JOURNAL ON TELECOMMUNICATIONS & HIGH TECHNOLOGY LAW
is published semi-annually by the
Journal on Telecommunications & High Technology Law,
Campus Box 401, Boulder, CO 80309-0401

ISSN: 1543-8899



POSTMASTER: Please send address changes to JTHTL,
Campus Box 401, Boulder, CO 80309-0401

*Subscriptions*

Volume subscriptions are available for $45.00. City of Boulder subscribers please add $3.67 sales tax. Boulder County subscribers outside the City of Boulder please add $2.14 sales tax. Metro Denver subscribers outside of Boulder County please add $1.85 sales tax. Colorado subscribers outside of Metro Denver please add $1.31 sales tax.

Inquiries concerning ongoing subscriptions or obtaining an individual issue should be directed to the attention of JTHTL Managing Editor at JTHTL@colorado.edu or by writing JTHTL Managing Editor, Campus Box 401, Boulder, CO 80309-0401.

Back issues in complete sets, volumes, or single issues may be obtained from: William S. Hein & Co., Inc., 1285 Main Street, Buffalo, NY 14209.

*Manuscripts*

JTHTL invites the submission of unsolicited manuscripts. Please send softcopy manuscripts to the attention of JTHTL Articles Editors at JTHTL@colorado.edu in Word or PDF formats or through ExpressO at http://law.bepress.com/expresso. Hardcopy submissions may be sent to JTHTL Articles Editors, Campus Box 401, Boulder, CO 80309-0401. Unfortunately, JTHTL cannot return manuscripts. JTHTL uses THE BLUEBOOK: A UNIFORM SYSTEM OF CITATION (18th ed. 2005) for citation format and THE CHICAGO MANUAL OF STYLE (15th ed. 2003) for a style guide.

Cite as: 4 J. ON TELECOMM. & HIGH TECH. L. __ (2005).

# JOURNAL ON TELECOMMUNICATIONS & HIGH TECHNOLOGY LAW

*Volume 4* *Fall 2005*

# THE UNIVERSITY OF COLORADO SCHOOL OF LAW

## FACULTY, 2005-06

BARBARA A. BINTLIFF, *Nicholas Rosenbaum Professor of Law and Law Library Director*. B.A., Central Washington State College; J.D., M.L.L., University of Washington.

HAROLD H. BRUFF, *Charles Inglis Thomson Professor of Law*. B.A., Williams College; J.D., Harvard University.

MAXINE BURKETT, *Associate Professor of Law*. B.A., Williams College; J.D., University of California, Berkeley.

CLIFFORD J. CALHOUN, *Professor Emeritus*. A.B., LL.B., Harvard University.

EMILY M. CALHOUN, *Professor of Law*. B.A., M.A., Texas Tech University; J.D., University of Texas.

PAUL F. CAMPOS, *Professor of Law*. A.B., M.A., J.D., University of Michigan.

HOMER H. CLARK, JR., *Professor Emeritus*. A.B., LL.D., Amherst College; LL.B., LL.M., Harvard University.

RICHARD B. COLLINS, *Professor of Law and Director of the Byron R. White Center for the Study of American Constitutional Law*. B.A., Yale College; LL.B., Harvard University.

JAMES N. CORBRIDGE, JR., *Professor Emeritus*. A.B., Brown University; LL.B., Yale University.

NESTOR DAVIDSON, *Associate Professor of Law*. A.B., Harvard University; J.D., Columbia University.

ALLISON HARTWELL EID, *Associate Professor of Law*. A.B., Stanford University; J.D., University of Chicago.

TED J. FIFLIS, *Professor of Law*. B.S., Northwestern University; LL.B., Harvard University.

WAYNE M. GAZUR, *Professor of Law*. B.S., University of Wyoming; J.D., University of Colorado; LL.M., University of Denver.

DAVID H. GETCHES, *Dean and Raphael J. Moses Professor of Natural Resources Law*. A.B., Occidental College; J.D., University of Southern California.

LAKSHMAN GURUSWAMY, *Professor of Law*. LL.B., Sri Lanka; Ph.D., University of Durham, U.K.

MELISSA HART, *Associate Professor of Law*. B.A., Harvard-Radcliffe College; J.D., Harvard University.

DAVID S. HILL, *Professor of Law*. B.S., J.D., University of Nebraska.

CLARE HUNTINGTON, *Associate Professor of Law*. B.A., Oberlin College; J.D., Columbia University.

J. DENNIS HYNES, *Nicholas Rosenbaum Professor Emeritus*. B.A., LL.B., University of Colorado.

HOWARD C. KLEMME, *Professor Emeritus*. B.A., LL.B., University of Colorado; LL.M., Yale University.

SARAH A. KRAKOFF, *Associate Professor of Law*. B.A., Yale University; LL.B, University of California, Berkeley.

MARK J. LOEWENSTEIN, *Associate Dean for Research and Professor of Law.* A.B., J.D., University of Illinois.

DAYNA BOWEN MATTHEW, *Associate Dean for Academic Affairs and Associate Professor of Law,* A.B., Harvard-Radcliffe; J.D., University of Virginia.

CHRISTOPHER B. MUELLER, *Henry S. Lindsley Professor of Procedure and Advocacy.* A.B., Haverford College; J.D., University of California, Berkeley.

ROBERT F. NAGEL, *Ira C. Rothgerber, Jr. Professor of Constitutional Law.* B.A., Swarthmore College; J.D., Yale University.

PAUL OHM, *Associate Professor of Law.* B.S./B.A., Yale University; J.D., University of California, Los Angeles.

SCOTT R. PEPPET, *Associate Professor of Law.* B.A., Cornell University; J.D., Harvard University.

MIRANDA PERRY, *Associate Professor of Law.* B.A., Duke University; J.D., University of Chicago; LL.M., New York University.

COURTLAND H. PETERSON, *Nicholas Doman Professor of International Law Emeritus.* B.A., LL.B., University of Colorado; M. Comp. L., University of Chicago; Dr. Jur., University of Freiburg (Germany).

WILLIAM T. PIZZI, *Professor of Law.* A.B., Holy Cross College; M.A., University of Massachusetts; J.D., Harvard University.

CAROLYN B. RAMSEY, *Associate Professor of Law.* B.A., University of California, Irvine; A.M., Stanford University; J.D., Stanford University.

KEVIN R. REITZ, *Professor of Law.* B.A., Dartmouth College; J.D., University of Pennsylvania.

WILLIAM E. RENTFRO, *Professor Emeritus.* B.A., University of Colorado; Th.M., LL.B., University of Denver.

PIERRE J. SCHLAG, *Byron White Professor of Law.* B.A., Yale University; J.D., University of California, Los Angeles.

AMY J. SCHMITZ, *Associate Professor of Law.* B.A., Drake University; J.D., University of Minnesota.

DON W. SEARS, *Professor Emeritus.* B.S., J.D., Ohio State University.

PETER N. SIMON, *Associate Professor Emeritus.* B.S., M.D., University of Wisconsin; J.D., University of California, Berkeley.

LAURA SPITZ, *Associate Professor.* B.A., University of Toronto; LL.B., University of British Columbia Faculty of Law; J.S.D., Cornell Law School.

MARK SQUILLACE, *Professor and Director of the Natural Resources Law Center.* B.S., Michigan State University; J.D., University of Utah College of Law.

NORTON L. STEUBEN, *Nicholas Rosenbaum Professor of Law Emeritus.* A.B., J.D., University of Michigan.

ARTHUR H. TRAVERS, JR., *Professor Emeritus.* B.A., Grinnell College; LL.B., Harvard University.

MICHAEL J. WAGGONER, *Associate Professor of Law.* A.B., Stanford University; LL.B., Harvard University.

PHILIP J. WEISER, *Professor of Law and Executive Director of the Silicon Flatirons Telecommunications Program.* B.A., Swarthmore College; J.D., New York University.

MARIANNE WESSON, *Professor of Law and Wolf-Nichol Fellow*. A.B., Vassar College; J.D., University of Texas.

AHMED A. WHITE, *Associate Professor of Law.* B.A., Southern University and A & M College; J.D., Yale University.

CHARLES F. WILKINSON, *University's Distinguished Professor and Moses Lasky Professor of Law*. B.A., Denison University; LL.B., Stanford University.

SIENHO YEE, *Associate Professor of Law.* Peking University, B.A., Brandeis University; J.D., Columbia University; University of Oxford.

### *Research and Clinical Faculty*

NORMAN F. AARONSON, *Clinical Professor*, *Legal Aid and Defender Program*. A.B., Brandeis University; J.D., Boston University.

ROBERT J. DIETER, *Clinical Professor*, *Legal Aid and Defender Program*. B.A., Yale University; J.D., University of Denver.

MARGARET ANN ENGLAND, *Clinical Professor*, *Legal Aid and Defender Program*. B.A., University of Michigan; J.D., University of Denver.

H. PATRICK FURMAN, *Clinical Professor, Legal Aid and Defender Program, and Director of Clinical Programs*. B.A., J.D., University of Colorado.

COLENE ROBINSON, *Clinical Professor, Juvenile and Family Law*. B.A., Valparaiso University; J.D., Loyola University School of Law, Chicago.

JILL E. TOMPKINS, *Instructor and Director of the Indian Law Clinic*. B.A., The King's College; J.D., University of Maine.

### *Law Library Faculty*

BARBARA A. BINTLIFF, *Nicholas Rosenbaum Professor of Law and Law Library Director*. B.A., Central Washington State College; J.D., M.L.L., University of Washington.

GEORGIA K. BRISCOE, *Associate Director and Head of Technical Services*. B.S., Washington State University; M.A., University of San Diego; M.L.S., University of Michigan.

DONALD L. FORD, *Reference Librarian.* B.A., American University School of International Service; J.D., University of Virginia; M.L.I.S., University of Pittsburgh School of Information Sciences.

YUMIN JIANG, *Technical Services Librarian.* M.S., University of Illinois, Urbana-Champaign; M.A., University of Wisconsin.

KAREN SELDEN, *Catalog Librarian*. B.S., Pennsylvania State University; M.L.S., Simmons College.

RUSSELL SWEET, *Head of Public Services.* B.A., University of California, Riverside; MAR, Yale University; J.D., University of Washington; M.L., University of Washington.

JANE E. THOMPSON, *Head of Faculty Services*. B.A., University of Missouri; M.A., J.D., University of Denver.

### *Legal Writing and Appellate Advocacy Faculty*

YVONNE DUTTON, *Legal Writing Instructor.* B.A., J.D., Columbia University.

LOUISA HEINY, *Legal Writing Instructor.* B.A., J.D., University of Colorado.

NATALIE MACK, *Legal Writing Instructor.* B.S., University of South Carolina; J.D., University of Colorado.

GABRIELLE M. STAFFORD, *Legal Writing Professor*. B.A., University of Pennsylvania; J.D., Boston University.

TODD M. STAFFORD, *Legal Writing Professor.* B.A., Southern Methodist University; J.D., Duke University.

### *Research Associates*

J. BRAD BERNTHAL, *2005-06 Silicon Flatirons Fellow Research Associate, Telecommunications.* B.A., University of Kansas; J.D., University of Colorado School of Law.

KRISTIN COLLINS, *Research Fellow, Complex Civil Procedure, Legal Ethics and Professionalism.* B.A., George Washington University; M.Litt., Oxford University; M.A., Columbia University; J.D., Yale Law School.

DOUGLAS S. KENNEY, *Research Associate, Natural Resources Law Center.* B.A., University of Colorado; M.S., University of Michigan School of Natural Resources and Environment; Ph.D., Cornell University.

KATHRYN M. MUTZ, *Research Associate, Natural Resources Law Center.* B.A., University of Chicago; M.S., Utah State University; J.D., University of Colorado.

### *Adjunct, Adjoint and Visiting Faculty*

GARRY R. APPEL, *Attorney at Law, Appel & Lucas, P.C., Denver, Colorado.* B.A., J.D., University of Colorado.

THE HONORABLE MICHAEL BENDER, *Justice, Colorado Supreme Court, Denver, Colorado.* B.A., Dartmouth College; J.D., University of Colorado School of Law School.

KATHERINE BRIEN, *Senior Attorney, Colorado Office of the Public Defender, Denver, Colorado.* B.A., University of Colorado; J.D., Boston University.

GEORGE BRAUCHLER, *Deputy District Attorney, First Judicial District, Golden, Colorado.* B.A., J.D., University of Colorado.

SHARON CAULFIELD, *Attorney at Law, Caplan & Earnest, LLC, Boulder, Colorado.* B.A., J.D., University of Colorado.

CHRISTIE COATES, *Attorney at Law, Boulder, Colorado.* B.A., Houston Baptist University; M.Ed., University of Houston; J.D., University of Colorado.

TOM CONNOLLY, *Chairman of the Board and CEO, Aeroturbine Energy Corporation and partner, Connolly Rosania & Lofstedt, PC, Colorado.* B.A., Ohio State University; J.D., Ohio State University School of Law.

STEVEN CLYMER, *Attorney at Law, ACCORD Dispute Resolution Services, Boulder, Colorado.* A.B., St. Louis University; J.D., Case Western Reserve University.

THE HONORABLE WILEY DANIEL, *Judge, United States District Court for the District of Colorado.* B.A., J.D., Howard University.

DANIEL DEASY, *Attorney at Law, George Browning & Associates, Westminster, Colorado.* B.A., J.D., University of Colorado.

ROGER FLYNN, *Executive Director, Western Mining Action Project, Boulder, Colorado.* B.S., Lehigh University; J.D., University of Colorado.

JOHN A. FRANCIS, *Partner, Davis, Graham, & Stubbs, Denver, Colorado.* B.A., University of Colorado; J.D., University of Michigan.

EDWARD J. GAC, *Associate Professor of Taxation and Business Law, College of Business, University of Colorado, Boulder.* A.A., Wright College; B.A., Western Illinois University; J.D., University of Illinois.

CRAIG C. GARBY, *Associate, Gibson, Dunn & Crutcher, LLP, Denver, Colorado.* B.A., University of Colorado; Graduate Research, Waseda University, Tokyo, Japan; M.P.A., Cornell University; J.D., Stanford University.

PHIL GORDON, *Shareholder, Littler Mendelson, P.C., Denver, Colorado.* A.B., Princeton University, J.D., New York University School of Law.

JASON D. HAISLMAIER, *Associate, Holme Roberts & Owen LLP, Boulder, Colorado.* B.S., Northwestern University; J.D., Franklin Pierce Law Center.

NATALIE HANLON-LEH, *Partner, Faegre & Benson, Denver, Co.* B.S., University of Colorado, Boulder; J.D., Harvard University.

ANDREW HARTMAN, *Attorney at Law, Cooley Godward, LLP, Broomfield, Colorado.* A.B., University of Michigan; J.D., Georgetown University.

THE HONORABLE MORRIS B. HOFFMAN, *Denver District Court, Colorado.* B.A., J.D., University of Colorado.

BETTY JACKSON, *Professor of Accounting, School of Business, University of Colorado, Boulder.* BBA, Southern Methodist University; M.P.A., Ph.D., University of Texas, Austin.

THOMAS D. LUSTIG, *Senior Staff Attorney, National Wildlife Federation, Boulder, Colorado.* A.B., Washington University; M.S., University of Michigan; J.D., University of Colorado; Ph.D., Massachusetts Institute of Technology.

