons*, 7 *ENVTL. ETHICS* 49, 53-55 (1985).

³⁶ *Id.* at 55-59; Garrett Hardin, *The Tragedy of the Commons*, in *THE CONCISE ENCYCLOPEDIA OF ECONOMICS* (David R. Henderson ed., 2005) available at <http://www.econlib.org/library/Enc/TragedyoftheCommons.html> (“Some of the common pastures of old England were protected from ruin by the tradition of stinting, the limitation of each herdsman to a fixed number of animals (not necessarily the same for all).”).

³⁷ As Stuart Buck notes, Garrett Hardin has stated, “The title of my 1968 paper should have been ‘The Tragedy of the Unmanaged Commons.’” Buck, *supra* note 30, at ¶10 n.12 (quoting Garrett Hardin, *The Tragedy of the Unmanaged Commons: Population and the Disguises of Providence*, in *COMMONS WITHOUT TRAGEDY: PROTECTING THE ENVIRONMENT FROM OVERPOPULATION—A NEW APPROACH* 162, 178 (Robert V. Andelson, ed., 1991)).

³⁸ Hazlett, *Wireless Craze*, *supra* note 24, at 373 (“[R]adio spectrum users under public interest regulation rely on de facto private property rights to limit interference. Wireless licensees, not the FCC, police ‘their’ airspace, reporting interference from unauthorized transmissions, or ‘piracy,’ to law enforcement authorities.” (citations omitted)).

³⁹ A private controller will certainly have a self-interested incentive to make the most efficient use of the resource and will certainly internalize the cost and benefits of its actions. A government controller’s incentive, however, is to make the most efficient use of the resource in the public interest and may not internalize all the costs and benefits of its actions.

⁴⁰ Social norms often serve to regulate the use of a common resource. “Social norms which address and prevent counterproductive behavior may well arise in repeat games situations, but there are no such guarantees where the parties are not likely to interact with one another on a regular basis. . . . [W]hen anonymous users send signals that travel great distances in dense areas, there are strong reasons to believe that social norms will break down.” Philip J. Weiser & Dale Hatfield, *Policing the Spectrum Commons*, 74 *FORDHAM L. REV.* 663, 676-677 (2005).

B. Given a Commons, a Controller

- ¶22 Notwithstanding the need for a controller if a commons is to be viable, proponents of a spectrum commons insist that in their model spectrum will be open and that everyone will have access to it without asking anyone for permission.⁴¹ They liken the system they envision to other commons such as a highway or Central Park.⁴² What is at work in this rhetoric is the open-commons confusion.⁴³ The only resource one can use without receiving any permission is one that is unowned and subject to open access.⁴⁴ Neither a highway nor Central Park qualifies.
- ¶23 While it is true that you don't have to ask for permission each time you wish to use a highway, permission is necessary and it is impliedly granted so long as you respect the traffic rules set by the controller of the road, namely the state.⁴⁵ If you fail to follow the rules of the road—say, by continuously driving on the wrong side of the road or not obeying traffic lights—you will soon find yourself excluded from access to the highway.
- ¶24 The same applies to Central Park. If you want to use one of the limited number of baseball fields available in the park, you must apply for a permit from the New York City Department of Parks and Recreation and pay a fee.⁴⁶ Use of the fields is subject to availability and other rules, such as time limits and a prohibition on using fields merely for practice sessions.⁴⁷
- ¶25 Therefore, while it is true that access to a commons can be open (as is the case with highways or Central Park), this does not mean there is no central rule-setting authority. Central Park may be a commons, but New York City is its owner and it can decide how the park's baseball fields will be used. A commons must be controlled either by private actors or by the government.⁴⁸ There is no “third way.”
- ¶26 Open access is not a feasible regime for spectrum because, as a scarce resource,⁴⁹ it will be subject to tragedy.⁵⁰ Even given new spectrum-sharing technologies, a controller is still needed because these technologies require standards setting and enforcement in order to function.⁵¹ A commons for spectrum, on the other hand, is feasible in that the controller of a particular block of spectrum—whether a private owner or the government—may choose to manage it as a commons. A commons may therefore exist in either (1) spectrum that is controlled by private actors, or (2) in spectrum that is controlled by the state.
- ¶27 In contrast to this conclusion, however, the leading advocates of a commons argue that such a regime will place control of the resource outside the reach of either government or private actors.⁵²

⁴¹ LESSIG, *FUTURE OF IDEAS* 76 (“Rather than controlled, spectrum would be, in this model, ‘free.’ Rather than permission to use it, the right to use it would be granted to anyone who wanted it. Rather than property, spectrum would be a commons.”); Benkler, *Some Economics*, *supra* note 6, at 72; Lawrence Lessig, *Commons and Code*, 9 *FORDHAM INTELL. PROP. MEDIA & ENT. L.J.* 405, 406 (1999) [hereinafter Lessig, *Commons and Code*]; Werbach, *Paradigm*, *supra* note 14, at 9.

⁴² Lessig, *Commons and Code*, *supra* note 41, at 406-07; LESSIG, *FUTURE OF IDEAS* 20-21 (2002); Werbach, *Paradigm*, *supra* note 14, at 9; Benkler, *Agoraphobia*, *supra* note 8, at 290.

⁴³ See *supra* Section I.A.

⁴⁴ *Id.*

⁴⁵ It should be noted that congestion is a common feature of roads. Congestion pricing has been introduced in some places to alleviate it. See TODD LITMAN, VICTORIA TRANSPORT POLICY INSTITUTE, LONDON CONGESTION PRICING: IMPLICATIONS FOR OTHER CITIES, (Jan. 10, 2006), available at <http://www.vtpi.org/london.pdf>.

⁴⁶ See New York City Department of Parks and Recreation, Athletic Permits and Applications: New York City Department of Parks and Recreation, http://www.nycgovparks.org/sub_permits_and_applications/athletic_permits_and_apps.html.

⁴⁷ New York City Department of Parks and Recreation, Guidelines for Use of Field and Court Space http://www.nycgovparks.org/sub_permits_and_applications/images_and_pdfs/sports_guidelines_form.pdf.

⁴⁸ Noam, *supra* note 14, at 780; Jon M. Peha, *Approaches to Spectrum Sharing*, IEEE COMMUNICATIONS, Feb. 2005, available at <http://www.comsoc.org/ci1/Public/2005/Feb/cireg.html>.

⁴⁹ See *supra* note 16 and accompanying text.

⁵⁰ Hazlett, *Spectrum Tragedies*, *supra* note 24, at 263 n.84. Professor Eli Noam has stated it succinctly: “With open access, scarcity emerges, the resource needs to be allocated, and a price mechanism is required.” Noam, *supra* note 16.

⁵¹ Hazlett, *Wireless Craze*, *supra* note 24, at 504 (“Despite the technical abundance assertion, unlicensed spectrum use is not free, which is why standards are called for, on the one hand, and fiercely debated, on the other.”).

⁵² See *supra* note 13.

They acknowledge that a spectrum commons will have to be subject to sharing rules, but they assert that neither government nor private owners will control spectrum use.⁵³ However, one cannot impose and enforce sharing rules without some actor controlling the spectrum.

¶28 Commons advocates suggest that the power to regulate communications equipment and mandate sharing rules is not the same as control over spectrum use.⁵⁴ The definition of “control” that they employ is limited to power over who may transmit over a certain band. But just as important as who may use spectrum is *how* they may use it. Indeed, current FCC licenses define not just who may transmit over a certain channel, but what technology they may use, what content they may transmit, and even what business model they may employ.⁵⁵ Even if transmission were open, authority to set rules about what kind of equipment is allowed to transmit—in government or private hands—is control over how the spectrum may be used because any decision in favor of one type of equipment or technology necessarily excludes others. Whoever has the power to set and enforce rules stipulating how all or a portion of the radio spectrum can be used is the de facto, if not de jure, controller of that spectrum.⁵⁶

C. Given a Controller, the Government

¶29 Once one understands that a commons requires a controller to set rules-of-the-road to facilitate sustainable sharing, it becomes apparent that the commons advocates’ aspiration to place spectrum use outside the control of government or private actors is untenable. This then raises the question, would advocates of a commons prefer that the controller be the government or private actors competing in the market? One might think that because they understand the inefficiency of government rule-setting very well, proponents of a commons would not choose a government controller. One would be wrong.⁵⁷ As Professor Lessig writes,

There would be a role for [government] regulation even if spectrum were “free.” But this regulation would look very different from the regulation that now controls spectrum The government would simply be assuring that the technologies that use the spectrum are properly certified technologies.⁵⁸

¶30 Yet there is nothing that will make this new government regulation free from the same protracted and inefficient processes that have thus far plagued decisions about spectrum. Commons advocates assume that because government will not be issuing exclusive licenses to spectrum—but instead will be issuing technical regulations mandating how devices can use spectrum generally—it will not be susceptible to the same pitfalls of its current command-and-control regime.⁵⁹ But as Professor Lessig notes a few pages before the passage quoted above: “It is an iron law of modern

⁵³ Benkler, *Some Economics*, *supra* note 6, at 28 (“This approach has been called a ‘spectrum commons’ approach, because it regards bandwidth as a common resource that all equipment can call on, subject to sharing protocols, rather than as a controlled resource that is always under the control of someone, be it a property owner, a government agency, or both.”); Werbach, PARADIGM, *supra* note 14, at 2 (“Allowing users to share spectrum, *subject to rules that ensure they do so efficiently*, would be far more effective than turning more spectrum over to private owners.”) (emphasis added).

⁵⁴ See *supra* note 14.

⁵⁵ Hazlett, *Spectrum Tragedies*, *supra* note 24, at 244.

⁵⁶ One need not have legal title to spectrum in order to be its de facto owner and controller. See Howard A. Shelanski & Peter W. Huber, *Administrative Creation of Property Rights to Radio Spectrum*, 41 J.L. & ECON. 581 (1998). Noam, *supra* note 14, at 785, notes:

As Richard Posner observes, “In economic, though not in formal legal terms, then, there are property rights in broadcast frequencies. . . . Once obtained the right is transferable. . . . And it is for all practical purposes perpetual. The right-holder is subject to various regulatory constraints, but less so than a public utility, the principal assets of which are private property in the formal legal sense.”

(quoting RICHARD A. POSNER, *ECONOMIC ANALYSIS OF LAW* (2d ed. 1977)). Similarly, in a commons regime it is the rule-setter—government or private—that will exercise ownership rights over the spectrum in at least an economic, if not a legal, sense.

⁵⁷ Stuart Minor Benjamin, *Spectrum Abundance and the Choice Between Private and Public Control*, 78 N.Y.U. L. REV. 2007, 2031 (2003); Hazlett, *Wireless Craze*, *supra* note 24, at 484 (“Gilder, Benkler, and Lessig pursue government regulation to police the commons.”).

⁵⁸ LESSIG, *FUTURE OF IDEAS* 83 (2002).

⁵⁹ *Id.* at 83-84.

democracy that when you create a regulator, you create a target for influence, and when you create a target for influence, those in the best position to influence will train their efforts upon that target.”⁶⁰

¶31 If government is to assure that technologies are “properly certified” it must first establish what is proper certification. It will do this using the tools at its disposal—through a political regulatory process and without the benefit of the dynamic feedback a market could provide. Noting that the rules governing current unlicensed spectrum bands, such as those used for Wi-Fi, are not optimized for efficient spectrum sharing, Professor Kevin Werbach writes that nevertheless, “[e]nlightened policies will allow the emergence of open spectrum systems[.]”⁶¹ But what will now ensure the enlightenment that was unknown to the regulators of the past?⁶²

¶32 Speaking at a telecommunications conference, Professor Benkler, a leading advocate of a commons regime, acknowledged the threat that a government-managed commons would pose: “Common law property adjudication is very inefficient[.] [But] the main problem is that the alternative, if it is regulation and some government-mandated . . . clear standard, [risks] reintroduction of command-and-control through the equipment rules. That is one thing we should absolutely resist.”⁶³ He suggested that one way to solve this problem might be to simply have no spectrum use rules.⁶⁴ As noted above, however, a lack of sharing rules would lead to an open access tragedy.⁶⁵

D. Given Government, Inefficiency

¶33 Spectrum under government control, even if managed as a commons, will be subject to the inefficiencies Coase recognized in 1959.⁶⁶ These can be divided into inefficiencies caused by political rent seeking and nonpolitical inefficiencies. Coase succinctly explained the latter category:

Quite apart from the malallocations which are the result of political pressures, an administrative agency which attempts to perform the function normally carried out by the pricing mechanism operates under two handicaps. First of all, it lacks the precise monetary measure of benefit and cost provided by the market. Second, it cannot, by the nature of things, be in possession of all relevant information possessed by the managers of every business which uses or might use radio frequencies, to say nothing of the preferences of consumers for the various goods and services in the production of which radio frequencies could be used. In fact, lengthy investigations are required to uncover part of this information, and decisions by the Federal Communications Commission emerge only after long delays, often extending to years.⁶⁷

⁶⁰ *Id.* at 74.

⁶¹ Werbach, PARADIGM, *supra* note 14, at 4.

⁶² Benjamin, *supra* note 57, at 2020 (noting that the arguments of commons proponents “rely on a set of idealized decisionmakers.”); Buck, *supra* note 30, at ¶ 39 (“[Yochai] Benkler’s prescription of creating a commons in the spectrum is not described in any great detail. Who would do the regulating in his system is left undetermined, as well as who would monitor behavior, administer penalties, and make decisions about localized exceptions to any regulation.”).

⁶³ Audio recording: Yochai Benkler speaking at the Cato Institute’s Sixth Annual Technology & Society Conference: Telecom and Broadband Policy After the Market Meltdown, held by the Cato Institute (Nov. 14, 2002) *available at* [rtsp://real.cato.org:554/archive-2002/confa-11-14-02-2.rm](http://real.cato.org:554/archive-2002/confa-11-14-02-2.rm), also available at <http://www.cato.org/events/techconf02/index.html>.

⁶⁴ *Id.*

⁶⁵ Others have tried to get around this. Professor Werbach has suggested what seems like a variant on a no-sharing-rules regime. *See* Werbach, *Supercommons*, *supra* note 13. Much like George Gilder, Werbach suggests that in his proposed “universal access” system, “[a]nyone would be permitted to transmit anywhere, at any time, in any manner, *so long as* they did not impose an excessive burden on others.” *Id.* at 930-31 (emphasis added). It is the “so long as” that removes the pure open access regime. Professor Werbach suggests that tort-like rules could resolve interference disputes. *Id.* at 938-43. However, the development of post hoc tort rules, even if they remove an ex ante regulatory process, still create a commons that is regulated without the benefit of market feedback. Benjamin, *supra* note 57, at 2031 n.78. Professor Werbach also proposes that actors who follow accepted sharing standards should be exempt from liability. Werbach, *Supercommons*, *supra* note 13, at 944-45. But the existence of these standards implies spectrum-sharing rules set by an ex ante regulator. Benjamin, *supra* note 57, at n.78. “Perhaps more important,” Professor Stuart Benjamin notes, “if Werbach’s proposed system yielded a much less controlled system, in which people really could transmit fairly freely, we would expect . . . interference[.]” *Id.*

⁶⁶ *See* Benjamin, *supra* note 57; Hazlett, *Wireless Craze*, *supra* note 24; Weiser & Hatfield, *supra* note 40.

⁶⁷ Coase, *supra* note 1, at 18.

¶34 Additionally, because it lacks a profit-maximizing incentive, the FCC instead must make its decisions based on a public interest standard that is quite malleable.⁶⁸ This makes it the target of rent-seeking behavior by parties who are willing to invest in lobbying.

1. Nonpolitical Inefficiencies

¶35 There are at least two nonpolitical inefficiencies specific to government creation of a spectrum commons. First is underprovisioning of the inputs required for effective sharing in a commons: sharing rules and rule enforcement. A private controller would have the incentive necessary to manage and enforce user coordination in order to maximize profits. A government controller, however, would be at a disadvantage.

¶36 Government must develop spectrum sharing rules to make a commons viable.⁶⁹ It does this by regulating the devices that may transmit over a commons.⁷⁰ This regulation entails many technical choices, each presenting technological trade-offs.⁷¹ For example, one of the most important parameters of device regulation is a power limitation. Limiting the power at which devices may transmit limits the strength of a transmission and thus reduces the probability that it will interfere with another device on the same frequency. Choosing one power limit necessarily excludes higher-power applications that might have made use of the same spectrum.⁷² However, without the help of dynamic price signals, the FCC must rely on less effective ways of measuring the opportunity cost of excluding those alternative uses. The result is that power limits (as well as other such technical constraints) will be set either too tightly or too loosely.⁷³ As Professor Thomas Hazlett has noted, “[h]itting the optimum is theoretically possible but will occur only in a (lucky) special case. There is no natural tendency for regulators to converge on this solution, while political forces reliably resist it.”⁷⁴

¶37 Similarly, a controller must enforce its sharing rules if they are to be effective. Enforcement of spectrum sharing rules in a government commons is a public good, and one that the FCC has historically underprovisioned. Citizens Band (CB) radio is a government commons that, after a boom in adoption, ultimately succumbed to tragedy.⁷⁵ While the FCC did control the power levels and equipment that could be used on the band, it did little to enforce its rules.⁷⁶ Users began to install illegal amplifiers that crowded out the communications of other users—in effect overgrazing—thus significantly diminishing the value of the band.⁷⁷ The CB radio bust came about in large part because the FCC did not appreciably enforce its usage rules.⁷⁸ In contrast, a private controller internalizes the

⁶⁸ 47 U.S.C. § 303 (2005). See PETER HUBER, *LAW AND DISORDER IN CYBERSPACE* (1997) (arguing that the public interest standard gives the FCC almost unqualified latitude in its policy decisions); Hazlett, *Wireless Craze*, *supra* note 24, at 401-03 (arguing that the public interest standard is ambiguous “largely by design” because “[t]he phrase provide[s] the least constraining constitutional standard for regulation”); Neil Hickey, *Unshackling Big Media*, *COLUM. JOURNALISM R.*, July-Aug. 2001, at 30 (“Asked at his maiden news conference for his definition of ‘the public interest,’ [FCC Chairman Michael] Powell joked, ‘I have no idea.’ The term can mean whatever people want it to mean, he said. ‘It’s an empty vessel in which people pour in whatever their preconceived views or biases are.’”).