JACK MILLS, *Attorney at Law, A.J. Mills, P.C., Boulder, Colorado.* BBA, LL.B., University of Oklahoma.

CHRISTOPHER NEUMANN, *Associate, Greenberg Traurig LLP, Denver, Colorado.* B.S., University of Notre Dame; J.D., Lewis & Clark Law School.

CHRISTOPHER D. OZEROFF, *Partner, Hogan & Hartson LLP, Boulder, Colorado.* B.A., Stanford University; J.D., University of Chicago.

THE HONORABLE NANCY E. RICE, *Justice, Colorado Supreme Court, Denver, Colorado*. B.A., Tufts University; J.D., University of Utah.

THE HONORABLE EDWARD J. RICHARDSON, *State of Florida Circuit Court Judge, Retired.* A.S., Brevard Community College; B.S., University of Florida; J.D., Florida State University.

PATRICK RYAN, *Attorney at Law, P.S.R. Lawfirm, Denver, Colorado.* B.A., M.B.A., Monterey Institute of International Studies; J.D., University of Texas at Austin; M.B.L., Universität St. Gallen, Switzerland; Ph.D. Katholieke Universiteit Leuven, Belgium.

WAYNE STACY, *Attorney, Cooley Godward, Denver, Colorado.* B.S., Southern Methodist University, J.D., George Washington University School of Law.

NATHANIEL TRELEASE, *President, WebCredenza, Inc., Denver, Colorado*. B.S., University of Wyoming; J.D., University of Wyoming; LL.M, University of Denver.

MARK WALTA, *Deputy Public Defender, Colorado Office of the Public Defender, Denver, Colorado.* A.B., Wabash College; M.A., Rutgers University; J.D., Northeastern University.

PAUL WASHINGTON, *President, LJS Holdings LLC, Berkeley, California.* B.S., J.D., University of California at Berkeley.

LISA WAYNE, *Attorney at Law, William Murphy & Associates, Baltimore, Maryland.* B.A., University of Colorado, J.D., Pepperdine University College of Law.

# FROM THE EDITOR

Volume 4 begins with the proceedings of the Silicon Flatirons Telecommunications Program's Fifth Anniversary Symposium where students, practitioners, academics, and telecommunications business professionals assembled to continue the communications reformation debate. The Silicon Flatirons symposium, continuing its tradition of encouraging "bolder thinking" in Boulder, enlisted a thoughtful array of academic, industry, and government leaders to examine issues that are largely unaddressed by the Telecom Act.[1] This year's flagship symposium, *The Digital Broadband Migration: Rewriting the Telecommunications Act*, covered a variety of topics from keynote addresses about the practicality of rewriting the Telecom Act to panel discussions about the feasibility of reforming the FCC and its mission.

It is particularly fitting that we begin this issue with an Introduction by Professor Philip J. Weiser, who early in his career, advised the Assistant Attorney General on antitrust policy in the telecommunications industry when the Telecom Act was enacted. Other noted authors included in Issue 1 are: former FCC Chairman Michael Powell; Qwest CEO Richard Notebaert; former Chairman of the Civil Aeronautics Board Alfred Khan; University of Pennsylvania Wharton School Professor Gerald Faulhaber and Assistant Professor Kevin Werbach; University of California at Berkley (Boalt Hall) Law School Acting Professor Molly Van Houweling; Northwestern University School of Law Associate Professor James Speta; Rutgers University School of Law (Camden) Associate Professor Ellen Goodman; and Silicon Flatirons Programs & Finance Director third year law student Travis Litman. This issue was made possible with the contributions from these authors for which we are most grateful.

In addition to the contributions of our nine authors, this issue was published with the tremendous efforts of our staff. Our staff has the great fortune to stand on the shoulders of those that created the journal and continue to raise the bar. While I am indebted to our entire staff, there are a few that I would especially like to thank. Todd Hoy, Eric Lentell, and Alison Minea, our Articles Editors, worked with the authors to develop and publish their articles in this issue and but for their efforts

1. Silicon Flatirons Telecommunications Program, The Digital Broadband Migration: Rewriting the Telecom Act *at* http://www.silicon-flatirons.org/conferences_old/20050213teleComAct.asp.

this issue would not be possible. Additionally, our exceptionally talented Production Editor, Rita Sanzgiri, and her team of assistants (Jennifer Loyd, Micah Schwalb, and Margot Summers), worked tirelessly on this issue to continue to raise the quality of our publication. I am particularly grateful for those members of our staff that always said "yes" to my many requests for volunteers—Molly Ferrer, Elizabeth Lewis, Alexander Ross, and Margot Summers—your efforts are greatly appreciated and often beyond the call of duty. Also, words cannot express my gratitude for the efforts of our Managing Editor, Travis Litman; his contributions to both the Journal operations as well as the production quality control made my job manageable.

Aside from the authors, there are others beyond the Journal staff who deserve recognition. First, we are grateful for our JTHTL Alumnae and their continued support of our journal. You have laid the groundwork for an excellent publication and your ongoing sponsorship and participation in our efforts are truly appreciated. Second, the Silicon Flatiron Telecommunications Program and JTHTL Board continues to support the efforts our organization—including student article review and writing competition sponsorship. You were there in the beginning, welcomed our staff, and we know that you will continue to participate with future staffs; thank you.

Finally, I am eternally grateful for the support that Professor Phil Weiser has extended to me personally and to the staff generally. We cannot thank you enough for the tremendous insight and counsel that you continue to provide. Our staff is grateful for your ongoing mentorship and friendship; you truly set the tone for an exceptional law school journal experience.

With these expressions of gratitude as a backdrop, it is with great pleasure that we publish Volume 4, Issue 1 of the *Journal on Telecommunications and High Technology Law*. We are certain that this issue will continue to feed your intellectual curiosity in telecommunications and technology law and policy.

*Lisa M. Neal-Graves*
*Editor-in-Chief*

# JOURNAL ON TELECOMMUNICATIONS & HIGH TECHNOLOGY LAW

*Volume 4* *Fall 2005*


## CONTENTS

### THE DIGITAL BROADBAND MIGRATION: REWRITING THE TELECOMMUNICATIONS ACT

*The 5th Anniversary Silicon Flatirons Telecommunications Program Symposium co-sponsored by the Journal on Telecommunications and High Technology Law*

## SPECTRUM REFORM



## STUDENT NOTE

# REWRITING THE TELECOM ACT: AN INTRODUCTION

PHILIP J. WEISER*

What a difference five years makes. In 2000, the Silicon Flatirons Telecommunications Program held its first conference on "Telecommunications Law for the Twenty First Century," with my opening remarks and essay titled "Paradigm Changes In Telecommunications Regulation."[1] That essay focused on the central themes of that conference, concluding with the observation that "Congress did not fully grasp the importance of the internet" in drafting the Telecommunications Act of 1996 and that the questions around "how to treat the internet will only heat up in the years to come."[2] Today, such observations are not only conventional wisdom, but Congress and other commentators have begun to debate how to craft a new statutory framework for an Internet age.[3]

Our conference on "Rewriting The Telecom Act" focused on the critical set of themes related to regulating digital broadband communications. As Chairman Powell noted in his remarks, a critical effort to ensure sound competition policy in the digital age is to promote the development of a third (and fourth) broadband pipe.[4] Of the contenders for the title of the third broadband pipe, the best prospects center on the development of new wireless technologies, such as the much-hyped WiMAX standard.[5] On most accounts, however, the promises of wireless broadband rest on the shoulders of spectrum policy

* Associate Professor of Law and Telecommunications and Executive Director of the Silicon Flatirons Telecommunications Program, University of Colorado.

1. Philip J. Weiser, *Paradigm Changes in Telecommunications Regulation*, 71 U. COLO. L. REV. 819 (2000).

2. *Id.* at 842.

3. *See, e.g.*, Staff Discussion Draft, http://energycommerce.house.gov/108/News/09152005_staff_disc.pdf (Sept. 15, 2005). *See also* PROGRESS & FREEDOM FOUND., *The Digital Age Communications Act Project*, *at* http://www.pff.org/daca (last visited Oct. 20, 2005) (presenting a notable effort to craft a new statutory framework).

4. Michael K. Powell, *The Digital Migration: Toward A New Telecom Act*, 4 J. ON TELECOMM. & HIGH TECH. L. 5, 12 (2005).

5. *See* WIMAX FORUM, *Technical Information*, *at* http://www.wimaxforum.org/technology (last visited Oct. 20, 2005).

reform. Without freeing up spectrum for new uses and facilitating more flexibility in how spectrum is used—either through a "commons" or "property rights" model[6]—we may still be talking about the prospects for a third broadband pipe in another five years.

The contributions that Gerry Faulhaber, Ellen Goodman, Jim Speta, and Travis Litman make to the debate on spectrum policy are critically important.[7] Together, they raise four questions regarding spectrum reform: (1) how can the inarguable benefits of a property rights system be put into practice; (2) whether any concerns about fairness (i.e., unjust enrichment) should influence spectrum policy; (3) how can new, smart technologies such as cognitive radios facilitate more effective uses of spectrum; and (4) what political forces will lead Congress to take the steps necessary to update our spectrum policy. Notably, the last question may well be the hardest of the three, but Jim Speta effectively engages that issue. Unfortunately, his call for a thorough re-thinking of spectrum policy as part of comprehensive telecommunications law reform does not seem to be taking hold on Capitol Hill.

The debate about the proper substantive and institutional strategy for the Federal Communications Commission are, as former Chairman Powell put it, "really hard" and "not a simple matter."[8] For starters, the deregulatory initiative in airlines, for example, represented a case where the industry was structurally competitive and regulation constituted an impediment to competition. As Alfred Kahn so wonderfully explains, the challenges of telecommunications regulation are more difficult. "Telephone regulation, in contrast [to airline regulation], set the prices and other conditions of sale on services whose supply was believed to be best handled by designated franchised 'natural' monopolists. . . . [T]he case for deregulation of industries such as telecommunications has to be that monopoly is no longer the most efficient form of supply, if it ever was; and that competition, once released from governmental restraint on the one side and subsidization of competitors on the other, will serve the

6. *See* JONATHAN E. NUECHTERLEIN & PHILIP J. WEISER, DIGITAL CROSSROADS: AMERICAN TELECOMMUNICATIONS POLICY IN THE INTERNET AGE 225–261 (2005); Philip J. Weiser & Dale Hatfield, *Policing the Spectrum Commons*, 74 FORD. L. REV. 101 (2005), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=704741; Philip J. Weiser & Dale Hatfield, *Property Rights In Spectrum: Taking the Next Step* (Sept. 30, 2005), *at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=818624.

7. Gerry R. Faulhaber, *The Question of Spectrum: Technology, Management, and Regime Change*, 4 J. ON TELECOMM. & HIGH TECH. L. 121 (2005); Ellen P. Goodman, *Spectrum Equity*, 4 J. ON TELECOMM. & HIGH TECH. L. 193 (2005); James B. Speta, *Making Spectrum Reform "Thinkable"*, 4 J. ON TELECOMM. & HIGH TECH. L. 181 (2005); Travis E. Litman, *Cognitive Radio: Moving Toward A Workable Framework for Commercial Leasing of Public Safety Spectrum*, 4 J. ON TELECOMM. & HIGH TECH. L. 249 (2005).

8. Michael K. Powell, *The Digital Migration: Rewriting the Telecom Act Through Self-Executing Deregulation*, 4 J. ON TELECOMM. & HIGH TECH. L. 5, 14 (2005).

public far better than public utility-type regulation."[9]

In considering the proposal offered by Kevin Werbach related to how to conceptualize the emerging telecommunications environment, readers can appreciate the great extent to which this field presents significant intellectual barriers to entry.[10] After all, to understand telecommunications regulation, one must focus not only on a complex statute, but dynamic technologies and economic principles. The difficulty in understanding these issues, along with an array of institutional challenges in implementing the Act, help explain why, to Richard Notebaert's great frustration, regulatory decisions do not proceed at "Internet time."[11]

The frontiers ahead and the appropriate scope of a new Telecom Act will not be decided in the very near term. Chairman Powell's suggestion of a self-executing deregulation model is now being considered, albeit in a bill over three times the length that he recommended.[12] Similarly, Congress is now considering instituting the broadcast flag proposal,[13] so Molly van Houweling's analysis of that proposal—which was invalidated on account of a lack of jurisdiction[14]—is most timely.[15]

The realities of legislation on any topic, particularly one as complex as telecommunications, is that developing thoughtful policy approaches will take time. In that respect, the work of the Journal on Telecommunications and High Technology Law is critically important. It's a great pleasure to see that, as the need for a new statutory framework increases and the challenges grow more complicated, the University of Colorado has a terrific group of students committed to searching for thoughtful answers and producing a Journal that continues to reach new heights.

---

9. Alfred E. Kahn, *Reforming the FCC and its Mission: Lessons from the Airline Experience*, 4 J. ON TELECOMM. & HIGH TECH. L. 43 , 43-4 (2005).

10. Kevin Werbach, *Breaking the Ice: Rethinking Telecommunications Law for the Digital Age*, 4 J. ON TELECOMM. & HIGH TECH. L. 55, (2005).

11. Richard C. Notebaert, *Overseeing the Unforeseeable: A Rational Regulatory Approach to 21st Century Communications*, 4 J. ON TELECOMM. & HIGH TECH. L. 31, 37-8 (2005).

12. *See* Staff Discussion Draft, *supra* note 3.

13. Declan McCullagh, *Politicians Want to Raise Broadcast Flag*, CNET NEWS.COM (Sept. 30, 2005), *at* http://news.com.com/Politicians+want+to+raise+broadcast+flag/2100-1028_3-5886722.html.

14. Am. Library Ass'n v. FCC, 406 F.3d 689 (D.C. Cir. 2005).

15. Molly Shaffer Van Houweling, Communications' Copyright Policy, 4 J. ON TELECOMM. & HIGH TECH. L. 95 (2005).

# THE DIGITAL MIGRATION: TOWARD A NEW TELECOM ACT

MICHAEL K. POWELL*

*On February 14, 2005, the University of Colorado School of Law welcomed then-Federal Communications Commission Chairman Michael Powell to present a keynote address at the Silicon Flatirons Telecommunications Program Symposium,* "The Digital Migration: Rewriting the '96 Telecom Act." *After being introduced by then-Colorado Secretary of Innovation and Technology Leroy Williams, Chairman Powell was asked to offer his remarks in the context of a talk-show format with Professor Phil Weiser, his former Department of Justice colleague, as the host. At the close of his remarks, Chairman Powell participated in a question-and-answer session also moderated by Professor Weiser. What follows is an edited transcript of a talk-show-like exchange between Chairman Powell and Professor Weiser, as well as the question-and-answer session.*

## INTRODUCTION

*Secretary Williams*: Thank you, it is great to be here. This is my second time having the opportunity and pleasure to introduce Chairman Powell, someone whom I highly respect and look up to. He has done just a tremendous job as a chairman at the FCC. Most people do not even understand the positive impact that he has made in our lives.