⁶⁹ LESSIG, *FUTURE OF IDEAS* 83 (2002).

⁷⁰ *Id.* at 83.

⁷¹ Benjamin, *supra* note 57, at 2046.

⁷² *Id.* at 2045; Hazlett, *Spectrum Tragedies*, *supra* note 24, at 270; Weiser & Hatfield, *supra* note 40, at 127; Spectrum Policy Task Force Report, *supra* note 5, at 40.

⁷³ Rules that are set too tightly are also inefficient because they leave socially valuable uses unrealized. Hazlett, *Wireless Craze*, *supra* note 24, at 381-82.

⁷⁴ *Id.* at 498.

⁷⁵ Benjamin, *supra* note 57, at 2023; Weiser & Hatfield, *supra* note 40, at 119-21; Noam, *supra* note 16, at 784; Carol Ting et al., *The U.S. Experience with Non-traditional Approaches to Spectrum Management: Tragedies of the Commons and Other Myths Reconsidered* (Sept. 21, 2003) (unpublished manuscript, presented at the 31st Research Conference on Communication, Information and Internet Policy, Arlington, VA, Sept. 19-21, 2003), available at <http://quello.msu.edu/wp/wp-03-05.pdf>.

⁷⁶ Weiser & Hatfield, *supra* note 40, at 120; Ting et al., *supra* note 75, at 12, 17.

⁷⁷ Benjamin, *supra* note 57, at 2023 (“Some users operated amplifiers at power levels above those that the FCC permitted; their messages got through, but at the cost of interfering with the messages of other users. CB users, in other words, behaved exactly as economic theory would predict, with the result that many users became crowded out.”)

⁷⁸ Weiser & Hatfield, *supra* note 40, at 120; Ting et al., *supra* note 75, at 12, 17.

costs and benefits of enforcement and therefore has the incentive to police its frequencies and take action against those who interfere.⁷⁹

¶38 The second nonpolitical inefficiency is the inertia and delay caused by lack of information. As Coase noted, the FCC must substitute price information with information gathered through public comment, testimony, and its own investigations.⁸⁰ It must then deliberate and issue decisions that it can justify using its public interest standard. This is by its nature a protracted process, especially because the FCC has little incentive to act quickly, but does wish to avoid making mistakes. Changing a rule once it is in place is possibly even more time-consuming, so it is unlikely rules will be modified to keep pace with technological innovation as quickly as a market actor might.⁸¹

2. Rent-Seeking

¶39 There are at least two ways that a government creation of a commons is subject to rent-seeking behavior. The first is in the allocation of the spectrum itself. Parties that stand to gain or lose depending on the outcome will hotly contest whether or not to allocate a certain band to commons use. Even if a commons is taken for granted, what the parameters of that commons will be are subject to debate.

¶40 Second, the trade-offs inherent in the selection of spectrum sharing rules are also trade-offs between the backers of the different rules or standards. Interested parties will exert pressure on the FCC to make sure that their technical standard is adopted or protected. For example, the 2.4 GHz band is a government-controlled commons on which Wi-Fi, cordless phones, garage door openers, and many other consumer devices operate subject to sharing rules enforced through federal device regulation.⁸² In 1999, Motorola, Proxim, Siemens, and other companies backed changes to the sharing rules that would allow them to offer a more robust competitor to Wi-Fi called HomeRF.⁸³ Predictably, Cisco, 3Com, Apple, and other Wi-Fi backers waged a contentious regulatory war against the rule change claiming that the new HomeRF technology would interfere with Wi-Fi transmissions.⁸⁴ In contrast, private controllers internalize the economic costs and benefits resulting from spectrum use decisions and will undertake all cost-effective measures to put in place optimal spectrum sharing rules.⁸⁵

II. THE 3650 MHZ PROCEEDING

¶41 Today, academics and policy makers have generally come to realize that command-and-control management of spectrum is undeniably inefficient. They have therefore undertaken to identify alternative management systems. Spectrum property rights combined with a free market is the alternative that Coase proposed, and it is not without its significant critiques.⁸⁶ As we have seen, the other notable system that has been proposed is spectrum managed as a commons. This Article does

⁷⁹ Hazlett, *Wireless Craze*, *supra* note 24, at 373-74, 387. “[U]nder public interest mandates, regulators have relied upon de facto property rights to police the airwaves. While harmful interference is quickly reported to authorities, very little occurs because it is not in the economic interest of private parties to invest in wireless communications without secure rights to use radio waves.” *Id.* at 536.

⁸⁰ Coase, *supra* note 1, at 18.

⁸¹ Hazlett compares the transition in the 1990s from analog to digital networks undertaken by cellular phone companies to the government-managed transition to digital television. Hazlett, *Spectrum Tragedies*, *supra* note 24, at 272. The former took only a few years and was accomplished successfully, while the latter has been fraught with political problems and the transition “is entering its third decade.” *Id.*

⁸² 47 C.F.R. §§ 15.243-15.249.

⁸³ Hazlett, *Wireless Craze*, *supra* note 24, at 503; Wylie Wong, *Future of home networking rests on FCC*, C|NET NEWS.COM, May 22, 2000, <http://news.com.com/2100-1033-240880.html>; Glenn Fleishman, *New Wireless Standards Challenge 802.11b*, O'REILLY WIRELESS DEVCENTER, Jun. 8, 2001, <http://www.oreillynet.com/pub/a/wireless/2001/05/08/standards.html>.

⁸⁴ *Id.*

⁸⁵ Hazlett, *Wireless Craze*, *supra* note 24, at 503-04.

⁸⁶ See Dale Hatfield & Philip J. Weiser, *Property Rights in Spectrum: Taking the Next Step*, Sep. 30, 2005, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=818624 (explaining that “the transition to a property rights model for spectrum is far more complex than commonly portrayed”).

not aim to champion the relative merit of one proposal over the other, for in fact each may be the most appropriate depending on the context. However, if what we aim to identify are indeed *alternatives* to command-and-control in order to avoid its inefficiencies, then we should carefully note if a proposed system is subject to the very same inefficiencies.

¶42 A commons that is created and managed by the federal government will rely heavily on the same regulatory regime that underpins the historical command-and-control system. It will thus likely be subject to similar inefficiencies and pitfalls. The popular notion that a commons is a third way independent of government hides this reality. While we might make the political decision to manage some spectrum as a government commons—the same way New Yorkers have chosen to manage a large portion of Manhattan as Central Park—we should do so mindful of the fact that we have likely not escaped some of the problems inherent in command-and-control.

¶43 Currently the FCC is engaged in a rulemaking that would designate the 50 MHz block of spectrum between 3650 and 3700 MHz as a commons. The commons that is being created in this proceeding is doubtlessly not the commons that many academic proponents would design if they were charged to do so. Nevertheless, it is the commons that government is giving us. That is if, as proponents advocate, government is to create a commons, then it will have to do so using the FCC's regulatory process—without the benefit of market feedback, with varying special interests lobbying the agency, and relying heavily on good intentions and the amorphous public interest standard to guide it. What we are witnessing in the 3650 proceeding is the birth of a government-controlled commons, and already the baby is exhibiting some of the telltale signs of regulatory inefficiency.

A. A (Concise) History of the 3650 MHz Band

¶44 The history of the 3650 MHz band is a long and convoluted one. Prior to 1984, the 3500-3700 MHz band was allocated exclusively for federal government use.⁸⁷ In 1984, the FCC changed its rules to allow the 3600-3700 MHz band to also be used by nongovernment satellite services.⁸⁸ That use was restricted “to international inter-continental [space-to-Earth] systems,”⁸⁹ which had the effect of locating the receiving stations largely along the coasts and not in the interior of the country.⁹⁰

¶45 In 1993, Congress mandated the Commerce Department to identify at least 200 MHz of federal government spectrum to be transferred to private use.⁹¹ Pursuant to this directive, the 3650-3700 MHz band was slated for transfer in 1999 as a mixed-use band.⁹² This meant that while the band would become available for allocation and assignment by the FCC to private users, the government would retain indefinite use of the band at three government installations.⁹³

¶46 Congress acted again in 1997 and mandated the FCC to assign through auctions a total of 55 MHz of nongovernment spectrum.⁹⁴ It specifically identified spectrum in the 1990-2150 MHz band for this purpose.⁹⁵ However, for a 15 MHz portion of this band, Congress gave the President the authority to identify an alternate 15 MHz of spectrum if the President determined that reallocation of

⁸⁷ Federal Communications Commission, *In the Matter of Unlicensed Operation in the Band 3650-3700 MHz, Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band, Amendment of the Commission's Rules With Regard to the 3650-3700 MHz Government Transfer Band*, ET Docket No. 04-151, ET Docket No. 02-380, ET Docket No. 98-237 (released Apr. 23, 2004), 19 FCC Rcd 7545, at ¶ 4 (2004) (notice of proposed rulemaking) [hereinafter 3650 NPRM], available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-04-100A1.pdf, summarized at Unlicensed Operation of the 3650-3700 MHz Band, 69 Fed. Reg. 26790 (May 14, 2004) (proposed rule).

⁸⁸ 3650 NPRM, *supra* note 87, at ¶ 4.

⁸⁹ *Id.*

⁹⁰ Hazlett, *Spectrum Tragedies*, *supra* note 24, at n.120.

⁹¹ 3650 NPRM, *supra* note 87, at ¶ 5.

⁹² *Id.*

⁹³ *Id.* The three installations are radiolocation stations at Pascagoula, Mississippi; Pensacola, Florida; and Saint Inigoes, Maryland. *Id.*

⁹⁴ *Id.* at ¶ 6.

⁹⁵ *Id.*

the spectrum Congress had chosen would interfere with incumbent government uses.⁹⁶ President Clinton exercised this option and, in 1998, through the National Telecommunications and Information Administration (NTIA), identified the 3650 MHz band as one possible source for the alternate 15 MHz spectrum block.⁹⁷

¶47 That same year, the FCC began a proceeding to allocate the 3650 MHz band for fixed wireless services.⁹⁸ To that end, the FCC sought to end the band's existing allocation for satellite services.⁹⁹ It issued a "freeze" order stating that it would no longer accept applications for new satellite Earth stations or major amendments to the licenses of existing stations.¹⁰⁰ The FCC nevertheless stated that if it took this course of action it would grandfather existing satellite Earth stations.¹⁰¹

¶48 In late 2000, the FCC issued rules allocating the 3650 MHz band for fixed and mobile wireless services.¹⁰² Pursuant to NTIA's identification of the 3650 MHz band as a candidate for auctioning, the FCC also established that it would assign licenses in the band through competitive bidding.¹⁰³ The FCC then began a proceeding to determine service rules for the band, which would determine the contours of the licenses to be offered.¹⁰⁴ After initial public comments were filed in that proceeding, the FCC took no further action on licensing the band until recently.¹⁰⁵

¶49 In November 2002, the FCC's Spectrum Policy Task Force, which had been charged with rethinking spectrum management, released its final report.¹⁰⁶ As noted in Part I, the Report concluded that command-and-control management of spectrum was inefficient and recommended auctions and commons as alternatives that should be pursued.¹⁰⁷ One month later, however, before the public comment period for the Report had ended, the FCC decided to begin investigating a commons approach for the 3650 MHz band.¹⁰⁸

¶50 The FCC issued a Notice of Inquiry seeking public comment on the possibility of allowing the unlicensed use of the 3650 MHz band.¹⁰⁹ The Commission contemplated use of the band at power levels higher than those allowed for other unlicensed bands and subject only to minimal technical requirements to avoid interference with incumbent satellite Earth stations.¹¹⁰ In response to this Notice of Inquiry, public comments were filed in favor and against unlicensed use of the band. In favor of an unlicensed commons approach were mainly rural wireless Internet service providers (WISPs) who sought new spectrum over which to provide high-speed Internet access to their customers. These WISPs had traditionally relied on existing unlicensed bands (such as the 2.4 GHz band that houses Wi-Fi and other unlicensed applications), but now complained that those unlicensed bands had become too crowded.¹¹¹ Against the unlicensed commons approach were

⁹⁶ *Id.*

⁹⁷ *Id.*

⁹⁸ *Id.* at ¶ 7.

⁹⁹ *Id.*

¹⁰⁰ *Id.*; Federal Communications Commission, *Amendment of the Commission's Rules With Regard to the 3650-3700 MHz Government Transfer Band*, ET Docket No. 98-237 (released Dec. 18, 1998), 14 FCC Rcd 1295 (1998) (notice of proposed rulemaking and order) [hereinafter FSS Freeze Order].

¹⁰¹ 3650 NPRM, *supra* note 87, at ¶ 7.

¹⁰² *Id.* at ¶ 8.

¹⁰³ *Id.*

¹⁰⁴ *Id.* at ¶ 11.

¹⁰⁵ *Id.* at ¶ 13.

¹⁰⁶ Spectrum Policy Task Force Report, *supra* note 5.

¹⁰⁷ *See supra* note 5.

¹⁰⁸ Federal Communications Commission, *Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, ET Docket No. 02-380 (released Dec. 20, 2002), http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-02-328A1.pdf (notice of inquiry) [hereinafter Unlicensed NOI]. In a statement accompanying the notice of inquiry, then-commissioner Kevin Martin criticized taking action, stating, "I question the timing of this item. This item is based around several recommendations of the Commission's Spectrum Policy Task Force Report. We only recently put that Report out for comment It seems odd to me to initiate this proceeding before we even receive any comments on the Task Force's recommendations." *Id.* at ¶ 18.

¹⁰⁹ *Id.*

¹¹⁰ *Id.* at ¶ 20.

¹¹¹ *See, e.g.* Roy Preston, *Comments Regarding Unlicensed NOI*, ET Docket No. 02-380 (Jan. 6, 2003); Lakeland Communications,

mobile wireless carriers and equipment manufacturers, such as Cingular and Motorola, who argued that unlicensed use was not allowed by the Communications Act and would also cause interference to existing devices.¹¹² Ultimately, the FCC issued in April 2004 a notice of proposed rulemaking to designate the 3650 MHz band for unlicensed use, especially emphasizing its potential benefit to rural WISPs.¹¹³

¶51 This final proposed rulemaking was hotly contested during the public comment period. It resulted in a March 2005 FCC order designating the 3650 MHz band for nonexclusive licensed use—a very unique commons. Although users of the band will have to acquire a license to use the band, the license does not give them the exclusive right to use the spectrum; that is, licensees will have to share the spectrum with every other licensee.¹¹⁴ An unlimited number of licenses will be issued on a national basis.¹¹⁵ Licensees will be required to “make every effort” not to interfere with each other.¹¹⁶ Additionally, there is no first-in-time right, meaning that an initial licensee does not have superior rights to a subsequent licensee.¹¹⁷

¶52 To facilitate sharing of the band, the FCC set very general sharing rules by mandating that devices operating in the band use a “contention-based protocol” such as “listen before talk.”¹¹⁸ The rules, however, do not make clear if only one standard can be used in the entire band or if several can be deployed. Nevertheless, before a device is allowed to transmit over the band, the FCC must certify it as compliant with the rules. Soon after the FCC’s designation of the 3650 MHz band as a commons, wireless manufacturers filed petitions for reconsideration that, among other things, asked the FCC to clarify the new rules.¹¹⁹ Other parties also filed petitions for reconsideration and they are all currently pending.¹²⁰

B. Allocation & Sharing Rules

¶53 Under the FCC’s traditional command-and-control system of spectrum management, blocks of spectrum are first allocated for a particular use and then assigned to licensees who may only use the spectrum within the confines of the allocation. For example, spectrum currently used by television broadcasters is well suited for mobile wireless communications, including high-speed mobile data. However, because the spectrum is allocated for free over-the-air television it cannot legally be used for any other purpose. The owner of a local VHF television license (effectively 6 MHz of spectrum somewhere between 54 and 806 MHz) cannot sell her license to a wireless carrier such as Verizon—even if that is a higher valued use. Nor may she offer a commercial-free pay-per-view television service over the spectrum; the allocation limits use of the spectrum to providing advertiser-supported

Comments of Lakeland Communications, ET Docket No. 02-380 (Feb. 2, 2003).

¹¹² Cingular, *Comments of Cingular Wireless LLC*, ET Docket No. 02-380 (Apr. 17, 2003) (arguing that unlicensed operations would violate Section 301 of the Communications Act of 1934, which established licensing as the statutory model, and arguing that unlicensed operations would also create technical problems); Motorola, *Comments of Motorola, Inc.*, ET Docket No. 02-380 (Apr. 17, 2003) (arguing that unlicensed operation in the 3650 MHz band would be premature before the Commission finalized service rules for licensed services in the band).

¹¹³ 3650 NPRM, *supra* note 87, at ¶ 2.

¹¹⁴ Federal Communications Commission, *In the Matter of Wireless Operations in the 3650-3700 MHz Band, Rules for Wireless Broadband Services in the 3650-3700 MHz Band, Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band, Amendment of the Commission's Rules With Regard to the 3650-3700 MHz Government Transfer Band*, ET Docket No. 04-151, WT Docket No. 05-96, ET Docket No. 02-380, ET Docket No. 98-237 (released Mar. 16, 2005), at ¶¶ 31-32 (2005) (report and order and memorandum opinion and order) [hereinafter 3650 Order], available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-05-56A1.pdf, published at *Wireless Operations in the 3650-3700 MHz Band*, 70 Fed. Reg. 24712 (May 11, 2005) (final rule).

¹¹⁵ *Id.*

¹¹⁶ *Id.*; 47 CFR § 90.1319 (2005).

¹¹⁷ 3650 Order, *supra* note 114, at ¶¶ 14, 28.

¹¹⁸ *Id.* ¶ 16.

¹¹⁹ See, e.g., Intel et al., *Petition for Reconsideration of Intel Corporation, Redline Communications, Inc., Alvarion, Inc.*, ET Docket No. 04-151 (June 10, 2005).