To begin, we here in Colorado are fortunate because we are on the leading edge of technology. We certainly have a strong presence in the telecommunications arena. It is unfortunate that I read in the paper this morning about Verizon winning the bid against Qwest in the MCI deal.[1] Had MCI come up here and taken a look at the scenery, they might have changed their mind. As a native passionate about Colorado, we do hope things work out with Qwest; we have been very good partners with

* This article was adapted from a speech and question-and-answer session delivered by FCC Chairman Michael K. Powell at the Silicon Flatirons Symposium on "The Digital Broadband Migration: Rewriting the Telecom Act" held at the University of Colorado School of Law on February 14, 2005.

1. Matt Richtel & Andrew Ross Sorkin, *Verizon Agrees to Acquire MCI for $6.6 Billion, Beating Qwest*, N.Y. TIMES, Feb. 14, 2005, at A1.

Qwest and our telecommunications community.

We are one of a few states that have actually begun to close the digital divide. We have deployed broadband services in all sixty-four counties,[2] which is not an easy economic proposition given the size of Colorado and the complexity of the Rocky Mountain geography. We are excited about the results. If you go down to the San Luis Valley, they actually have DSL.[3] The San Luis Valley is a remote area with very low population density. The economics and demographics would suggest they would not see DSL for a long time. It was our partnership with Qwest and other telecommunications providers that made it possible for San Luis Valley and other rural parts of Colorado to have DSL service.

What best describes Chairman Powell is that he just flat out *gets it*. We owe a lot to his abilities to have conversations with Congress, talking about and promoting policies, breaking things down so people understand what's important, working with academia, driving competition, and promoting innovation to continue the investments in technology.

His recent statement highlights his tenure as chairman:

> [We] worked to get the law right in order to stimulate innovative technology that puts more power in the hands of the American people, giving them greater choices that enrich their lives. Evidence of our success can be seen increasingly in the offices, the automobiles and the living rooms of the American consumer.[4]

He consistently advocated a free market approach to broadband and VoIP, which often put him at odds with two Democratic Commissioners and a fellow Republican.[5] He argued for greater competition between cable and DSL rather than continuing his predecessor's approach of forcing telecommunications companies to accommodate rivals by signing money-losing deals.[6]

In my own tenure in the government, often it is easy to walk a delicate line where you do not raise controversies and push the envelopes.

---

2. For information on Colorado's state-wide multi-use network that brings broadband communications to every county seat, see http://www.mnt.state.co.us/.

3. Digital Subscriber Line service, a type of broadband platform that utilizes the copper wires of the telephone network.

4. Press Release, Fed. Commc'ns Comm'n, Statement of FCC Chairman Michael K. Powell on Leaving the Commission (Jan. 21, 2005), http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-256206A1.pdf.

5. Declan McCullagh & Ben Charny, *Mixed Legacy for FCC's Powell*, CNET NEWS.COM (Jan. 21, 2005), http://news.com.com/Mixed+legacy+for+FCCs+Powell/2100-1033_3-5545030.html.

6. *Id.*

Chairman Powell has certainly raised controversies and pushed the envelope through his philosophy and his policies. We thank you, Chairman Powell, for taking on those battles and leading the free market drive.

During this conference last year, Chairman Powell and I had a brief conversation about new maturing technologies and their mass market potential to create a convergence for 100% broadband availability. Six weeks later, the President announced his 100% broadband availability initiative. While I do not know if that was attributed to Colorado, I think we should take some credit.

Finally, I listened to a speech by Chairman Powell last year on ethics and integrity which had tremendous take-aways for the students and the audience. He clearly comes from a family heritage of the utmost integrity. Again, I want to thank you for all that you have done for the telecommunications and high tech industries. With that, here is Chairman Powell.

## I. DIGITAL MIGRATION

*Professor Weiser*: One thing people may not know is that Chairman Powell is a big fan of the Charlie Rose Show.[7] Actually, he may not know that. But in this version of the show, I get to take on the persona of Charlie Rose. The idea here is to underscore his agility both in regulatory philosophy and in mind. We will go through a series of questions that will capture the theme of the conference, and then open up questions to the audience.

To start, when you first came here in Fall 2000, you looked out in the broad frontier of the mountains and made an analogy to the migration of ancient peoples.[8] You analogized ancient peoples who came through straits and faced new challenges to what you foresaw as the digital migration. Where are we in this migration?

*Chairman Powell*: To paraphrase Martin Luther King, we may not be there yet, but I have been to the mountaintop and seen the Promised Land.

*Professor Weiser*: Was that in South Korea?

*Chairman Powell*: I thought that was in Colorado. We have breached through and established a beachhead on the other side of the digital migration. People, ideas, and products are pouring through that breach rapidly, and it's expanding. Since I gave that speech four or five years ago, I have seen the TiVo, the iPod, the Blackberry. I have seen

7. *See generally* THE CHARLIE ROSE HOME PAGE, http://www.charlierose.com/.

8. Before delivering his "Great Digital Broadband Migration" speech to the Progress and Freedom Foundation (in its final form), Chairman Powell delivered those remarks at the University of Colorado. *See* http://www.fcc.gov/Speeches/Powell/2000/spmkp003.html.

the arrival of digital cable service, an explosion of DSL provisioning, and satellite-delivered local communications. I have seen the arrival of the Xbox, Xbox LIVE, Playstation 2, PSP, and on and on. Cell phones that are basically your new electronic Swiss army knife.

If you have any doubt that the basic paradigm to digitization, digital technology, and digital migration are in force, then you are not paying attention to the children in your living room. That generation is unquestionably and irreversibly committed to that transformation and everything that transformation entails. It is a passion of mine that the seeds of these things have been planted and are blossoming. I think 2005 and the future are extraordinarily bright.

Nobody debates this anymore. We did this, Phil, as an academic exercise. I hear people in this room saying this is all very academic. It all starts academic and I have been criticized for years that this won't happen or that I am in an ivory tower. Nobody is having this discussion anymore. Companies are radically looking for their movement, their play, and their transformation. Consumers are adopting. Digital migration is not an open question. The only question is how fast it will get to the new Promised Land.

## II. SPECTRUM POLICY REFORM

*Professor Weiser*: So the next time you spoke here, about a year later, you spoke about the problems with the spectrum regime we have.[9] Where companies have licenses to use spectrum, they would basically come to the FCC, hat in hand, and say "may I do this?" You noted that this was a very restrictive and stifling regime for innovation. So you launched a new initiative, Digital Broadband Migration Part II, to reform spectrum policy. Reflecting back, where are we along that path?

*Chairman Powell*: I am pretty bullish about this, too. This is one of the most remarkable examples of an agency actually developing a consensus to establish a vision to build, develop, distribute, and execute a blueprint. This has been the success story of the Spectrum Policy Task Force[10] and an initiative launched at this conference. We knew that spectrum policy was broken. The command-and-control that was governing spectrum management could not guarantee highest and best use of spectrum in a fast moving, innovative, and driven space.

Some very talented staffers at the FCC took charge of the mission. I remember very clearly saying to them, Don't come back with anything

9. Michael K. Powell, Chairman, FCC, Broadband Migration III: New Directions in Wireless Policy, Remarks at the Silicon Flatirons Telecommunications Program (Oct. 30, 2002), http://www.fcc.gov/Speeches/Powell/2002/spmkp212.html.

10. *See generally* Fed. Commc'ns Comm'n, About the Spectrum Policy Task Force (last visited Oct. 5, 2005), http://www.fcc.gov/sptf/.

meek, I don't want to see it. I don't want to see incrementalism. I don't want to see repackaging of the same old stuff we have been doing for the last twenty years. They did not shirk from their mission at all. They produced an outstanding piece of government work about changes and the future, some of which we laid out at the conference here.

We have been marching relentlessly down this path ever since we put out this vision. Spectrum reform means a lot of things to a lot of people. But in a very short time, we have eliminated our official spectrum cap constraints on spectrum in the market.[11] We have introduced secondary markets and leasing policies that allow technology to be moved in a free market without coming back to the government for permission.[12]

If you had asked five years ago if you could you get away with creating secondary markets, you would have been told that you were crazy. The public interest stewards of spectrum would never let a private entity sell and transact spectrum in secondary markets with the blessing of the government. But we do that freely today. Today, it is more common than not that spectrum comes with enormous flexibility of use. We may set interference parameters,[13] market area,[14] or geographic regions,[15] depending on how we choose to license a spectrum. But I don't remember the last time we said anything about what to do with spectrum.

At the FCC, we rarely ask, "What's this spectrum for?" We decided that's none of our business and I used the following analogy: It's like a driver's license—don't speed, don't kill anybody, what color of car you drive is none of my business. This actually is a paradigm that is used in the allocation of spectrum at the FCC everyday now.

So we have spectrum flexibility and secondary markets. But we don't have spectrum caps. Additionally, we have explored the possibilities of public benefit in lots of models. For Wi-Fi, which to the used junk spectrum for baby monitors and microwave ovens, it's pretty remarkable what's being done with it. What a radical notion it is to say that Mike Powell, not Verizon, not Sprint, owns this spectrum in his house. I can go down to the Circuit City and buy a box for $70, throw it in my house, and create a wireless network at a very low cost. That's the democratization of technology and power.

---

11. *See* 2000 Biennial Regulatory Review Spectrum Aggregation Limits for Commercial Mobile Radio Services*, Report & Order*, 16 FCC Rcd. 22,668 (2001).

12. *See* Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets, *Second Report & Order & Order on Reconsideration & Second Further Notice of Proposed Rulemaking*, 19 FCC Rcd. 17,503 (2004).

13. *Id.* at 17,546 ¶ 86, 17,561-62 ¶ 119, 17,563-64 ¶ 126.

14. *Id.* at 17,517 ¶ 26, 17,519 ¶ 27, 17,522 ¶ 36.

15. *Id.* at 15,515 ¶¶ 21-22, 15,516-19 ¶¶ 25-27, 17,532 ¶ 59.

Things like this pop up all over the country at the most unbelievable rate. In my 8 years, every time we looked at one of these things, we had technologists and lobbyists come in and tell us that this could never be used so don't do that. They would say satellite could never deliver signal into local markets, so don't do that. They would say, Don't ever do Wi-Fi because you could never get a last mile solution out of that technology. Every time, some innovator blows these people off the map.

Last time I was in Colorado, I met three guys who in three weeks with forty thousand dollars had a 54 Mbps blanket network over Aspen shooting signals nine miles. Don't tell an American entrepreneur what he cannot do, and we have learned to be aggressive about letting people try. I am very proud of the spectrum policy. There is a lot more that can be done and it is in a remarkably healthier place than when we set out on this mission.

## III. "NET FREEDOM" PRINCIPLES

*Professor Weiser*: When you spoke here last year, you spoke about the "Net Freedom" principles. You have reiterated those principles more recently in connection with VoIP and the potential for discrimination between service providers. Why is this issue important to you? What do you envision the FCC doing down the road, such as a FCC formal policy on this issue?

*Chairman Powell*: I have read in the papers that I am a rabid believer in laissez-faire, which makes me laugh because I don't think anybody truly believes in laissez-faire. I think anybody who is truly committed to market principles knows that markets only work if you are committed to the rule of law. Markets only work if, in the rare instances when there is a risk of market failure, the government is prepared to act, and act quite brutally. The presumption is that if someone is cheating, the government kills it. This is the competition policy under the antitrust model. In other words, I don't think the government can champion moving our entire communications architecture to an Internet Protocol data space and then stay mum about genuine risks to the viability of that regime through anti-competitive behavior.

Being neutral is the healthy way that is the most faithful to the market and technology. It is also the least governmentally intrusive, and the one that best promotes innovation. What's essential to realize the dream of the Internet is for the government to just hang out there in the periphery of the Internet space and assure that providers wouldn't try to hurt the consumers. A willing consumer can then make a connection with a willing provider anywhere in the world.

So these principles are elegant, but what about a rule? The government has to be very cautious about when it moves the policy to a

rule because it is a lot easier said than written. When the writing starts, all kinds of mischief begin: the definitional issues, at what technical point to enforce a regime, who is allowed to access it, and who is not. And you have to be sure you have a problem—this may sound really radical and novel—you should not have a solution until you have a problem. Before the government opens up a regime, you ought to have good evidence of how that problem presents itself and that there is actually a problem.

Another point people talk about is that regulators like to really swagger and act tough. But the government should not bring companies to their knees. I am a big believer in aligning interests in regulation, which means you should define the public interest and understand the private interest of the providers. Then see if you can develop policies that align them so that concurrently the government is actually going with interests. My experience has been that when a company is diametrically opposed to what the government is trying to shove down its throat, you will try to do it in court forever. And you almost never win because as soon as you stop one thing, the companies find another way if they are so sufficiently motivated to cheat.

What makes a policy last for decades is when the policy begins to be part of the culture of the company, the market, and the processes. I worried a lot more about cable companies' impulses on this several years ago than I do today. I actually believe that the cable companies are getting smarter about what the Internet is, getting better at understanding of what kind of opportunities it provides, and getting a clear picture of what their consumer would accept. I believe we are beginning to successfully create a culture knowing what the Internet is and is not. The Internet is not a place for a company to strip a consumer's alternative. There are a lot of things everyone told me that carriers would stop doing, but they haven't. I hope there won't be a need for a rule. But trust me, if there is need for a rule, this would be an area I would move into.

## IV. BROADBAND PLATFORMS

*Professor Weiser*: I hope you will continue on, because the spirit of your direction is important and inspiring. One of your directions has been that it's really important that we get more broadband platforms. A quote from you is that "magical things start to happen when you get to three." Why do you think that and what are you doing to promote additional broadband platform entrants?

*Chairman Powell*: Yeah, I do say stupid things like that. Then I have to explain it.

*Professor Weiser*: Comes from reading all the Harry Potter books, I guess.

*Chairman Powell*: Right, we could be metaphysical here. There is something magical about three, isn't there? Everything from the Trinity to the Three Stooges. All right, we will leave this metaphor here and try something else.

Here is why I think three is important. One, it's a low plateau when duopoly is not enough. That does not mean duopoly sometimes isn't completely healthy from a competitive standpoint. Coke and Pepsi are a duopoly and they beat each other's brain out. But duopoly is not where your aspiration should stop. So "three" is a statement of vision—go farther and dare to want more than you know you can get. I am very confident we can get a lot more, so I never want to endorse the idea that two would be enough.

The other reason is that researchers have shown that the competitive dynamic gets a lot richer when you start to have three players. Collusion becomes harder and coordinated activities become harder. Someone always breaks ranks and pushes an innovation that threatens the others and forces the others to move. I won't recount all of the antitrust literature, but it is fairly well established that "three" is a special number in markets.

But here is why it is really magical for everything we have heard in this conference. It is important to remember what the market is. "Three" is a way to have the market discipline behavior rather than having the regulators do it.

If you want our broadband market to get healthy enough, competitive enough, and disciplined enough to lower the regulatory barrier, you should promote more platforms. The more platforms there are, the richer the competition and the better the innovation. Similarly, with more platforms, you can make a compelling case for less regulatory intervention, which in turn spurs more investments in innovation.

The FCC has a venture policy as follows: If you have an innovation or a new technology for broadband, you can have a meeting tomorrow and we will hear about what you plan to do. We will devote every resource we have. Sometimes it's nothing more than coming to your press conference, and I will go watch your new product trial in Kansas or Silicon Valley. I will talk to every newspaper that wants to talk about broadband and give a quote. We will drive with every ounce of our being to facilitate every opportunity for a new platform to exist. This is another area where the FCC deserves some rare commendation.