¹²⁰ See, e.g., Wireless Communications Association International, *Petition of Reconsideration of the Wireless Communications Association International, Inc.*, ET Docket No. 04-151 (June 10, 2005); Satellite Industry Association, *Petition for Partial Reconsideration of the Satellite Industry Association*, ET Docket No. 04-151 (June 10, 2005).

over-the-air television. Therefore, not only does government decide the application for which that block of spectrum is to be used, it often also decides what business model may be employed.¹²¹

¶54 The FCC calls the assignment of a frequency that is made for the sole use of one licensee “exclusive use licensing.”¹²² “Under this model, exclusive rights resemble property rights in spectrum, but this model does not imply or require creation of ‘full’ private property rights in spectrum.”¹²³ In contrast, if a band is allocated as a commons, “unlimited numbers of unlicensed users to share frequencies [are allowed], with usage rights that are governed by technical standards or etiquettes but with no right to protection from interference.”¹²⁴

¶55 Allocation decisions are critical, yet as Coase noted, they are made with only blunt approximations of the cost and benefits of the competing potential uses of spectrum. Additionally, parties that stand to gain from particular outcomes will logically make an investment in exerting political pressure on the government decision-makers. The likely result of this process is an inefficient allocation of spectrum resources.

¶56 Short of congressional action mandating a course of action, transition from command-and-control spectrum management to either of the two alternatives identified by the Spectrum Policy Task Force Report—exclusive use and commons—will require that the FCC engage in allocation. That is, before a block of spectrum can be assigned through competitive bidding or utilized as a commons, it must first be allocated for either use.

¶57 It should be understood that assignment only determines who may use a section of spectrum; use must still comply with the terms of the spectrum’s allocation. For example, if the FCC designates a block of spectrum as a commons (so that it is not assigned exclusively to just one licensee) then anyone can use it, but only consistent with its allocation.¹²⁵ By the same token, while the FCC might assign exclusive use of a block of spectrum to the winner of an auction, that exclusive licensee cannot put the spectrum to whatever use she pleases, but must instead comply with the terms of the license she has purchased, which in turn will be consistent with the spectrum’s allocation.¹²⁶ Therefore, having auctions or commons are not ends in themselves. Auctioning a TV broadcast license may more efficiently assign the license among several potential licensees, but if allocation is still a command-and-control process, an auction will do nothing to more efficiently determine whether the licensed spectrum is better put to use for TV broadcasting or some other purpose.

¶58 With that in mind, we can see that what the Spectrum Policy Task Force—and, indeed, Coase—recommended was that spectrum be allocated for *flexible use*.¹²⁷ That is, spectrum should not be fettered with use restrictions, but should instead be freed so that assignees have the power to use it however they see fit. To leverage the power of the market—its ability to efficiently prioritize among competing uses of a resource—spectrum must not only be freely traded in a market or freely utilized in a commons, but it must also be free of regulations that prevent its holders from putting it to the most productive use.

¶59 Only if spectrum is first allocated for flexible use, with few if any conditions on its use, can a commons or a property rights regime help overcome the inefficiencies of command-and-control spectrum management. For example, if spectrum is allocated for flexible use, a property rights regime will allow the owner of spectrum to put it to the most valuable use or sell it to someone who will.¹²⁸

¹²¹ Hazlett, *Spectrum Tragedies*, *supra* note 24, at 244.

¹²² Spectrum Policy Task Force Report, *supra* note 5, at 35.

¹²³ *Id.*

¹²⁴ *Id.*

¹²⁵ For example, devices such as baby monitors, garage door openers, and Wi-Fi, which operate on the ISM bands, must comply with the FCC’s Part 15 rules. 47 C.F.R. § 15 (2005).

¹²⁶ For example, winners of PCS band auctions may use their spectrum only in compliance with the FCC’s Part 24 rules. 47 C.F.R. § 24 (2005).

¹²⁷ Spectrum Policy Task Force Report, *supra* note 5, at 16. This is also the consensus view of economists. *See generally* Martin Neil Baily et al., *Comments of 37 Concerned Economists*, WT Docket No. 00-230 (Feb. 7, 2001), available at <http://www.aei-brookings.org/admin/authorpdfs/page.php?id=176>.

¹²⁸ It should be noted that the highest valued use might even be a commons that is privately managed.

Similarly, if there are no restrictions on use, a commons will allow anyone to use the spectrum however she sees fit, thus overcoming command-and-control misallocation.

¶60 However, while title to spectrum could theoretically be auctioned off in fee simple with no strings attached, a government-created and -managed commons will always have its usage rules set through a command-and-control process. Users of a government commons might not be explicitly restricted in the applications they can deploy over the spectrum, but they will have to comply with the sharing rules that govern the commons. Sharing rules, which will be established through regulation, will in turn limit the types and number of applications that can be deployed.

¶61 If flexible use spectrum is auctioned, then proponents of every possible application can bid for access to the spectrum. One will win and the rest will be excluded. By the same token, if a commons is created, the sharing rules selected will make some uses mutually exclusive. The difference is that a market determines who will own spectrum—and thus what uses are excluded—through a price mechanism, while a government commons excludes uses through regulatory decisions.

¶62 Instead of giving potential spectrum users an incentive to bid higher, the regulatory process encourages rent-seeking to ensure their use is favored. Not only will users that back competing sharing rules engage in such lobbying, but so will parties that seek spectrum to be allocated for exclusive use.¹²⁹ The FCC proceeding to create a commons in the 3650 MHz is rife with such petitioning, as we will see below. While spectrum sharing may ultimately work well in that band and others, claims that a government-controlled commons will remove the inefficiencies of command-and-control regulation are exaggerated.

1. *The Incumbents: Satellite Operators*

¶63 As noted earlier, since 1984 the FCC has allowed nongovernment fixed satellite services (FSS) to use the 3600-3700 MHz band limited to international intercontinental systems.¹³⁰ FSS use of the 3650-3700 MHz band was further restricted by a 1998 order that halted consideration of new FSS licenses, or amendments to existing ones, because the FCC contemplated allocating the band for fixed wireless and mobile wireless services.¹³¹ Although the FCC ultimately changed course and allocated the 3650 MHz band as a commons, a petition to stay the freeze order was denied and the limitations were upheld.¹³² Not surprisingly, since the regulatory process to reallocate the 3650 MHz band began in 1998, the satellite industry's objectives have been to preserve its incumbent uses of the band and to remove the restrictions placed on it.

¶64 The satellite industry has resisted the reallocation of the 3650 MHz band as a commons on several grounds. One of its main objections has been that the FCC underestimates the size of the exclusion zones¹³³ needed around existing FSS stations to prevent interference to their operations from devices using the commons.¹³⁴ According to the Satellite Industry Association, fixed stations must be located at least 220 to 313 kilometers away from a FSS station to avoid interference.¹³⁵ In its final order, the FCC set the distance at 150 km, stating that even that number “employs a high degree of worst-case conservatism[.]”¹³⁶ Not satisfied with the measures taken in that order to protect FSS stations, SIA filed a petition for reconsideration.¹³⁷

¹²⁹ One reason why some parties might lobby against the creation of a commons is that while privately owned spectrum can be managed as a commons and therefore host commons applications, a government-managed spectrum commons cannot host applications that require an exclusive use right.

¹³⁰ 3650 NPRM, *supra* note 87, at ¶ 4.

¹³¹ FSS Freeze Order, *supra* note 100, at ¶ 7.

¹³² 3650 Order, *supra* note 114, at ¶¶ 89-91.

¹³³ An exclusion zone is an area around an FSS station in which the new nonexclusively licensed devices are not allowed to transmit. This is because transmitting within the exclusion zone would interfere with the FSS station.

¹³⁴ Satellite Industry Association, *Comments of the Satellite Industry Association*, ET Docket No. 04-151 (July 28, 2004), at 17.

¹³⁵ *Id.*

¹³⁶ 3650 Order, *supra* note 114, at ¶ 60.

¹³⁷ Satellite Industry Association, *Petition for Partial Reconsideration of the Satellite Industry Association*, ET Docket No. 04-151 (June 10, 2005).

¶65 Because it has nothing to gain, and perhaps something to lose, by the reallocation of the 3650 MHz band, the incentive of the satellite industry is to support the tightest restrictions possible on the new commons.¹³⁸ Meanwhile, potential users of the commons have an incentive to underestimate the protection needed by FSS stations so as not to limit the geographic areas and power levels at which they can operate. Caught in the middle of two interest groups, the FCC must make a command-and-control decision that affects both the commons and the incumbents. However, without price information to guide a cost-benefit analysis, it is unlikely that it will very closely approximate an economically efficient result.¹³⁹

¶66 The FCC confronted a similar dilemma in the satellite industry's petitions that asked it to remove the restrictions placed on FSS stations in the 3650 MHz band, including removing the freeze on new FSS stations.¹⁴⁰ Doing so would affect the capacity of a new commons in the band. Therefore, this was a trade-off between using the spectrum for one use (satellite service) or another (a commons likely to be used for wireless data). Ultimately, the FCC opted for the latter and denied the satellite industry's petition, stating simply that increasing the number of FSS stations in the band "would be directly counter to [its] fundamental judgments concerning future use of the 3650 MHz band and would not serve the public interest."¹⁴¹ The new commons, therefore, owes its creation in large part to the type of command-and-control decisions the Spectrum Policy Task Force Report aims to curtail.

2. *The Young Turks: WISPs*

¶67 Immediately after the release of the Spectrum Policy Task Force Report, the FCC changed course with regard to its plans for the 3650 MHz band. It shelved the idea of auctioning exclusive use licenses for fixed and mobile wireless services in the band and instead began a Notice of Inquiry (NOI) proceeding that sought public comment on whether the 3650 MHz band should be opened to unlicensed use.¹⁴² Small rural wireless Internet service providers (WISPs) seized the moment and lobbied heavily in support of an unlicensed commons.

¶68 Because of the low population densities in rural areas, broadband Internet access over cable or DSL is not as readily available as it is in metropolitan areas. Rural WISPs fill the void by providing high-speed Internet access wirelessly using existing unlicensed commons such as the 2.4 GHz Wi-Fi band. However, in their comments to the NOI, WISPs complained that the commons they now use are becoming crowded and virtually unusable.¹⁴³ Competing with WISPs in the unlicensed bands are signals from consumer products such as remote controls and garage door openers, as well as the signals of other WISPs.¹⁴⁴ The WISPs supported making available a new virgin commons over which to continue to provide service to their customers.

¶69 The WISPs, essentially a special interest group, got the attention of the FCC. The NOI made no mention of creating a commons for the purpose of helping spread broadband to rural areas.¹⁴⁵

¹³⁸ Hazlett, *Wireless Craze*, *supra* note 24, at 387-88 (discussing incumbent sensitivity to interference).

¹³⁹ The FCC itself acknowledges that the rules it has chosen "employ a high degree of worst-case conservatism" and are therefore probably too strict. 3650 Order, *supra* note 114, at ¶ 60. They attempt to mitigate this shortcoming by allowing transmissions within the protection zones, "so long as they negotiate agreements with the earth station operators." *Id.*

¹⁴⁰ Lockheed Martin Corporation, *Petition for Reconsideration*, ET Docket No. 98-237 (Dec. 18, 2000); Extended C-Band Ad-Hoc Coalition, *Petition for Reconsideration and Comments*, ET Docket No. 98-237 (Dec. 18, 2000); Inmarsat Ltd., *Petition for Reconsideration of the First Report and Order*, ET Docket No. 98-237 (Dec. 18, 2000). Specifically, satellite industry asked that the FSS freeze order be lifted and for an end to the international intercontinental limitation.

¹⁴¹ 3650 Order, *supra* note 114, at ¶ 91.

¹⁴² See *supra* note 108.

¹⁴³ See e.g. Roy Preston, Comments regarding Unlicensed NOI, ET Docket No. 02-380 (Jan. 6, 2003); Lakeland Communications, *Comments of Lakeland Communications*, ET Docket No. 02-380 (Feb. 2, 2003).

¹⁴⁴ See e.g. Bruce Collins, Comments of VeriQik DSL, ET Docket No. 04-151 (July 1, 2004) ("We would ask that the FCC not allow use of this spectrum for general consumer products not to be limited to but including Residential Wireless Access Point, Cordless phones." Kent Anderson, Comments of Altazip, Inc., ET Docket No. 04-151 (June 28, 2004) ("We do not encourage the use of this spectrum to be used for general consumer goods to be used in the home. Including Residential wireless access points, Cordless phones, etc.").

¹⁴⁵ See Unlicensed NOI, *supra* note 108.

However, the Notice of Proposed Rulemaking (NPRM) that followed it, and that started the process of making the 3650 MHz band into a commons, began by stating that the FCC had “tentatively conclude[d] that permitting unlicensed operation in the 3650 MHz band would foster the introduction of new and advanced services to the American public, especially in rural areas[.]”¹⁴⁶ The benefit of a commons to rural America was then touted throughout the NPRM so that it became the central reason why the reallocation would be in the public interest.¹⁴⁷ The final order establishing the commons did the same.¹⁴⁸

¶70 Allocating the 3650 MHz band for national nonexclusive licensed use, with the special purpose of assisting rural WISPs, is a trade-off that precludes other uses of the band. For example, such an allocation is arguably a choice against WISPs that wish to use the band to serve metropolitan areas.¹⁴⁹ Additionally, it can be thought of as a trade-off between making possible services that have low entry costs but also low quality of service, at the expense of services that while requiring higher up-front costs will also deliver a higher guaranteed quality of service.

¶71 For example, high-speed data transmission over unlicensed bands works today in rural areas first because those areas are not heavily congested with radio signals, and second because competing users of the unlicensed bands are few, allowing them to meet and coordinate their uses so as not to cause each other interference.¹⁵⁰ In contrast, however, one can expect far more users of a commons in a large metropolitan area, increasing congestion and inhibiting the ability to coordinate.¹⁵¹ Additionally, some applications, such as voice over Internet Protocol (VoIP) and streaming video, are latency-sensitive and therefore require constant high-speed data transmission rates.¹⁵² Yet inherent in the nature of a commons is the fact that high speeds cannot be guaranteed because the number of band users is virtually unrestricted and also potentially uncoordinated. Therefore, a high quality of service cannot be guaranteed for latency-sensitive applications over a commons.

¶72 In effect, then, choosing a commons allocation over an exclusive licensed allocation—which *can* guarantee a certain quality of service—is a trade-off between a service that can consistently provide latency-sensitive services and one that is precluded from doing so. It is also a trade-off between rural and metropolitan wireless data services. One reason is that, as some contend, it might be impossible to effectively use a commons for wireless high-speed data in a congested metropolitan area. More importantly, however, while rural consumers might be willing to tolerate the inconvenience of slower speeds and a lower quality of service,¹⁵³ metropolitan WISPs must compete against the incumbent high-speed data providers—cable and DSL—which do guarantee a high quality of service standard to their customers.

¹⁴⁶ 3650 NPRM, *supra* note 87, at ¶ 2.

¹⁴⁷ *Id.* (“This band appears particularly well suited to respond to the needs expressed by the growing number of entrepreneurial wireless internet service providers (WISPs) who are today bringing broadband services to consumers in rural areas of the United States who have many fewer choices for such services than consumers in more populated areas.”); 3650 NPRM, *supra* note 87, at ¶ 18 (“We believe that the 3650 MHz band is well-suited [sic] for the provision of new and advanced services to the American public, particularly in rural areas.”); *see also* 3650 NPRM, *supra* note 87, at ¶¶ 15, 32, 43.

¹⁴⁸ 3650 Order, *supra* note 114, at ¶ 15 (“[T]he public interest is best served by establishing minimal regulatory barriers to encourage multiple entrants in the 3650 MHz band and to stimulate the rapid expansion of broadband services—especially in America’s rural heartland.”); *see also id.* at ¶¶ 1, 2, 11, 13, 14, 28.

¹⁴⁹ It should be noted that without the economies of scale and scope afforded by nationwide network rollouts that include metropolitan areas, technology costs would likely remain high and network development could therefore be stunted.

¹⁵⁰ The proprietors of rural WISPs have the opportunity to meet at a local coffee shop and amicably coordinate their spectrum uses so as not to interfere with one another.

¹⁵¹ Spectrum Policy Task Force Report, *supra* note 5, at 54 (“In large area wireless systems, it has been difficult to control mutual interference without entry and technical regulation.”). Congestion in urban areas was another reason that CB radio failed. Ellen P. Goodman, *Spectrum Rights in the Telecosm To Come*, 41 SAN DIEGO L. REV. 269, 374 (2004) (“As a general matter, real-time applications cannot sustain delays in the delivery of the signal and require a high quality of service. Citizen Band (CB) radio—a real time ‘unlicensed’ service—ultimately failed in large part because it was inefficient and undependable in crowded regions.”).

¹⁵² Goodman, *supra* note 151, at 374 (“The current rules controlling entry to the unlicensed bands favor services that are less vulnerable to uncontrollable interference. They disfavor real-time applications that are more vulnerable to interference and mixed use of the same spectrum. As a general matter, real-time applications cannot sustain delays in the delivery of the signal and require a high quality of service.”).

¹⁵³ Additionally, slow connections might not be a problem in rural areas where coordination to prevent congestion is more easily achieved.

¶73 On the other hand, if the FCC had chosen to allocate the 3650 MHz band not as a commons, but for exclusive licensed use, then the licensees, who would no longer face a congestion or coordination problem, would be able to offer high-speed Internet access, in both rural and congested metropolitan areas. So why would rural WISPs prefer a commons to exclusive licenses? One answer is that access to a commons would be virtually costless,¹⁵⁴ while exclusive licenses would have to be purchased at auction or a secondary market.¹⁵⁵ It might therefore be rational for some parties to invest in lobbying to acquire free access, thus leading to the type of rent-seeking activity characteristic of command-and-control inefficiency.