Whether it's Wi-Fi, WiMaX, broadband over power line, satellite delivered broadband, cable modem, or DSL, we have exhaustively tried to create as many platforms as possible. I am confident more than three of them will stay.

*Professor Weiser*: I guess what they say is, from your lips to God's

ears.

*Chairman Powell*: It's another one of the Trinities.

*Professor Weiser*: Exactly.

## V. FCC REFORM

*Professor Weiser*: One of your prayers in taking over the FCC was to reform the institution itself: improving its expertise, raising its commitment to the rule of law, and moving in the direction of being more of an enforcement agency and less of a quasi-legislative one. How would you rate your success on this score and what would you recommend for the future?

*Chairman Powell*: I don't like this rate-yourself stuff, Phil.

*Professor Weiser*: At least I am not asking you to rate from one to ten.

*Chairman Powell*: Anyone who wants to sit in my seat needs to spend at least as much time talking about grand visionary policies as the actual management and stewardship of that organism. The FCC has two thousand amazing people. These are amazing people who work enormously long hours on very long and complicated stuff for very little money. Unlike some industries, these are people who could go work elsewhere. They are special. So, we took the management of the FCC very seriously. We decided that the FCC is an extraordinary institution, but it has a few flaws.

The FCC was an institution that was constructed and whose culture was built around one hundred years of a very mature industry. And it was constructed *for* that mature industry. For the better part of the FCC's history, there was only one phone company and a couple of broadcast companies. Only in modern times have we added wireless and these other things.

The FCC is fundamentally in a new place and needs a new culture. The FCC is also lawyer-heavy and lawyers are incrementalists. We are trained to be incrementalists and not do anything without precedent. We are conservative and avoid risk when possible. This is not the splashy stuff of Internet vision. We had to radically change the culture and create an institutional commitment to look forward instead of backward. When I first arrived at the FCC, I felt like we were reacting to a crisis 95% of the time. Now, we still have to react to things, but for the first time we have things on our agenda because we proactively want to do those things. And those things are forward looking.

The best thing we have ever done was building our own University. Every employee is required to participate in the University. Your performance appraisal includes an employee development plan and you have to take classes on technology. You have to teach if you are a senior

person. These courses are amazing. Now we also have an online version and people can take classes at home. We have regulators from around the world asking me if they can send their people to the classes. We invite Hill staffers to come, so we can all try to develop a common knowledge and intellectual path.

What the University does for morale, commitment, and excitement about new stuff is enormous. The FCC is a wonderful place to work right now. It is a wonderfully exciting place that looks forward rather than backward. On that score, we get an A.

As to enforcement, you heard my philosophy that you cannot be a credible market person if you do not believe in enforcement. We are the only Commission in thirty years that has blocked a media merger.[16] We did not condition it, we just said no, and pulled the trigger even though nobody believed we would. By the way, we went ahead of Justice, something I was particular proud of. We have blocked a lot of things and gone after very big companies for very big amounts of money. That's an important legacy.

## VI. FCC DECISION MAKING

*Professor Weiser*: Let's follow up on that. One of the points the last panel discussed was that the FCC has become less deliberative and constructive in its decision-making and there is more partisan infighting. To what extent is that true, and is there a way that future Commissioners can try to get to the judicial ideal? One suggestion is to have just one chairman. Are there ideas that you have thought of that could help this process?

*Chairman Powell*: This is actually a really hard question because there are many more pieces to it. It's not a simple matter of who you put on the Commission. And it's not a simple matter of a sunshine act or any quick fixes. Some of the reasons are inherent in the transformation going on in the market. I am not sure whether there is anything that can be done about it. Legislative activity is inherently political.

As the Telecommunications Act[17] turns gray and positive law does not squarely answer important questions, the FCC's place on the spectrum is definitely moving more toward being legislative. We are increasingly being asked to answer questions that are not really questions, but are the identification of issues. The FCC is in essence being asked to write the new rule. Even when it is interpreting a rule in a statute, rarely is the statute offering anything clear. So even if you are just fighting over

16. Application of EchoStar Communications Corp., General Motors Corp., and Hughes Elec. Corp., *Hearing Designation Order*, 17 FCC Rcd. 20,559 (2002).

17. Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56 (codified in scattered sections of 15, 18 and 47 U.S.C.).

ambiguity, you are really writing new law.

To follow the open administrative process when outcomes affect a billion-dollar industry and many consumer groups, you have to let people join meetings and do things in the open. All these interrelate to make the agency heavily legislative in a way that makes you uncomfortable. This is beginning to be a warning sign to the Congress because something has to be changed. Something has to be changed because more and more of the agency is being forced to do the Congress' job and the organic statute is losing its applicability and relevance.

The other interesting thing is that the FCC needs to shut its processes down tighter because our *ex parte* process is out of control. It is out of control because people feel they can call you and ask what you think even on the eve of a decision. By the way, many in the audience are as much to blame as we are because lawyers work very hard at keeping the access. So do companies.

What happens is that documents are flying in the door the night before a decision. Lawyers across the country are asking what caused this situation. Even the D.C. circuit is expressing worries that this agency is getting out of control. The FCC is not really developing a record and procedure with late night filings that often do not tell you what really happened in the conversations and meetings.

I have shut a lot of that down. The problem is I do not control every office and some offices think that's just the way you do business. I might be stubborn and I might be losing something in the political game, but I do not call companies and ask them what to think. I just don't. We should have the peace of mind and confidence in our authority and judgment to make decisions. We should stand by our decisions without needing companies' approval, because seeking approval gets dangerous.

Another thing that I do not have an answer for is the process of selecting Commissioners. My colleagues are great people. But the selection process has become highly politicized, where people are actually being promoted for the sole purpose of representing only one narrow interest. In two or three Commissions that I have worked on, there were a couple of people who think they work for senator X or constituency Y. Constituencies work very hard to stack the FCC with people whom the constituencies think will be their reliable people.

If you want judges, you have to stand by the people who will rule both against you and for you depending on what is fair. But as long as people play this game and do not care about what happens to the rest of the country, you will hear complaints at conferences like this because everyone can play this game. It would be better if nobody played this game.

*Professor Weiser*: There is a lack of scholarship on this issue, and I would encourage others to write a scholarly explication. It is an important set of issues.

## VII. WASHINGTON IDEOLOGUE

*Professor Weiser*: I want to move on to another question, which is dealing with the nature of Washington and its tendency to put people into a box. In your case, the box is a pro-business ideologue who does not care about consumers. How do you react to this unfortunate tendency and how does this label fit with some of the things you championed like number portability,[18] Do Not Call,[19] and hearing aid compatibility[20]?

*Chairman Powell*: I love this criticism. In 2005, with the United States democracy and capitalist system standing on the reign of world history, the lesson of the Twentieth Century is that Communist and socialist models basically collapsed into the sea. I cannot believe that anyone still has to continue to defend the commitment of the market to maximize consumer and public interest welfare. The idea that businesses and consumers are incompatible is ridiculous. It just amazes me that every ten years somebody has to prove again that when you allow businesses to operate in a market and have a dialogue between producer and consumer, they find mutual value.

So if I am pro-business because I believe free markets maximize consumer welfare, I am guilty and I do not want to be anything else. But any real free market includes the rule of law for market failure and for social or political imperatives. Any free market is not inherently economic in nature. I would be doing a weird job if I did not actually believe that regulations are for the benefit of the consumers. I guess you can put number portability and do not call in the protecting consumer interest category. But we don't go out and sing off the mountaintop about them. It is unfair and trivializing consumers if there is a portfolio of things just for consumers and somehow everything else is for something else. Our view is that everything we do is about consumers.

The right pricing model is to maximize overall consumer welfare.

---

18. *See* FCC Clears Way for Local Number Portability Between Local Wireline and Wireless Carriers, FCC 03-284, CC Dkt. No. 95-116, 2003 WL 22658210 (Nov. 10, 2003), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-241057A2.pdf.

19. *See Rules and Regulations Implementing the Do-Not-Call Registry Pursuant to the Telephone Consumer Protection Act of 1991: Hearing Before the S. Comm. on Commerce, Science and Transportation*, 108th Cong. (2003) (statement of Michael K. Powell, Chairman, FCC).

20. *See* Susan Boswell, *Hearing Aids and Cell Phones: Fast-track Work Underway to Boost Compatibility*, THE ASHA LEADER ONLINE (Nov. 4, 2003), http://www.asha.org/about/publications/leader-online/archives/2003/q4/031104a.htm.

Anybody who is a true student of market capitalism knows that law is critical to protection of expectations. A healthy disclosure dialogue between consumers and producers makes the market work. The government must be a steward of law; laissez-faire does not work.

## VIII. EXPLAINING WHAT FCC DOES

*Professor Weiser*: Having written the book *Digital Crossroads: American Telecommunications Policy in the Internet Age*,[21] I can definitely say that explaining telecommunications regulation is no easy task.

*Chairman Powell*: You are hawking that book.

*Professor Weiser*: I sure am. When I try to broach the subject, often the first thing people say is "what do you think about that Janet Jackson episode?" Last year, you noted that she obviously had her own definition of "open access." But seriously, how do you get away from talking about indecency? The public and mainstream media seem to be focused disproportionately on indecency because most people can understand that. People do not understand things like the complexities of the layered model or the Digital Broadband Migration. How do you begin to communicate to the public about what your vision is and why telecommunications regulation is important for their lives?

*Chairman Powell*: First of all, you have to have a thick skin and just accept that people tune in for what they care about, and they tune out when they are not interested. Mainstream media likes high profile controversial stories. If a story is not controversial, rarely is the story interesting to them for selling papers. They like issues that are simplistic to understand—ripping cloth off is a pretty easy story. I better stop there.

This type of story is one-dimensional and does a disservice to what the FCC is involved in. It trivializes the most important things the FCC does, which has a much more meaningful impact on your child's life than whether the Super Bowl was or was not decent. The FCC has to be involved in the decency issues as required by our Congress. I find the decency issue fascinating only from the standpoint of how the media writes about us. It is as if it's a complete discretionary action on our part. It's as if we do it just for fun: we sit around in a movie room, watch dirty TV, decide to go get them, take the money, and have a party.

Trust me, we do not have this room. But I dwell here for a second because your students should hear this. If you have been charged to do something, leading at a principled level means doing what you want to

21. JONATHAN E. NUECHTERLEIN & PHILIP J. WEISER, DIGITAL CROSSROADS (2005).

do, as well as doing what you are not necessarily comfortable doing. In 1927, the American people asked their representatives to pass a statute that bans indecency.[22] The statute has never been overturned or modified. The Justice Department could have gone and arrested Janet Jackson for violation of the Indecency Statute. We have not gone that far, thank God.

But it does not matter what your personal comfort level is about these things. If you are sworn to uphold the Constitution to execute your duty as you are assigned, you will enforce the law particularly against public complaint. But if you are at The New York Times, you are free to criticize if you do not like the policy. But let's be candid about it: you are criticizing the American public that passed the statute. You can use me as a convenient moniker if you want, but what you are really saying is you are very disturbed by the fact that a significant majority of Americans want those limitations.

Also, mainstream media should stop personalizing policy about one or two people, because policies will not be adopted if only one or two people want them. When the United States Senate, Democrats and Republicans alike, vote 99 to 1 to raise the indecency standards by a factor of 10, it is a much more widely held view than because Mike Powell is on a crusade. This point is very important because an administrative agency is not all-powerful. The people are free to make constraints and empowerment through their representatives and we have to apply the statutes.

I do have to find ways to change the dialogue. One of the things I often do with groups is ask people to pull out their electronic devices. Turn those devices over and you will find the FCC stamp. The stamp is on everything. If that does not give you the sense of the breadth and depth of our portfolio, I don't know what does. Your Xbox, your TV, your cell phone, all have our stamp on it. That is because we type-approve equipment in our laboratories. But more importantly, it is a wonderful symbol of how broadly and expansively we are invited to participate in the digital space.

If you look at the Telecom Act, basically if an electron bounces off of you, we regulate you. Photons too now—we have now expanded our portfolio to include light. I have heard all these reform discussions and I kind of cringe because I hear people suggest getting rid of the FCC. The FCC is growing and not shrinking because our portfolio is defined by the movement of electrons and photons. I wish I could do a "day in the life of the chairman" video. You would be shocked by the issues we are immersed in on a daily basis.

22. *See* 18 U.S.C. § 1464 (2005).

What I do with consumer groups is just try to point to things. For example, telling them why their TV does this or that because we did or did not do something. I also learned to talk about these things. You have just heard me talk here and I talk about your kids. Because there is something intuitive in our ability to relate to our children and their world, parents and adults somehow understand that the digital creatures that are living in their houses are strange. The digital creatures are not of this world and consumers do not understand them. People ask, what is Xbox Live and what is my kid doing? If you learn to translate that stuff, very quickly people get it. You cannot talk the way we hideous lawyers talk.

## IX. UNIVERSAL SERVICE

*Professor Weiser*: One of the most challenging issues for the FCC has been transitioning from a legacy model of affordable telephone service. Given its emphasis on implicit subsidies that are captured by intercarrier fees, the Internet and VoIP are breaking this system. But the political will to come up with a different model seems difficult to generate. Joel Klein, whom we both worked for, said that the problem with universal service is that Congress wants to deficit finance it, which means once everybody gets the benefit, nobody wants to pay. What are your thoughts on this challenge and how to confront telecom policy in the future?

*Chairman Powell*: It is a tough one. Sometimes when you are tangled up, the best thing you can do is to try to go back to the first principle and the alphabet. Too often I hear people talk about universal service in terms of the current mechanism and program, and lose sight of what the purpose is.

The goal of universal service is ubiquitous service for all Americans at affordable rates.[23] Everybody agrees on this. Now we can talk about all kinds of ways to achieve it. As long as we achieve it, why do we care how we do it? If you are really willing to embrace that fundamental principle, you have the courage to take on the current way we do it. The current way we do it might have been fine. I said "might have" because I am not convinced that the current way is optimal.

Universal service was built entirely on the premise of a monopoly over the last 100 years. The monopoly gets both the exclusive burdens and the exclusive benefits. Ma Bell never cared about universal service. All she was doing was slushing money from one bucket to the other. Implicit subsidies did not matter until you broke Ma Bell up. After you start having competition, people beat subsidies out of the system and

23. *See* 47 U.S.C. § 254 (2005).

now you have a distorting impact that did not exist before.

This is the incrementalism model I was talking and worried about. People always want to bolt something else onto universal service in an attempt to fix it. It's like your old Chevy you had in high school. If you can just change this part, the Chevy is going to get to the gas station. Well, you are about to run out of gas and you need a new car. We need a new car. What is really not depressing, but challenging, about this is that the improvement in cars in the interim has been enormous.

There are so many easier and exciting ways to achieve ubiquitous and affordable service for Americans in every corner of the country today than there have ever been in history. Yet, we are still trying to push this broken Chevy up the hill instead of hopping into this cool hybrid. If you are a wireless service provider in rural America, you are running circles around the subsidized wireline model trying to do the same thing.

Why aren't we embracing the new vehicle to get to the event? Goals can be venerable; universal service goals are venerable. But it does not mean the approach has to be ancient. We have to separate those two things as a political matter. Also, as a political matter, we need to talk about how to muster political will. We better start having some courage to ask, Is this about rural consumers or rural producers? The cold truth here is that the policy is about the latter. I see people argue extraordinary things that actually harm rural consumers in order to preserve a quasi-monopoly.

I am going to get into trouble for saying this, but I do not care anymore. Universal service has to be taken on directly. I have heard people who otherwise are champions of competition tell me that wireless companies should not be allowed to compete and offer substitute services because it would take revenues out of the system. So these people want to condemn rural people to monopoly forever? One day this incrementalism model is not going to work because technology is going to rip it up everywhere.

What about the idea of having a little more patience and try to work on it? That's fine, but if you think it gets better with time, you are wrong. It's not fine wine, it does not get better with age. The problem will not get easier. We can either be a part of it and try to manage the collapse and reorientation, or we will let it blow up into smithereens and then wonder what happened to all the companies. So I keep listening to people who always say, go slow, don't do this, don't touch it, just a little more here and there. And I respond, when are we going to have the courage to stop perpetuating this incrementalism model?

Additionally, would the world not be better without this incrementalism model? You go to rural America, and there are two wonderful public policy bugaboos that make me laugh because they are

completely inconsistent. On the one hand, the problem is the digital divide; on the other hand the problem is universal service. What does the digital divide mean? It means if I live in South Dakota, you better get me all that stuff they have in New York. I do not want to hear that New Yorkers have VoIP, wireless, and cable with 120 channels. I want that stuff here, too. So close the digital divide, bring me all those same things they have over there. But then universal service makes sure those things do not come to me so that the guy providing the old stuff stays viable. This is the quandary that we live with. But by at least admitting to it, maybe we will have a better dialogue of what to do about it.

## X. REWRITING THE TELECOMM ACT

*Professor Weiser*: That's the spirit of this conference, which gets to the title, *Rewriting the Telecom Act*. What are your thoughts on this project?

*Chairman Powell*: I do not need to repeat it, because now there is consensus. Is the current one broken? Yes. But can a solution be worse than the broken thing? Yes. So it raises the question of what you should do about it. Dick Notebaert today eloquently said that the FCC has all the authority to do it.[24] It is plausible that we could just do it, but I do not think it can go the distance that he would really want to see. Like it or not, as the statute becomes more ambiguous, making the choices becomes more politicized. It's like an asymptote where you get closer and closer but you cannot quite cross. You are still legally bound to faithfully administer a dying statute and you cannot get too far afield without putting yourself in trouble with the judiciary. You actually need a new direction.

My current view is not to start on page one and rewrite all 75,000 words of the Telecom Act. Otherwise, it will take seven years, produce the same bizarre lobbying practices that the last one did, and not come out better. Instead of writing a new Telecom Act, write an Internet Protocol (IP) statute. A small, light, and standard IP statute that talks about what the regulatory environment should be under the Internet Protocol. Just define it. Then tell the market, here is the Telecom Act of 1996 and here is the IP Act of 2005. As companies make investments and move their networks, the act becomes self-executing deregulation.

The act would plant the seed of its own future by reinvesting what the country gets from the deregulation in advanced architecture that leads to IP. It is true that for a while, some guy like Vonage gets to start in IP. It's not a travesty; maybe it gives more incentives to get to IP

24. Richard C. Notebaert, *Overseeing the Unforeseeable: A Rational Regulatory Approach to 21st Century Communications*, 4 J. TELECOMM. & HIGH TECH. L. 31 (2005).

quicker. It is possible for this Congress to get together and do a VoIP statute. But it should be an IP statute because it is going to be about video, not just voice, in the next year. If the Congress can do an IP-everything statute, the statute can define core principles about not regulating economic terms and conditions. The statute should be 25 pages long at the most. Promulgate the statute and tell the world: Go. Anybody who wants to make investments, build the infrastructure, and provide the services gets to go to the Promised Land.

One thing I fear is that we have made a lot of progress trying to make the best of a bad act. If I were Wall Street, I would be scared again and I would not want to put any money into anything because I do not know how this will come out. I have seen big companies crash around the Hill trying to screw their competitors and help themselves. I would not know where my money is going and I would not want to do it anymore. We are starting to get to a pretty decent place in the investment side. I would hate to see it shut off because Congress lacks a clear direction.

So this is why I like an IP-everything statute because it charts a very clear path. I would, as an investor, put pressure on old-line companies to make the investments. The old-line companies would actually have the story to tell Wall Street: If I go to IP, I get to go to the Promised Land, so award me with risk capital. Let me go to IP and I will not have the problem of having to convince those knuckleheads at the FCC.

It's self-executing and it's the best I have got, Phil.

## XI. PROUDEST ACCOMPLISHMENT

*Professor Weiser*: That's pretty good. Before opening up for questions, I have six short questions for you. What is your proudest accomplishment as Commissioner and Chairman?

*Chairman Powell*: You may be surprised; it is not a policy. I believe it is things like the FCC University and what we have done to reform the FCC. I grew up in a leadership model that said your goal is to make yourself dispensable. The day you are dispensable, you should leave. The legacy is only what you leave behind, not what you did while you were there.

If I did anything that matters, I hope it lives on in the career employees at the FCC, in the institution, in the FCC University, and in their focus on technology. If twenty years from now I hear the same kind of stuff out of the FCC, and they are still looking at tough issues, I will be really, really proud.

Whatever the policy of the day is, that's going to come and go. Ten years from now, whatever we are talking about today may or may not be there. But the institution and the people probably will be. My

management model is a lot like the top Illinois basketball team. I cannot predict the game. I do not know who is going to get hot or what will open up. But if the team is disciplined, well-trained, and adaptive, they go on the court and win games because they move, they adjust, and they pick up.

I cannot predict what the FCC will have to do five years from now. But if I had the right players with the right training, the right discipline, and the right message, I am pretty confident that they will make the adjustments and constructive decisions that win the game.

*Professor Weiser*: Favorite TV show?

*Chairman Powell*: Fox's *24*. Unequivocally the best show on television. I love TV. I am a TV-aholic. I have two TiVos. I watch TV all the time. And *24* is awesome and it is coming to a cell phone near you this year. This is digital migration at its best. Fox has actually written a minute version of *24* for cell phone, which airs this year on your cell phone.[25] How cool is that—Jack Bauer all the time.

*Professor Weiser*: In the movie version of your life, what actor would play you?

*Chairman Powell*: Denzel Washington. Isn't that what every black man would say?

*Professor Weiser*: You know Jamie Foxx, as I understand it, is closing in on that race.

*Chairman Powell*: Yeah, well, he doesn't look as good in a uniform.

*Professor Weiser*: (lots of laughter).

*Chairman Powell*: This is when the moderator loses it. Like a *Saturday Night Live* skit when the actors finally break.

*Professor Weiser*: That's right. As an avid user of technology, what gadget would you most recommend to a friend?

*Chairman Powell*: I have to provide my answer in two categories. First, in entertainment, iPod and TiVo are my favorites at the moment because they embody the true power of personalizing technology and changing a system that used to be institution-centric. Instead of telling you what the album is, they give you the power to self-create. That is really cool. Second, in business productivity, I cannot live without my Blackberry.

*Professor Weiser*: If you have to choose between the Blackberry functionality and your cell phone, which would you choose?

*Chairman Powell*: They are the same!

*Professor Weiser*: What do you want to do when you grow up?

*Chairman Powell*: I don't ever want to grow up.

---

25. Seth Sutel, *Fox to Provide TV Series for Wireless Phones*, USA TODAY, Nov. 11, 2004, *available at* http://www.usatoday.com/tech/wireless/phones/2004-11-10-tv-for-mobile-phones_x.htm.

## XII. ADVICE FOR SUCCESSOR

*Professor Weiser*: What advice would you give to your successor?

*Chairman Powell*: It is really easy to be timid, conservative, and comfortable in government service, particularly in an agency like mine. You can avoid controversy if you want. You can keep things quieter than we have been if you want. But why bother? It is sure not the money. If they let you ride the horse and pull the reign, go for it.

The next Commission has to be courageous to truly be bold and visionary. Lead and not react. Do not let other people take the heat while you sit back and figure out whether that's a good thing to be a part of. Dare to go out to the front line. You will be wrong sometimes. So what? If you move forward three steps and fall back one every now and then, that is OK. One thing I am proud of my Commission is we did not shirk from doing the hard stuff. We did not get it right all the time, but we were always willing to go into that water. We did not shy away from something just because it was going to be hard or somebody was going to call you out.

Another thing is to be better prepared for battle and be ready for pain. If you are going to lead, do not think you get to do it for free. The minute you do something someone does not like, they will come after you, really hard. They will call your children names. Sometimes I read stuff. But if you do not have the courage, the conviction, and commitment to be bold and stick to a set of principles, that stuff will eat you alive. Nobody better want this job if they cannot handle being slapped around a bit.

Be able to communicate to people, not to lobbyists. Talk to consumers and they will come to your rescue. Consumers came to the rescue in the digital migration. I do not care if *The New York Times* does not get it. Their children do and they will own the *Times* someday.

And then take care of your soldiers. I will never forget when I was a brand new lieutenant and I was moving to Germany, my father, who was a general, came in and kissed me on the cheek. He only had one thing to say to me: When you get there, take care of our soldiers, that's all you are for. So, you better take care of the FCC and the industry in a way that you have been privileged to do. The rest will follow. It's a great ride.

## XIII. QUESTIONS AND ANSWERS

*Professor Weiser*: I know you love questions, particularly from students. I would open the floor to students in particular and then I will get to others as well.

*Student*: Are there plans to regulate the content of satellite radio?

*Chairman Powell*: Not for the next thirty days.

*A. Media Ownership*

*Student*: Will you provide your perspective on media ownership?

*Chairman Powell*: As a country, we are kind of messed up about media. What I mean is that for all the debates, struggles, and controversy, we are a country not completely on the same page with a common understanding of the media ownership problems. If we cannot come to a common understanding of exactly what problems we face and how they manifest themselves, it is hard to get consensus on the appropriate solutions.

I have never met anybody who does not believe that media ought to promote diversity and localism. I have never heard anybody who does not understand the value of a free media environment and democracy. But free media does not translate to the specific judgments. If you are a competition policy guy, you know how to do that. We know how to measure concentration and make predictions about prices. But diversity and localism are very elusive values. You would never get an argument about needing them, but you would get bitter arguments of what constitutes diversity and localism.

You have to be on guard that diversity and localism are not defined by political power *de jure.* For all the nobility associated with these concepts, they can lead to dangerous impulses. They can lead to an invitation for government to decide when content is sufficiently diverse or local. One of the things we tried, but did not do successfully, was attempt to find more objective measures that are not just results of a power struggle or a political process.

If I talk to my liberal friends, they think the end of civilization is the Fox network. Half of the noise is about Fox and conservative Christian radio. Meanwhile, we say we want diversity. But isn't this diversity? We have had three networks for forty years. Fox is the fourth to the market, which is one more voice and it is conservative. Yet, somehow, Fox is the death of democracy.

You also have to be on guard because I often find people involved in this argument like the monopolist as long as the monopolist is one of them. I do not mind this as a noisy public discourse. But it worries me a lot when you invite government to be part of that, because I can go to the Hill and get lots of different reasons that are not entirely noble as to whether people would want this or that media ownership rule.

This is what Thomas Jefferson was worried about. Big media and privately owned media definitely involve risks. But the risks are not the greatest kind or the kind that our founding fathers were worried about. The risks that our founding fathers were worried about were the kind when those with the power and the political control would manipulate the press to promote their values for their own purposes. So when

people start talking about the government being involved and drawing constraints, we had better be on guard.

Here is another bugaboo in media where I often find one of the imponderables. Sometimes I hear that we should have diversity in the market place of ideas. I also hear that we should also have fair, unbiased media that reports objectively without a viewpoint. These things don't always square. For example, the liberals hated the election film from the Sinclair Group because the film contained a biased point of view. The argument was that the film should be fair, objective, and unbiased portrayal of news. But when Disney refused to distribute *Fahrenheit 911* because Disney believed the film was too political, many of the same liberals condemned Disney for squelching a diverse point of view.

The only thing that reconciles the two events is that it all depends on your political view. If you were liberal, you were all for *Fahrenheit 911*'s wide distribution. If you were conservative, you loved the Sinclair Group film. Neither side was clean in this argument. But this cannot be the purpose of what the regulatory model should be.

Lastly, the public was given the misimpression that the media ownership debate was about media in general. Instead, the media ownership debate is only about broadcasting. We sit here in these conferences and talk about the Internet, cable, satellite, cell phone, and all these other ways people get news and information. But none of them is included in the calculus for media diversity. It is ironic that MoveOn.org criticized us for including the Internet as a source for media diversity. Yet, MoveOn.org's power in the political process is being extensively derived from the arrival of the Internet.

We continue to treat broadcasting in a unique way. We will never go anywhere unless we are willing to take a more sober and open-minded assessment of all media sources at once, recognize consumers in all these spaces, and build the rules accordingly. It is true that some of our rules were liberalizing. But we did not succeed in our attempt to modernize the media rules to include the other media sources that consumers truly were embracing. If we can count cable as a media source, the market is in fact more diverse. A more diverse market makes it harder to justify tighter ownership limit. All we were trying to do was to better evaluate media diversity.

My child has no idea about the difference between channel 7 versus 107 and my child does not know what a broadcast network is. Yet we are regulating in these buckets as if there is a difference between channel 7 versus 107. We need to admit that the problem with media ownership is not concentration, but its hyper competition and access abundance.

### *B. VoIP*

*Student*: In your estimation, what is VoIP and its future?

*Chairman Powell*: The future is very bright. But VoIP is only emblematic of something bigger. We have to get past VoIP because everything is data. Put zeros and ones in a stream, they can represent a picture, voice, or video. I do not like it when people talk about the triple play. There is no triple play, there is one play and it is data. VoIP is most notorious simply because it is the first data application that really goes right to the teeth, similar to what MP3 and Napster have done. VoIP goes right into the teeth of various established institutional business lines and challenges some very big long-held views about what the service is. Video over IP is going to be just as intriguing.

### *C. Authority for "Net Freedom"*

*Student*: Do the current telecom regulations give you legal authority to deal with "Net Freedom" concerns?

*Chairman Powell*: Conceivably. The statute speaks somewhat differently depending on who the gatekeeper is. Arguably, the statute has principles of nondiscrimination for common carriers that could be a cause of action. So maybe it's in there, maybe it's not. It is kind of an open question. But our greater aspiration for Net Freedom would cross both telecommunications and cable, and currently this is not fairly incorporated in the statute. While I personally believe in them deeply and would be the first to put them in place, I would also be very careful that you know what you are going after because it can quickly result in all kinds of administration that are not worth the cost. So having some caution and humility about applying the statute and how you move forward is important.

### *D. The Courts*

*Student*: What is the relationship between the FCC and the courts? How does the *Brand X* decision[26] reflect this dynamic?