¶74 Subsidizing rural Internet access may well be a political choice we are happy to make. However, we should recognize that doing so through policies such as those employed in the 3650 MHz Order precludes overcoming regulatory inefficiencies. While the rent-seeking behavior exhibited by WISPs in the 3650 MHz proceeding might be consistent with a perception of what is “in the public interest,” namely increased rural Internet access, there is little evidence that their use of the spectrum as a commons is the best use. Rather than making spectrum flexible so that market actors can put it to its optimal use, the FCC used a command-and-control process to decide which use would most be “in the public interest.”

3. Device Manufacturers

¶75 Opposing the WISPs in the 3650 MHz proceeding, device manufacturers such as Intel and Motorola, as well as the larger wireless broadband industry, have lobbied for an exclusive use allocation. However the 3650 MHz band is allocated, it will be manufacturers that develop the devices to use the band. It is therefore in their best interest to support an allocation that maximizes the number of devices deployed. Nevertheless, they oppose a spectrum commons for the band and believe that only exclusive licensed use will provide the certainty needed to ensure broad investment in the band.¹⁵⁶

¶76 In essence, the FCC adopted Professor Benkler’s approach to the creation of a commons. Whereas licensees (or owners) of spectrum have the incentive to maximize its utilization under an exclusive use allocation, Benkler suggests that allocating spectrum as a commons shifts the incentive to optimize spectrum use to device manufacturers:

The value of communications in an unlicensed environment is, then, measured primarily in the price of equipment capable of unlicensed operation. To maximize the value of the equipment they produce, manufacturers must maximize the value of communications their equipment makes possible for its end-users. There are two types of investments that must be made in order to maximize the value of communications in a given range of frequencies, and which will be made by equipment manufacturers where they would have been made by spectrum owners/licensees in a privatization or licensing regime. The first type of investment involves development of standards and protocols to allow networking (secondary physical layer decisions). The second type involves investment in increasing equipment efficiency, and hence spectrum utilization efficiency, to gain an advantage over

¹⁵⁴ Although the FCC has refrained from issuing licenses for the 3650 MHz band until it rules on the petitions for reconsideration, all FCC wireless licenses have a fee attached to them. The least expensive of these fees is \$55. Telephone Interview with Tammy Jay, Clerk, Wireless Telecommunications Bureau, Federal Communications Commission (Mar. 10, 2006). See Federal Commuc’n Comm’n, FCC Form 1070M: Fee Requirements for FCC Form 601 & FCC Form 1070Y: Fee Requirements for FCC Form 605 (August 2005) available at <http://wireless.fcc.gov/feesforms>.

¹⁵⁵ It should be noted that on the other side of the debate, arguing for an exclusive licensed allocation of the 3650 MHz band, are the manufacturers of the devices that would operate in the band. This is in contrast to Prof. Benkler’s suggestion that device manufacturers would benefit from unlicensed spectrum. Benkler, *Agoraphobia*, *supra* note 8, at 348. Meanwhile, incumbent wireless licensees, who Benkler predicted would oppose a commons, are silent on the 3650 MHz proceeding. *Id.* at 373.

¹⁵⁶ See, e.g., Wireless Communications Association International, *Consolidated Opposition and Comments to Petitions for Reconsideration*, ET Docket 04-151 (Aug. 11, 2005) at 4-6. Device manufacturers argue that the 3650 MHz commons as designed cannot ensure the level of interference protection necessary for “high bandwidth and low latency demanded by emerging broadband applications such as VoIP.” *Id.* at 4. Because a high quality of service cannot be guaranteed over the commons, they argue, investment to provide broadband services in the band will be severely constrained. *Id.* at 4-6. Even if a certain quality of service level can be achieved, because the potential number of users of the commons is unlimited, there is no assurance that it can be maintained in the future. This lack of business certainty, manufacturers argue, will prevent significant investment in the band. *Id.* 5-6.

competitors in the market for equipment (primary physical layer decisions).¹⁵⁷

¶77 Given the constraint of a commons, the idea seems to be, device manufacturers will be forced to develop efficient spectrum sharing rules and devices.

¶78 The FCC created a commons by making the 3650 MHz band open to anyone who acquires a nonexclusive license, but subject to certain usage rules. Those usage rules set some technical restrictions, including power levels and exclusion zones, but as for spectrum sharing rules, the Commission simply stated that any device “designed for use in the 3650 MHz band [must] incorporate *some type* of contention based protocol.”¹⁵⁸ It explained: “We will leave it up to the industry to determine flexible and efficient methods for meeting the technical requirements we adopt herein. In particular, the industry will need to address issues such as contention-based protocols and base-station enabled mobile operations.”¹⁵⁹

¶79 The FCC has, however, put the cart before the horse. The FCC has created, by fiat, a requirement for a “contention based protocol” to be employed in a commons that has a virtually unrestricted number of potential users. It then expects industry to develop—within those constraints—a technology that will produce the optimal use of the spectrum.¹⁶⁰ Rather than allocating spectrum for flexible use, and allowing owners to deploy within it the most efficient sharing protocol, what the FCC has done is create a roadblock that device manufacturers must now work around. In contrast, competing spectrum licensees will always have to make the most efficient use of the spectrum they own if they are to compete successfully.

¶80 Establishing a commons will no doubt shift the incentive to optimize spectrum use to device manufacturers, but they will have to do so within rules-of-the-road arrived at through a lingering command-and-control process. These rules are the result of trade-offs and they exclude alternate uses of the spectrum. For example, the FCC decided that only base station-enabled mobile devices would be allowed to operate in the 3650 MHz band.¹⁶¹ This means that a mobile device must first make contact with a fixed station—much like a Wi-Fi enabled laptop connects with a hotspot—before it can operate.¹⁶² This precludes uses of the 3650 MHz commons that could be characterized as broadcasting or mobile-to-mobile mesh communications without first contacting a base station. Also, the FCC imposed a 25 Watt EIRP power limitation on the band, which is higher than existing unlicensed bands such as Wi-Fi, but less than what would have been possible in an exclusive-licensed allocation.¹⁶³ Even the type of standard to be used (i.e. “contention based protocol”) was specified—even if vaguely—in the FCC’s Final Order.¹⁶⁴ Such a requirement prevents industry from choosing other protocols.¹⁶⁵ Therefore, although the FCC portrays the standards-setting process as an exercise of private industry (much as Professor Benkler would have it), a command-and-control process

¹⁵⁷ Benkler, *Agoraphobia*, *supra* note 8, at 348.

¹⁵⁸ 3650 Order, *supra* note 114, at ¶ 58 (emphasis added).

¹⁵⁹ *Id.* at ¶ 49.

¹⁶⁰ This might be impossible. “While WCA certainly encourages reliance on evolving radio technologies where appropriate, there is no evidence that a single protocol is available at the present time or could be developed in short order that will permit an unlimited number of nonexclusive users operating on independent systems to utilize the band in a viable manner.” Wireless Communications Association International, *Petitions for Reconsideration of the Wireless Communications Association International, Inc.*, ET Docket 04-151 (June 10, 2005) at 6.

¹⁶¹ 3650 Order, *supra* note 114, at ¶ 51.

¹⁶² *Id.*

¹⁶³ Industrial Telecommunications Association, *Comments of the Industrial Telecommunications Association, Inc.*, ET Docket 04-151 (July 28, 2004) at 2; Spectrum Policy Task Force Report, *supra* note 5, at 40 (“[P]roductive use of spectrum commons by unlicensed devices . . . typically requires significant regulatory limitations on device transmitter power that preclude many other technically and economically feasible spectrum uses that rely on higher-power signal propagation over longer distances, or that require greater protection from interference.”).

¹⁶⁴ 3650 Order, *supra* note 114, at ¶ 58.

¹⁶⁵ Additionally, the FCC must approve all devices that plan to operate in the band in order to certify that the protocol employed by them complies with the “contention based protocol requirement.” 3650 Order, *supra* note 114, at ¶ 58. This creates a delay that might not exist in an exclusive use allocation. This also creates the possibility that a competitor will seek to delay or challenge an applicant’s protocol certification.

actually defines the initial contours of the sharing rules.¹⁶⁶ Device manufacturers have not been given incentives to produce efficient devices for the 3650 MHz commons and as a result we cannot expect the optimal use of the band to materialize.¹⁶⁷ For example, because manufacturers cannot capture the gains derived from designing devices that make quieter use of a spectrum commons, they will have no incentive to conserve their device's spectrum use. A viable commons requires a controller to set sharing rules; in the 3650 MHz commons the controller is the government and it has set these sharing rules through command-and-control.

C. Enforcement

¶81 Not only must a controller set sharing rules for a commons to be viable, it must also effectively enforce those rules. As Professors Weiser and Hatfield note, “[i]n general, the FCC’s regulatory tools for ensuring cooperation in the use of commons access spectrum fall into two categories: proactive requirements and reactive enforcement measures.”¹⁶⁸ The former includes not just the sharing rules discussed above, but mechanisms designed to ensure those rules are observed. The latter encompasses device certification and policing the airwaves.