*Chairman Powell*: Well, the Ninth Circuit is terribly wrong. Beyond that, the FCC's relation with the courts is fine. The court problem currently is the statute's problem—an unintended byproduct when you try to write a statute that is thousands and thousands of words long. Words are imprecise and you create an enormous amount of ambiguity and inconsistency. This is the stuff of lawyer dreams. The problem with the statute arises when it is graded by technology. Every

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

time we have a question, it is a novel application of a wordy statute to a particular set of facts.

Companies have had no problem running us up the court flagpole on three-year cycles every time we try to do something. So, if you want to speed stuff up, stop suing me. Accept your medicine of what we decide and be done with it. But no company seems willing to do that either. So these companies are as much a culprit in the lengthy processes. What has happened, unfortunately, is that the statute does have so many tensions and inconsistencies. If a company does not like what we do, the company will sue. But what is really going on is that courts are being invited into the legislative process.

With all due respect to courts, they are people and they have thoughts about these things. Normally, under differential principles, you just yield to the FCC. But there are so many muddy ways to claim an effect of the will of the Congress. Well, I do not know what the Congress meant, but if you are sufficiently motivated, you can be really critical of the FCC. You can easily find a net statute to suggest that the FCC just is not effectuating the will of the Congress. This is a wider invitation to companies and courts to stray quite a bit farther than they should. For example, the Ninth Circuit reached a question that was not even necessary for a resolution. Nobody briefed the question. All of a sudden the court started talking about what is broadband. But what is broadband is not and should not be a judicial question.

I do not know why the court seemed to think they needed to tell us, the expert agency, what was telecom and what was broadband. But in fairness to them and the court system, that is why I do not like really long statutes. Long statutes are just litigation Merry-Go-Rounds and provide ample opportunity for litigation. None of the major rules we have done have not gone up and down the courts. We have been to the Supreme Court probably more than any federal agency I know of. We seem to live up there. I have dinner with Justice Scalia at these parties and he would say, so you are back. I would say, yes sir, do right by us, won't you?

## XIV. A GREAT AMERICA AND A GREAT AMERICAN

*Professor Weiser*: Final thoughts?

*Chairman Powell*: No, I would just thank you Phil and this conference and Colorado because you have been a good friend to me. As we discussed last night, you either forced me, conjured me, or invited me, to almost always come here to try and set out what we were going to do for the next year. As your litany showed, we have. This is a smart conference. I have been to a lot of dumb conferences with a lot of weird abstract ideas. This is a hardheaded, trying-to-solve-problems

conference and I commend the people who come.

And I would just say to the Bar and everyone who work in this field, This is great stuff. Our nation's competitiveness, our nation's welfare, the future of our children, our labor market, our economy, and our health care system are all dependent on whether we all get this right. Demand your governors, your presidents, your politicians, and your leaders to take this seriously. This is whether the United States remains a great nation for the next great epic or it doesn't. It is doing OK, but it is not living up to its greatest glory. That is the responsibility for everybody in this room.

*Professor Weiser*: It's clear you are not done with your leadership for this industry. We look forward to bringing you back here. Your continuing involvement and what you do next will be exciting. As Dick Notebaert said, You are truly a great American.[27] Thank you very much.

*Chairman Powell*: Thank you very much.

27. Notebaert, *supra* note 24.

# OVERSEEING THE UNFORESEEABLE: A RATIONAL REGULATORY APPROACH TO 21ST CENTURY COMMUNICATIONS

RICHARD C. NOTEBAERT*



Thank you very much and good morning everybody. It is really fun to be here and have a chance to discuss the various topics on the agenda. Looking at it, there is nothing on the agenda that is not fun, challenging, and interesting to debate.

In our sector, every hour of every day, we have to deal with the very real ramifications of technology, and the technological migration that we face today; some of us have participated in a similar migration at least two previous times. We also have to be really conscious of what this means in a regulatory framework and what it means for regulatory reform. And lastly, we need to look at the legislative effort and the need for legislative reform.

The realities of what I'm talking about impact every aspect of our business, including our decisions about how many dollars we invest, and they are really the crux of our ability, or in fact our *inability* to serve customers the way they want to be served. So those three items also impact

* This article was adapted from a speech delivered by Qwest Chairman and CEO Richard C. Notebaert at the Symposium on "The Digital Broadband Migration: Rewriting the Telecom Act" held at the University of Colorado School of Law on February 14, 2005.

the customer, and we try to see the world through the eyes of the customer.

The title of this year's program, "The Digital Broadband Migration - Rewriting the Telecom Act," is pretty intriguing. Not only is it relevant to the discussions that take place everyday in our industry, but also to the discussions that are going to take place in the future. For those of us who are critics or cynics, the idea of a new Telecom Act is a fairly tough notion. On the other hand, anything is possible. We were able to change a 60-year old piece of legislation with the '96 Telecom Act, so, again, anything is possible.[1]

I will begin with an overview of the 1996 Telecom Act, followed by a discussion of the sufficiency of the Federal Communications Commission ("FCC") as a regulatory authority, new communications business models, and an analysis of the potential rewards and fallacies of rewriting the Act.

## I. THE 1996 TELECOM ACT OVERVIEW

The 1996 Telecom Act is far from being everything we'd hoped it would be. On the other hand, we were very encouraged by the monumental effort that took place to get that law written. We felt that it had a chance to be progressive, rational, and to create a national, not state, telecom policy. I really believe, given my intimate knowledge of the Act, that that is exactly what Congress had intended. I remember working with the people on both sides in 1994 and 1995; namely John Dingell, Jack Fields, Larry Pressler, and Fritz Hollings. We were adamant about what we needed to do. Henry Hyde ran the Judiciary Committee at the time, and we were adamant in our belief that there would be no market share test; notwithstanding the assurances we heard from the legislation. The other assurance we were given was, the incumbent communications players would not be handicapped in favor of new players. Public policy makers guaranteed us that they were not going to pick winners and losers; they claimed to support the opportunity to create choices for customers. The one statement that always stands out in my mind is the first line of the 1996 Telecom Act. It says that the purpose of the Act is "to promote competition and to *reduce regulation*."[2]

Unfortunately, I remember with equal clarity the conversations that took place once that bill was passed. This time policy makers had a very clear perspective that more regulation was better than less; they focused on competition, and the theme was consistent. It became clear that the

---

1. Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56 (codified in scattered sections of 15, 18, and 47 U.S.C.).

2. *Id.* at pmbl. (emphasis added).

1996 Telecom Act would be used to handicap incumbents.[3] The Act would be interpreted in ways that would hasten the loss of 20 to 30 percent market share for incumbents because it was what the federal regulators, under the leadership of Reed Hundt, believed was necessary. If other providers would not invest in actual infrastructure or spend capital to create the competition, then the government would eliminate the need to make an investment. This was accomplished by forcing incumbents to resell unbundled network elements as a means to arbitrage the system.

Eventually, however, technology created real competition which is what we have today. But the 1996 Telecom Act, based on what I have shared with you thus far, was a failure. Not the law itself, but the interpretation of that law. Needless to say, more than one person has suggested that I should just get over it. After all, a friend of mine who was a staffer of one of the prior administrations in Washington recently said to me, "You know, Dick, you should stop talking about the 1996 Telecom Act. It's just not that important anymore." As you would imagine, I rolled my eyes and said, "That's true because you represent the cable companies now." After all, the 1996 Telecom Act is the law of the land. It is what governs how our industry is regulated and it does, in fact, impact my company and other companies in the sector. It also affects our ability to achieve the services customers want us to deliver every day.

I have to confess to you that every time I go and revisit this discussion, I look out at folks like you and think of Tommy Lasorda who said, "I find it's not good to talk about my problems. Eighty percent of the people who hear them don't care, and the other twenty percent are glad I'm having trouble."[4]

Accordingly, I'm not going to stand here today and whine. I'm going to listen to that great philosopher Tommy Lasorda and not talk about my problems. I do, however, feel it is critical for us to have a discussion about pursuing new and better telecommunications law and policy. To do that, we have to talk about some of the fundamentals that caused the failure of our last attempt to craft legislation to regulate the communications industry.

## II. IS THE FCC THE REGULATORY SOLUTION?

Let's pause for a moment to talk about what has happened over the last few years. The reality is that the FCC currently has sufficient regulatory authority to do what needs to be done today. There is no question

---

3. J. Gregory Sidak & Daniel F. Spulber, *Deregulatory Takings and Breach of the Regulatory Contract*, 71 N.Y.U. L. REV. 851, 869-71 (1996).

4. "Eighty percent of the people who hear them (your troubles) don't care and the other twenty percent are glad you're having them." Baseball Almanac, Tommy Lasorda Quotations, http://www.baseball-almanac.com/quotes/quolasor.shtml (last visited Sept. 26, 2005).

of what the best option is for our country. I'm sure you know, particularly since our President made an announcement to this effect, that we continue to fall behind progressive countries of the world with our approach to broadband deployments.[5] We can point our finger at a lot of places, but public policy really does both incentivize and retard broadband deployment.

Would it be such a tall order for the FCC to step up to this challenge? Without question, the politics would be brutal. It would require hard work. It requires merging diverse opinions among the Commission. It necessitates tremendous focus and it calls for determination on the part of the Commission and its staff to do the right thing, to face the dissent and the criticism that would come pouring out.

I really haven't had the good fortune to observe this kind of determination in the staff nor the various offices at the FCC, although I would love nothing more than to not have to go through the legislative battle again and have the FCC step up to the plate. In the meantime, the communications regulatory state languishes due to the lack of resolution. Let me offer broadband as an example. This is the one service in which we have invested a lot of time. Unfortunately, there are glaring discrepancies in the way the regulations are interpreted.

### *A. Disparities in Regularity Treatment*

It's fairly obvious, I think, to anyone that there's something amiss with the way cable communications services are regulated vis-à-vis traditional telephony communications services. Cable companies have two-thirds of the broadband market.[6] No one debates this. I haven't heard anyone say, "No, Dick, that's not true." In large part my friends on the other side of the competitive landscape, the CEOs of the cable companies, have enjoyed success because they don't have any regulatory impediments. Various surveys conducted by third parties point out that subscribers, in many cases, would prefer DSL.[7] However, companies like Qwest that do provide DSL, have been hobbled by current regulation that runs the gamut.

---

5. President George W. Bush, President Unveils Tech Initiatives for Energy, Health Care, Internet, Remarks at American Association of Community Colleges Annual Convention (Apr. 26, 2004) (stating that "we [the U.S.] rank 10th amongst the industrialized world in broadband technology and its availability. That's not good enough for America. Tenth is 10 spots too low as far as I'm concerned."), http://www.whitehouse.gov/news/releases/2004/04/20040426-6.html.

6. Ken Belson, *Bells are Catching Up In Battle for Broadband*, N.Y. TIMES, July 28, 2004, at C4.

7. Jim Hu, *Survey: Users Want DSL But Can't Get It*, CNET NEWS.COM, Aug. 6, 2003, http://news.com.com/Survey+Users+want+DSL+but+cant+get+it/2100-1023_3-5060701.html.

1. Pricing issues

It took three weeks and over $100,000 to offer services that customers begged us to provide. Yet, the Friday before we launched, an FCC staffer actually asked us not to launch it so they could add some regulatory oversight to manage our pricing. Wow! I hardly call that supporting competition.

2. Service roll out

To roll out new services, we have to notify our entire market—post our rates of each service. If we were a cable company, this wouldn't be necessary. Cable companies can look at our postings and know what our service revenue will be in the next sixty days. Can you guess what they'll be doing in those sixty days?

3. Promotions

If we want to run a promotion, we have to go through an unbelievable process to get permission. We have to go through the FCC regulatory drill. If our competitors decide tonight at five o'clock that they want to run a promotion tomorrow, it's done. In contrast, we have to give so much notice that it's hard to imagine that a cable company would not have its feet on the street weeks before we even start to advertise particularly since we can't advertise until we get permission to move forward.

4. Cable companies: An unregulated competitor

Cable companies have twice as many subscribers but they do not have any regulatory requirements. We, on the other hand, are regulated at virtually every turn. For example, how do you tax a cable modem versus DSL? You slap state taxes, federal taxes, USF [Universal Service Fund], etcetera on DSL but not cable. Is there any logical argument here? No! Clearly, it would make more sense to treat them the same. One can hardly argue with this. Instead, what you invariably hear is, "Dick, we have no authority over cable deployment." I got it; you do have authority over telephony. Then why don't you back off and make the decision to treat cable telephony and DSL the same? Instead of looking at why you can't regulate cable, why don't you look at having a level playing field by treating DSL in the same manner?

The disparities are getting worse and this is why I am raising the issue. What makes matters worse is the fact that the terms "cable company" and telephone company are misnomers. These terms are no longer applicable. We are *communications* providers. One, cable companies, may aggregate entertainment and let you select, while the other, telecom

companies, may enable you to visit a website and let you download the same entertainment. Since we are all trying to meet customer preference from a single source to deliver various communications needs, we are, in fact, going head-to-head.

Everyone knows that now you have choices. Cable is going into the telephone business. And we are collaborating with the satellite folks. Some of my peer companies are doing fiber-to-the-home or fiber-to-a-node and attempting to do ten megabytes per second or a high definition television ("HDTV") play. We are also looking at that. I think this is one case where we can take a lesson from wireless. The lesson is: step away regulator and let the capital market work. You'll be surprised at how fast technological innovation will occur.

Let me take this just one step further. If you go to Omaha, Nebraska - I probably shouldn't talk about that here, bad judgment on my part - but by their own count, the cable company there, Cox Cable, provides more than half of the local telephone service there.[8] That's their count, not ours. Despite their huge market share, no one pushes back against that. On the other hand, we are regulated as a dominant provider. Hello! How is this possible? (The state commission has responded to this situation with what I think are very good-faith efforts to create a level playing field on the retail side and I applaud their efforts.) So we went to the FCC last summer and filed a petition to deregulate our wholesale offers. Sounds logical, does it not? We said that we have less than half of the market and that competition has been achieved. We argued that it is only right to release us from the restrictions that are applied to dominant providers.

What happened? Nothing. We are on hold. There is no sense of urgency, certainly not the kind of urgency that should exist in a competitive market. In fact, the FCC has 15 months to respond and, even then, they can ask us for an extension. Sometimes one is forced to grant the extension because there is a need to deal with people on multiple levels. We can only make a guess as to what the communications landscape in Omaha will look like 15 months from now.

These are the challenges faced by the FCC and its implementation of the 1996 Act. These challenges are not easily addressed, and they point out the shortcomings of the Act. If Congress were to muster the will to make this right, I'd applaud their efforts, and I would work tirelessly to help. But I would suggest that this time they begin with a clear-eyed analysis of what went wrong with the '96 Act. Such analysis would need to be accomplished through hard-nosed determination, no matter

---

8. COX COMM'CNS, WHITEPAPER: VOICE OVER INTERNET PROTOCOL: READY FOR PRIME TIME, *available at* http://www.cox.com/about/NewsRoom/files/VoIPready May04.pdf.

what pressures were applied, to avoid the mistakes this time around.

## III. FIXING THE 1996 TELECOM ACT; THREE SUGGESTIONS

With this in mind, I have three suggestions that could launch the examination. I'd start with the fact that the 1996 Telecommunications Act was too narrow in its approach; we must expand the scope of the Act. Second, we must promote competition while reducing regulation. Third, we must address the difficult issues relating to replacement services in a competitive market of public services.