1. Proactive Requirements

¶82 Just as a controller sets and enforces rules in a commons, a licensee manages sharing capacity within exclusively licensed spectrum. For example, a wireless telephone company that has exclusive use of a block of spectrum coordinates sharing of that spectrum by its many customers so that they do not interfere with each other. It does so by setting rules-of-the-road for its network and by internally enforcing those rules. Because the firm internalizes the costs of any failure in enforcement, it seeks the optimal level of enforcement. In contrast, enforcement in a commons is a public good and will generally be suboptimally provisioned.¹⁶⁹

¶83 Devices operating in traditional unlicensed bands must accept any interference they encounter; in effect there is no enforcement. Many unlicensed applications—such as Wi-Fi and Bluetooth—are nonetheless viable because they are by and large deployed in relatively small spaces that are controlled privately by one party—whether it is a home, a coffee shop, or a university campus.¹⁷⁰ Because these parties control their physical domains through private property rights, they can control and coordinate use of the unlicensed spectrum in their space so as to minimize interference.¹⁷¹ In this sense, users of unlicensed spectrum provide their own enforcement within their physical domains because they internalize the costs and benefits of that enforcement. When an unlicensed (or nonexclusive licensed) use of the band extends beyond a privately controlled domain, the benefits of enforcement are no longer internalized by one party.

¶84 In the 3650 MHz band, the FCC tries to have its cake and eat it, too. The Commission seems to understand that if devices in a large area commons are required to accept any interference, then there will be a race to the bottom because users will have little incentive to restrain their use, much as was the case with CB radio. On the other hand, an exclusive licensed approach is out of the question because it is a commons they are trying to craft. So, it created a nonexclusive licensed allocation that, while not guaranteeing licensees a right to be free from interference, does impose on them an obligation to cooperate with every other licensee.¹⁷² In relevant part, the rules state that “[l]icensees

¹⁶⁶ Weiser & Hatfield, *supra* note 40, at 128.

¹⁶⁷ *Id.* at 127.

¹⁶⁸ *Id.* at 122.

¹⁶⁹ *Id.* at 115; Hazlett, *Spectrum Tragedies*, *supra* note 24, at 270.

¹⁷⁰ Hazlett, *Wireless Crazy*, *supra* note 24, at 508; Spectrum Policy Task Force Report, *supra* note 5, at 39-41 (explaining that a commons approach is best suited for short-distance communications in which an exclusive use models might present high transactions costs).

¹⁷¹ Physical property rights mitigate the open access element inherent in unlicensed spectrum.

¹⁷² 3650 Order, *supra* note 114, at 16. “While terrestrial licensees in this band will not have interference protection rights of primary, exclusive use licensees, the licensing scheme imposes on all licensees the mutual obligation to cooperate and avoid harmful interference to one another.” *Id.* at 29.

of stations suffering or causing harmful interference are expected to cooperate and resolve this problem by mutually satisfactory arrangements.”¹⁷³ There is no indication, however, of how this obligation will be policed or enforced.

¶85 Additionally, the rules adopted require that “[a]ll applicants and licensees . . . cooperate in the selection and use of frequencies in the 3650-3700 MHz band in order to minimize the potential for interference and make the most effective use of the authorized facilities.”¹⁷⁴ In other words, the FCC is mandating the sort of face-to-face cooperation WISPs engage in today in low congestion areas. To facilitate this, the rules require that “all licensees register[] their fixed and base stations in a common data base [sic]” before beginning operation.¹⁷⁵ The rules state that “[l]icensees *should* examine this database before seeking station authorization, and *make every effort* to ensure that their fixed and base stations operate at a location, and with technical parameters, that will minimize the *potential* to cause and receive interference.”¹⁷⁶

¶86 While the FCC does not explain what it means to “make every effort to . . . minimize the potential to cause and receive interference,”¹⁷⁷ or to be “expected to cooperate and resolve [harmful interference problems],”¹⁷⁸ such mandates are likely to result in either too much or too little enforcement, but certainly not the optimal amount because no one internalizes the costs and benefits of enforcing coordination.

¶87 If the rules do in fact require that *every* possible effort be made to avoid interference, then there will be too much enforcement.¹⁷⁹ New entrants will be forced to take all feasible steps to avoid interference to protect incumbents in the band—even economically untenable steps. This would likely result in less entry than might otherwise be the case and thus inefficient use of the band. Additionally, because the obligation is mutual, initial entry might be reduced. Potential initial entrants will be wary of a requirement that forces them to spend resources to accommodate every subsequent new entrant. On the other hand, there might be too little enforcement if these vague coordination requirements are interpreted loosely. If that were the case, the result would be tragedy because a user’s incentive would be to maximize her own use without concern for the efficient use of the commons as a whole. It is difficult to imagine any substantial private investment in communications networks that rely on this spectrum as long as there is such pervasive uncertainty.

2. Reactive Enforcement Measures

¶88 Even assuming that the FCC can clarify the rules so that they are able to yield the best use of the band, the Commission must then ensure that it polices the commons and punishes those that violate the rules. Unlike licensees or owners in an exclusive use regime, users of the 3650 MHz band do not have a right to be free from interference and thus no clear legal recourse in case of interference.¹⁸⁰ While users may be able to complain to the FCC if other users are not observing the band’s rules, all enforcement falls on the shoulders of the FCC.

¶89 As noted earlier, proponents of a spectrum commons often analogize their proposed scheme to the highway system.¹⁸¹ As Professor Lessig put it,

¹⁷³ *Id.* at 44 (codified at 47 C.F.R. § 90.1319(c) (2005)).

¹⁷⁴ *Id.*

¹⁷⁵ *Id.* at ¶ 16. The FCC’s new rules provide: “The 3650-3700 MHz band is licensed on the basis of nonexclusive nationwide licenses. Nonexclusive nationwide licenses will serve as a prerequisite for registering individual fixed and base stations. A licensee cannot operate a fixed or base station before registering it under its license.” 47 C.F.R. § 90.1305 (2005).

¹⁷⁶ 3650 Order, *supra* note 114, at 44 (codified at 47 C.F.R. § 90.1319(c) (2005)) (emphasis added).

¹⁷⁷ *Id.*

¹⁷⁸ *Id.*

¹⁷⁹ Weiser & Hatfield, *supra* note 40, at 104 (“[I]f the FCC institutes overly restrictive regulations of commons access spectrum, it may risk sacrificing some of the benefits of commons access spectrum and allow such spectrum to fall prey to some of the failings of the legacy command and control model.”); Intel et al., *Petition for Reconsideration of Intel Corporation, Redline Communications, Inc., Aharion, Inc.*, ET Docket No. 04-151 (June 10, 2005) at 9 (“Interpreted most strictly, the rule could require new entrants to take all technically feasible actions to avoid interference—even if such actions would be economically impracticable.”).

¹⁸⁰ 3650 Order, *supra* note 114, at ¶ 29.

¹⁸¹ See *supra* note 42.

[T]he spectrum-as-commons model does not assume no role for the government. The role of government, however, would be much less invasive than under the current regulatory regime. The government does decide who gets to drive on the highways; it doesn't sell off a right to drive on the highways; it simply makes sure that the devices that are used on the highway are certified as safe.¹⁸²

¶90 However, safety inspection is not the extent of rule enforcement on the highways; certification only ensures that proactive requirements are initially observed and that is only half the job. What Lessig does not take into account is that government also employs reactive enforcement measures in the form of police. Because enforcement of the rules on a highway is a public good, scads of highway patrol must be employed by the states to supply it. We must not forget that the highway system is accompanied by large administrative costs. If designating spectrum as a commons—as was done in the 3650 MHz band—requires expanding the FCC's enforcement responsibilities and capabilities, then that is hardly reducing the invasiveness of government.

¶91 Alternatively, it may be the case, as with CB radio, that enforcement will be underprovisioned. As Professors Weiser and Hatfield note, “Although the FCC's Chief Engineer has indicated that the agency intends to ‘get serious’ about unauthorized use of commons access spectrum and will ‘go after abusers of unlicensed spectrum,’ neither its relevant rules nor its enforcement apparatus are set up to do this job.”¹⁸³

CONCLUSION

¶92 A commons is not a third way for spectrum management. It can only exist with either a private controller or a government controller. Although they portray their model as an alternative to the existing regulatory system and its inefficiencies, proponents of a spectrum commons in the legal literature ultimately advocate for government control. The 3650 MHz band proceeding is a real-world example of how a government-controlled commons is created and what it looks like, and it exhibits many of the same inefficiencies of the existing command-and-control system it is trying to avoid.

¶93 In their petitions for reconsideration, several commenters have proposed a compromise to the allocation of the 3650 MHz band.¹⁸⁴ What they propose is that the band be allocated for flexible exclusive licensed use in the top 50 metro areas in the country, while keeping the nonexclusive licensed use everywhere else.¹⁸⁵ This allows rural WISPs to offer service over a commons, which might work in less congested areas. In more congested urban areas, property-like exclusive licenses, especially if they are auctioned, will avoid interference, assure a high quality of service, and foster investment in the band.

¹⁸² LESSIG, FUTURE OF IDEAS, *supra* note 13, at 83.

¹⁸³ Weiser & Hatfield, *supra* note 40, at 129-30.

¹⁸⁴ See e.g. Intel et al., *Petition for Reconsideration of Intel Corporation, Redline Communications, Inc., Alvarion, Inc.*, ET Docket No. 04-151 (June 10, 2005) at 20-24.

¹⁸⁵ *Id.*