### *A. Expand the Scope*

The '96 Act tried to focus on existing technology, but in fact, it really didn't. It focused back a few years. We were looking in that rear-view mirror. We never even thought about new technologies. We didn't think about wireless. We didn't think about cable data modems. We didn't think about cable telephony even though, in fact, it was there on the edge. We didn't look at the ways technology would evolve.

The '96 Act focused on landline telephony. It focused specifically on local and long distance. It did not anticipate the Internet. It did not see what effect the Internet would have on the competitive landscape. It barely addressed wireless. The Act does not even address the fact that Brian Roberts, my friend at Comcast, markets telephony and broadband data. In fact, their announcement that within 18 months they'll provide this to all the customers should send a strong signal of what the Act missed.[9]

You may be thinking, "Dick, that's pretty cool. You've got 20/20 hindsight; very good." The point is, at the time the Act was written, there was no attempt to look at the way the industry would grow and the shifts that it would make. Instead, the legislation was based on the platforms and the distinctions that were correct in the early 90s. But today, these distinctions are, without question, *incorrect*; in fact, they were incorrect shortly after the passage of the Act.

Bottom line - customers like you and I don't think about whether our service comes over coaxial cable, whether it comes over copper wires, or whether it comes over our wireless devices. Most customers look at Evolution Data Optimized ("EvDO") and say, "What does that mean, and I don't care." Those of us that are addicted to that little black thing called Blackberry, or Crackberry, or whatever you want to call it, aren't really too sure how it works. We just know it works all the time, and we

---

9. Chris Walsh, *Bees Buzzing Around Adelphia Assets; Swarm of Potential Bidders May Now Include Comcast*, ROCKY MTN. NEWS, May 4, 2004, at 2B.

can't stop hitting the keyboard with our thumbs.

We must not analyze competitive services through the eyes of a regulator; competitive services must be analyzed through the eyes of the customer. We should look not at individual technologies but look at the services they provide. , We should then decide whether or not those *services* should be regulated, regardless of the technology used as the delivery system. In the real competitive world, this is the way new product introduction is determined.

We really need to understand what we mean by competitive services. We have to understand the application and the goals we are trying to accomplish, and then decide what to regulate. This is the reality of the communications world that we operate in today and for the foreseeable future. There are so many choices and so many opportunities.

Wireline and wireless—I've worked in both—are examples of two, technologies that provide the same service, yet are treated totally differently. In years past when students arrived on this campus [CU Boulder] in September, we had to dispatch our crews on campus to provide communications services. We blocked the vacation schedules of our crews and wouldn't let anyone off. We worked overtime, seven days a week, because everyone here had to have a telephone and we knew we would have a real peak in our workload. Today, there's no such increase. In fact, there is actually a decrease in the number of services because a lot of the students use their cell phones exclusively.

The reason we offer naked DSL, or stand-alone DSL, is because the customer said, "I don't need a telephone number with my broadband. I need my computer hookup and I'll use my cell." This is the kind of competitive business models that we need to think about. We need to realize that no matter how much some people would like to deny it, these are substitutable services.

I saw some numbers that stated nine million Americans use their cell phones exclusively.[10] It is not clear where they got such a small number. Have any of you ever sat at your desk or sat in your home, looked at the phone with the wire hooked up to it while you were talking on your cell phone? I do it all the time. I find myself say, "Oh my God, I'm in the telephone business. What am I doing?" I mean, I'm not supposed to use my cell phone when I have a landline available and yet, I do it all the time. There are 174 million subscribers needing communications services and to say that one service is not substitutable at the expense of the other is missing the whole point.[11] They are totally substitutable. All you have

---

10. Tyler Hamilton, *Better Speak Up If You Want Wireless White Pages*, TORONTO STAR, Oct. 25, 2004, at D01.

11. Maureen McDonald, *Cell Phone Company Returns to Its Roots*, DETROIT NEWS, Jan. 7, 2005, at 2C.

to do is look at the minutes of use on the networks.

For legislation to succeed, it has to recognize this. It can't get hung up in trying to define the finer points of whether it is 173 million or 172 million. When we look at a particular service and recognize that it is provided by company X or Q, then we shouldn't say, "Because the service provider is Q, the services should be regulated this way and because the service provider is X, services should be regulated a different way—or not at all." It comes down to distinctions of a Regional Bell Operating Company ("RBOC") vis-à-vis new competitive companies. This just doesn't make sense; new legislation needs to recognize the reality of this fact.

### *B. Promote Competition while Reducing Regulation*

There is a second failure of the 1996 Telecom Act. As I mentioned earlier, the exact words were "to promote competition and to reduce regulation" and while there was an effort applied to how this first goal could be accomplished, the second one was pretty much, I think, ignored.

The legislation punted, for instance, when it came to specifying time tables for the FCC to make decisions. We've seen that with the Triennial Review Order (TRO).[12] We have a sector moving at warp speed. Look at the technology that's flowing out. Look at what's happening in an agency that moves way too slowly. It's unfair to them in many ways.

Take the process surrounding Voice over Internet Protocol (VoIP). I got to tell you, I applauded the FCC when they voted last November that Voice over IP, VoIP, is an interstate service and not intrastate.[13] It was a unanimous decision and we thought this was positive. The decision is really helpful. We're going to have a national policy; how good is this? This delivery option, however, is already mainstream and it has taken over a year to get where we are. But still, glad to get it. In fact, we carry over two *billion* minutes of VoIP on our network every single month.[14] While the interstate decision is a step forward, this decision – given that there are so many issues surrounding this technology on which the FCC continues to vacillate - continues to be debated.

---

12. Review Of The Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, *Report & Order & Order on Remand & Further Notice of Proposed Rulemaking*, 18 FCC Rcd. 19,020 (2003) (adopting rules pursuant to section 251 of the 1996 Act, requiring incumbent local exchange carriers to make elements of their local network available to competitors on an unbundled basis).

13. Vonage Holdings Corporation, *Petition for Declaratory Ruling Concerning an Order of the Minnesota Public Utilities Commission*, 19 FCC Rcd. 22,404 (Nov. 9, 2004).

14. Press Release, Qwest Commc'ns Int'l Inc., Qwest Communications Expands VoIP Solutions for Enterprise Customers With IP Centrex Prime (Oct. 6, 2004), http://www.qwest.com/about/media/pressroom/1,1281,1605_archive,00.html.

Back in 1999, former Chairman Bill Kennard outlined a plan to overhaul the agency for the 21st century.[15] Unfortunately, that outline resulted in nothing. Just a few weeks ago, the Progress & Freedom Foundation called for serious institutional changes, even suggesting that the five member Commission go down to three members.[16] Maybe having two less people to discuss it with, you could move faster. I'm not sure that's the issue.

Lots of people recognize that the FCC is based on bureaus set up to oversee technologies. You got to stand back and say, "Wow, wrong idea; it is time to change." I'm sure in his seven years of service to the FCC, Michael Powell has had some insight on how this agency should be, or might be reformed. I'm not here to advocate a position. I'm simply saying if we have legislation, it can only be written if it takes reform into account. The legislation must address this issue.

### *C. Address the Difficult Issues*

The third area where Congress can learn from the failure of the current legislation has to do with taking on difficult issues. We watered down the 1996 Telecom Act; we tried to compromise. We also tried to get the different parties—I'm not just talking about different sides of the aisle but the different strong views—to come together.

I understand that is the way legislation is written on sensitive issues, but if we do that again without providing specific direction, then we will not address the issues. How do we reform the Universal Service Fund? It's a complex and thorny issue. This is an issue that we really need to analyze with an open mind about whether it is universal service that we are defining now. Is it broadband to the schools and the libraries? We really need to stand back and assess what we have accomplished with the current program, determine what our objectives for the future fund should be, and then figure out how big of a fund we need.

Should we be getting rid of subsidies? How do we create competition and not inhibit economic development? And then how do we deal with intercarrier compensation, a non-thorny issue that everyone has an easy answer for?

These questions were ignored in 1995 and are still ignored today. Most of these questions have only grown tougher and harder to address. We need to face these questions with the new legislation and in the end

---

15. Bob Metcalfe, *The Internet in 1999: This Will Prove to be the Year of the Bills, Bills, and Bills*, INFOWORLD, Jan. 18, 1999, http://www.infoworld.com/cgi-bin/displayNew.pl?/metcalfe/990118bm.htm.

16. Thomas M. Lenard et al., *Panel Discussion: Reinventing the FCC for the Digital Age*, 11.22 PROGRESS & FREEDOM FOUND. PROGRESS ON POINT (2004), http://www.pff.org/issues-pubs/pops/pop11.22reinventingfcc.pdf.

it's going to take a strong commitment to try to resolve these issues. It took us eight years to get the 1996 Telecom Act written. It's hard for me to tell you how many times we went to Washington where we wrote, rewrote, and discussed. The 1996 Telecom Act took almost as long as it took to put the Clean Air Act into place.[17] I think the effort required to rewrite the Act would be worthwhile but only if we're willing to step up to complete the task. Today, you and I have six to ten different choices of communications services. This is America and the free enterprise system works. If we can't accept that free enterprise works, then rewriting the Act is an exercise in futility. If we could just accept the concept of free enterprise, we would be better off.

## IV. FCC CHANGES—NEW LEADERSHIP OPPORTUNITIES?

In the meantime, I think the FCC and the new members of the FCC have a chance to demonstrate leadership if they are willing to step-up and eliminate some of the rules in the bureaucracy. All the issues that I talked about today could have been addressed. They have been discussed, and it's time for a progressive FCC pursuant to the authority granted by Congress to take action. Unfortunately, the FCC will have to take action without the benefit of Michael Powell. I think Chairman Powell is the most visionary FCC chairman that I have worked with during my 36 years in this business. I believe this true public servant had the greatest desire to implement competition and he showed it everyday. I think he followed up on the second part of the first line of the 1996 Telecom Act because he tried to reduce regulation like no other chairman that I have seen; not regulation that serves customers, but regulations that exist for the sake of regulation.

We will miss Chairman Powell in our sector. We wish him Godspeed on whatever he does. The FCC needs to continue to do the good work that this great American has done for us. At Qwest, we pledge our professionalism, integrity, and the vigorous pursuit of sane regulatory policy to the new commission. We offer the same to any members of the House and Senate with the courage and initiative to step up to the challenges of new telecom legislation.

## CONCLUSION

We consider it a privilege to be part of an extraordinarily dynamic industry. There's never been a more exciting time in our industry. We're in transition. Transitions are painful, but they have so much opportunity. We are anxious to see the developments that will take place in the next

several months and in the years ahead. I appreciate the opportunity to talk to you today. I really enjoyed it.

# REFORMING THE FCC AND ITS MISSION: LESSONS FROM THE AIRLINE EXPERIENCE

ALFRED E. KAHN*



## INTRODUCTION

I have been involved in one capacity or another with the regulation and deregulation of telecommunications for most of the last 35 years — going back to my five years or more membership on the National Economic Advisory Council to AT&T[1] — as contrasted with a mere 18 months in the Chairmanship of the late, unlamented Civil Aeronautics Board. I nevertheless sympathize with the logic of comparative advantage that recommends adding the subtitle, "lessons from the airline experience," even though the two cases were and are very different.

Simply put, airline regulation was a regime of governmental cartelization of an industry that was and would otherwise have been structurally competitive — imposing direct limitations on the permissible operations of the several offerers of airline service and strictly prohibiting price competition among them. Telephone regulation, in contrast, set the prices and other conditions of sale on services whose supply was believed to be best handled by designated franchised "natural"

* Robert Julius Thorne Professor of Political Economy, Emeritus, Cornell University. I am grateful to Timothy J. Tardiff, Dennis L. Weisman and Charles A. Zielinski for their wise and reputation-protecting suggestions.

1. The only substantive product of which I can recall was my widely ignored "Grand Competitive Strategy for the Bell System." In dreams of eluded glory, I see AT&T avoiding its dreary decline since 1982 by following my advice.

monopolists.

In terms of their effects on efficiency — both productive and economic — cartels are probably worse than single-firm monopolies because of their inherent compulsion to interfere with the competitive displacement of high-cost, sluggish producers by low-cost, innovative ones; and government-enforced and -administered cartels are, in this respect, the worst of all.[2] The case for deregulation of such industries has to be that competition, once freed of governmental restraints, will better protect the public, weed out inefficient suppliers, and leave it to free consumer choices to confer profits on the ones offering the best possible price and quality combinations. In contrast, the case for deregulation of industries such as telecommunications has to be that monopoly is no longer the most efficient form of supply, if it ever was; and that competition, once released from governmental restraint on the one side and subsidization of competitors on the other, will serve the public far better than public utility-type regulation.

Immediately upon my assumption of the Chairmanship of the CAB, I realized in what ludicrous detail that maxim applied to the airline industry. Within a very short time, I was presented with the need for each of the five members of the Board to independently approve an agreement between an unscheduled cargo carrier and a breeder of horses to transport his charges in time to participate in some race. Shortly thereafter, United Airlines asked for our permission to introduce a skiing-guaranteed airfare between New York and Denver — under whose terms its skiing customers would be refunded their airline ticket prices if there was not enough snow. That, our chief attorney advised us, would be an impermissible rebate in violation of the filed tariff. The same advice applied to an analogous request by a cash-strapped Eastern Airlines for permission to pay for advertising with passes on its flights and to a failure of any carrier to make certain that tour operators to whom it had given passes to inspect the various ground facilities included in a particular tour actually performed the inspections.[3]

A conscientious regulator — read "government cartelizer" — of a potentially competitive industry finds himself in the position of the fabled Dutch boy holding back the ocean by sticking his finger in the dike.

Control price, and the result will be an artificial stimulus to entry. Control entry as well, and the result will be an artificial stimulus to

2. *See* Alfred E. Kahn, *The Depletion Allowance in the Context of Cartelization*, 54 AM. ECON. REV. 286, 286-314 (June 1964); Alfred E. Kahn, *Cartels and Trade Associations*, *in* 2 INT'L ENCYCLOPEDIA SOC. SCI. 320, 320-25 (David L. Sills ed., 1968).

3. *See* Alfred E. Kahn, Talk to the New York Society of Security Analysts (Feb. 2, 1978) (unpublished manuscript, on file with author).

compete by offering larger commissions to travel agents, advertising, scheduling, free meals, and bigger seats. The response of the complete regulator, then, is to limit advertising, control scheduling and travel agents' commissions, specify the size of the sandwiches and seats and the charge for in-flight movies. Each time the dike springs a leak, plug it with one of your fingers; just as a dynamic industry will perpetually find ways of opening new holes in the dike, so an ingenious regulator will never run out of regulatory fingers.[4]

Analogously, the process of unraveling those irrational government interferences between willing airlines and willing travelers took on a momentum of its own. As a result, deregulation followed with almost amazing speed.[5]

The first two parts of this paper expand and support two propositions: Part I, that airline deregulation has been a great success despite the pitiful financial condition and bankruptcies of the major carriers during the last few years; and Part II, that the recent financial boom-and-bust in neither the airline industry nor in telecommunications justifies the reimposition of competition-restraining regulation any more than it did the cartelization of trucking and airlines after a comparable experience in the 1930s. In Part III of this paper, I proceed to describe the imperfections of the implicit analogy between the experiences in the airline and telecommunications industries. In particular it has been technological progress above all that, first gradually then explosively, undermined AT&T's and its successor local companies' putative natural monopolies, rather than the FCC's ill-advised — not to say politically motivated — effort to create competition by subsidizing competitors. It is that still-exploding technology that now demands not merely abandonment of those misguided efforts, but, where technological competition is demonstrably effective,[6] leaving it to competition and the antitrust laws to serve the "public convenience and necessity," as in industry generally.

In Parts IV and V, I conclude with a brief look at two tough problems for which simple deregulation of telecommunications may not be politically acceptable or sufficient: political pressures to subsidize basic

4. Alfred E. Kahn, *The Changing Environment of International Air Commerce*, 3 AIR LAW 3 (1978) (on file with author). This work was first presented at the Symposium on the Changing Environment of International Air Commerce at Georgetown University on May 4, 1978.

5. *See* Alfred E. Kahn, *Applications of Economics to an Imperfect World*, 69 THE AM. ECON. REV. 1, 5-12 (May 1979).

6. *See, e.g.*, The "Two-Facilities Bright-Line Test for Forbearance" proposed by the Canadian TELUS Corporation to the Canadian Radio-television and Telecommunications Commission (CRTC) (PN 2005-2, June 22, 2005), with separate supporting testimonies by Robert Crandall and Alfred E. Kahn.

residential service, particularly in rural areas; and problems of consumers making wise choices when confronted by a bewildering and ever-changing mix of options.

## I. THE SUCCESS OF AIRLINE DEREGULATION

Even though it invites the retort, "*But the patient died!*" I maintain with all the objectivity I can summon up that airline deregulation has been an outstanding success. The competition that it unleashed—including most importantly the freedom it conferred on both incumbents and challengers to configure and re-configure their operations, enter one another's markets, and price their services freely—has conferred billions upon billions of dollars annually on consumers.

That the carriers have exercised this freedom to adopt increasingly fine differentiations in their fares has been a source of bewilderment, if not anger, particularly among consumer organizations. [7] As to the former, however, travel agents and then the Internet have reduced those search costs to tolerable levels. As for the latter, differentiations reflecting differences in cost (e.g., between long and short, dense and thin routes, and peak and off-peak flights, all previously curbed or suppressed by regulation in a deliberate policy of cross-subsidization) are clearly unexceptionable. Moreover, truly discriminatory fare structures, reflecting differences in elasticities of demand, are typically necessary to permit suppliers to recover the heavy fixed costs of maintaining convenient scheduling in the presence of marginal costs typically far below average; and are likewise unexceptionable when, as in commercial aviation, profits overall are modest at best. The consumer benefits have taken the form not only of huge monetary savings but also more convenient access to a greater number of origins and destinations.[8]

An essential accompaniment and instrument of these huge savings has been an approximately 20 percentage point increase in industry-average load factors, from the low 50s to the low 70s—which goes far to

7. I duly note defections from the deregulation cause by such once-enthusiastic allies as the Consumer Federation of America, Consumers' Union and The Public Citizen (but not of other early supporters such as Common Cause, the Antitrust Division of the Department of Justice and the Federal Trade Commission).

8. One might have expected some dilutions of the latter benefit in the last few years, as hub-and-spoke carriers, which seemed a decade or so ago to have swept the field, have had to trim marginal operations under the intense and increasingly pervasive competition of lower-cost, point-to-point challengers. They have, however, offset this tendency by increasing recourse to regional affiliates, code-sharing alliances and the use of regional jets. Between June 2000 and June 2005, the period of their most severe losses, American, Continental and Delta increased the number of cities served in these two ways by 2 percent, 18 percent and 15 percent, respectively, while Northwest, United and US Air—the last two under bankruptcy protection—have curtailed their operations, thus measured, by 15 percent, 19 percent and 9 percent, respectively (data from the Air Transport Association).

expose both the inefficiency of the previous cartelization and, after its removal, the very large decrease in average real fares, along with the longer lines and more crowded planes (the lower-price/quality combination that regulation had suppressed and the overwhelming majority of travelers thereafter embraced).

But surely it is time to pay attention to that protest from the small voice in the balcony —"*Yes, but the patient died!*" Undeniably, both airline deregulation, which was genuine and complete, and telecommunications deregulation, which remains incomplete, have been accompanied by appalling financial losses to the incumbents and — especially catastrophically, in telecommunications — to new facilities-based competitors.[9] Whether the one *caused* the other is less obvious.[10]

In the airline case, financial losses have had two unique causes in addition to the historical sensitivity of the industry to the business cycle: (1) 9/11 and (2) the suddenly increasingly successful inroads of the low-cost, essentially point-to-point carriers,[11] representing a dramatic reversal of the apparent complete triumph of the major hub-and-spoke operators during the first two decades of deregulation. If any patients actually "die," it is likely to be one or more of those hub-and-spoke operators. Southwest has been profitable every year since deregulation and the low-fare, low-cost carriers have increased their combined share of the domestic business from less than one-tenth to one-third in the last few years.[12] However painful to the incumbents, that is the nature and virtue of the competitive process that deregulation unleashed.[13]

## II. THE BOOM AND BUST IN TELECOMMUNICATIONS

As to the telecommunications case, a balanced appraisal must take into account several additional considerations, rather than focus solely on deregulation. For one, exuberant over-investment, particularly in the exploitation of new technologies, has always been characteristic of capitalist economic development. This over-investment occurs in the absence as well as presence of regulation — witness the railroad constructions of the nineteenth century, the boom and Great Depression of the 1920s and 1930s, respectively, and the dot-com boom and bust of the last decade. The recent massive over-investment in fiber-optic

9. *See* Alfred E. Kahn, *Lessons from Deregulation: Telecommunications and Airlines After the Crunch*, 49-50 (AEI Brookings Joint Center for Regulatory Studies 2004).

10. With respect to telecommunications, *see id.* at 26-34.

11. As of the spring of 2005 it is necessary to add the explosion of fuel prices.

12. *See* Michael Allen, *Back Aviation Solutions*, *at* http://www.backaviation.com.

13. It was, precisely, the impossibility of knowing which form of operation would prove to be the dominant one—or in what proportions they would prevail—that was the strongest argument for leaving it to the deregulated market to tell us, *See, e.g.*, Kahn, *supra* note 3.

facilities, ending up with at least 95 percent of fiber in the ground "dark," was, in exactly the same way, the product of revolutionary technological developments, which increased the number of channels attainable from a single strand of fiber from two to over 100, with the possibility it will eventually exceed 1,000.[14] Much as after those earlier booms, in which investors lost huge amounts of money, the physical capital survived: in this latest case, the excess fiber-optic capacity, once laid in the ground, remains physically available and can, and almost certainly will, be reactivated at a comparatively low incremental cost.[15] The over-investment in telephony was encouraged also by the previous regulatorily distorted rate structures — in particular the grossly inflated charges of the local companies for initiating and terminating long-distance calls and the entire range of retail services to businesses, in order to generate multi-billion-dollar annual subsidies of the charges for basic residential service, especially in rural areas. With the introduction of fiber-optic transmission, there sprang into being, especially in concentrated metropolitan areas, a host of competitors constructing their own access facilities to bypass those of the incumbents and to compete directly with them at both wholesale and retail.

Further contributing to the subsequent failure of those ventures from 2000 onward was the FCC's ill-advised policy of making available to competitive local exchange companies (CLECs) the ineffable, oxymoronic UNE-P (totally bundled "unbundled network elements"), at rates intentionally far below the actual costs of the incumbent carriers, both historical and incremental.[16] The result was a sharp increase in

14. *See* J. Gregory Sidak, *The Failure of Good Intentions: The WorldCom Fraud and the Collapse of American Telecommunications After Deregulation*, 20 YALE J. ON REG. 207, 216 (2003). *See also* T. Ohara, et al., *Over 1000 Channel, 6.25 GHz-spaced Ultra-DWDM Transmission with Supercontinuum Multi-carrier Source*, 3 TECHNICAL DIGEST OFC/NFOEC 16-18 (Mar. 6-11, 2005).

15. For a reminder, however, that while "For certain, . . . [the carriers] won't need to lay new fiber,. . . .lighting dark fiber or adding wavelengths on existing fiber can be extremely expensive." Press Release, TeleGeography, Most Intercity Bandwidth Still Unlit (Apr. 20, 2005) *available at* http://www.telegeography.com/press/releases/2005-04-20.php.

16. *See* Thomas W. Hazlett, et al., Declaration Submitted to the Federal Communications Commission by Verizon Communications, Reply Comments of Verizon Telephone Cos. in Support of Petition for Expedited Forbearance from the Current Pricing Rules for the Unbundled Network Element Platform, WC Docket No. 03-157 Sept. 2, 2003, *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6514783810; Alfred E. Kahn, et al., *The Telecommunications Act at Three Years: An Economic Evaluation of its Implementation by the Federal Communications Commission*, 11 INFORMATION ECONOMICS AND POLICY, 319-65 (1999); Alfred E. Kahn, *Whom the Gods Would Destroy or How Not to Deregulate*, 3-16 (AEI-Brookings Joint Center for Regulatory Studies 2001); Robert S. Pyndyk, *Pricing Capital Under Mandatory Unbundling and Facilities Sharing* (April 2005) (unpublished draft, *available at* http://www.nber.org/papers/W11225); Robert S. Pyndyk, *Mandatory Unbundling and Irreversible Investment in Telecom Networks* (January 2004) (unpublished draft, *available at*

*non*-facilities-based reselling, predominantly by AT&T and MCI — in effect, a betrayal of the CLECs that had made the mistake of constructing their own facilities[17] and a discouragement to genuine competition at the "production" or wholesale level.[18]

## III. THE IMPERFECTIONS OF THE ANALOGY: THE OVERWHELMING ROLE OF TECHNOLOGY IN TELECOMMUNICATIONS

I have already described the essential respect in which the analogy between commercial aviation and telecommunications is highly imperfect: The original rationale for regulation in the first case was a presumed inherent tendency of the industry to periodic bouts of destructive competition, requiring governmentally imposed price floors. In the second, the assumption was that the industry was a natural monopoly, requiring price ceilings to protect consumers from monopolistic exploitation.

This essential difference did not prevent both industries from suffering catastrophic losses in the last few years, a consequence of their heavy fixed costs and fluctuating demand. But there the analogy ends. While technological progress in commercial aviation, notably the jet and jumbo jet revolutions, did generate pressures in the 1970s and 1980s for greater freedom in pricing, specifically to offer discounted fares in order to fill all those empty seats, it did not play a significant role in undermining the rationale of continued regulation. In contrast, it has been technological progress that first undermined, then destroyed, the natural monopoly rationale in telecommunications,[19] while at the same

---

http://www.nber.org/papers/W10287) (citing pioneering work by Jerry Hausman) .

17. *See* John Wohlstetter, *Telecom Madness*, AM. OUTLOOK, 33 (Fall 2003); *See also* Kahn, *supra* note 9, at 35-39.

18. *See* Robert W. Crandall et al., *Do Unbundling Policies Discourage CLEC Facilities-Based Investment?*, 4 TOPICS IN ECONOMIC ANALYSIS & POLICY 14 (2004), *available at* http://www.bepress.com/cgi/viewcontent.cgi?article=1136&context=bejeap; Thomas W. Hazlett & Arthur M. Havenner, *The Arbitrage Mirage: Regulated Access Prices with Free Entry in Local Telecommunications Markets*, 2 REVIEW OF NETWORK ECONOMICS 440 (Dec. 2003), *available at* http://www.rnejournal.com/articles/hazlett-havenner-RNE_8_dec_03final.pdf.

19. *See* GERALD R. FAULHABER, TELECOMMUNICATIONS IN TURMOIL: TECHNOLOGY AND PUBLIC POLICY (1987). I owe to Charles Jackson, an engineer and valued former colleague, the admonition that my expression of technological determinism is simplistic. He contends that, entirely apart from technological developments [the] modern era of competition in telecommunications began with terminal equipment. Terminal equipment competition was possible no later than 1930 and would have been beneficial then. Yet, real terminal equipment competition in the United States began only in 1968 with the FCC's Carterfone decision. Telephone Interview with Charles Jackson, Independent Telecommunications Consultant (Sept. 13, 2005). As an active participant in the deregulation of terminal equipment, going back to my scornful criticisms of the lamentable FCC Hush-a-Phone decision of 1956, as well as in the airline field, I happily acknowledge the over-simplification of attributing it all merely to technological change. *See* Hush-A-Phone v.

time increasing the industry's susceptibility to boom and bust.

The first example of the critical role of technological progress was the microwave revolution of a half-century ago, which imposed ultimately irresistible pressures on the Federal Communications Commission to permit, first, unregulated private, then MCI's common long-distance microwave carriage.[20] Similarly, a quarter-century later, fiber optics permitted direct facilities-based competition in metropolitan areas attracted by, and undermining, the distorted rate structures I have already described. Next came cellular telephony, subscribership to which has soared in just the last few years to levels comparable to those of traditional fixed-line service.

Finally — although history tells us there is no "finally" in this technology — broadband is destroying the distinctions among cable, wireless, and circuit-switched telephony, between local and long-distance, intra- and interLATA, voice and data, telecommunications and "information service." Broadband cable companies have maintained a better than 1.6 to 1 lead over telephone companies and broadband wireless and electric power lines have already crossed the threshold of offering viable market alternatives.

Observe that the first of these developments, dating back a half-century, undermined the putative natural monopoly only in long-distance carriage. The lingering conception that the local part of the telephone business retained the characteristics of a natural monopoly seemed to make simple deregulation inadvisable. In these circumstances, the FCC became understandably preoccupied with the need to prevent AT&T from "cross-subsidizing" its newly competitive long-distance operations at the expense of its local rates. The line of battle shifted to the proper measure or test of such cross-subsidization, with the Commission holding out for fully distributed and the Bell Company for long-run incremental costs. How many of you remember the infamous Seven-Way Cost Study — the FCC's last-gasp effort to preserve the historical cross-subsidization by cost prestidigitation?[21] Later, the Department of Justice became convinced and, in turn, evidently convinced Judge Greene that AT&T was using its control over the local bottleneck to handicap MCI and its other long-distance competitors.

The result was, of course, the Consent Decree that broke up

---

United States, 238 F.2d 266 (D.C. Cir. 1956); ALFRED E. KAHN, THE CONOMICS OF REGULATION: PRINCIPLES AND INSTITUTION 140-45 (John Wiley ed., MIT Press 1988) (1970).

20. *See, e.g.*, Gerald Brock, Dynamic Market Structure and Technical Innovation, *in* TELECOMMUNICATIONS ACCESS AND PUBLIC POLICY (Alan Baughcum & Jerald R. Faulhaber eds., 1982); *see also* KAHN, *supra* note 19, at 126-39.

21. KAHN, *supra* note 19, at 156-58. On the fallacies of such fully distributed costs exercises, *see id.* at 150-56.

AT&T, separating the competitive long-distance from the putatively still monopolistic and therefore tightly regulated local services. Following this — to skip the twelve years in which Judge Greene effectively oversaw the industry[22] — came the grand and in some ways impressive compromise of the 1996 Act. The Act required the incumbent local Bell companies to open their local networks to competitors, primarily by leasing to them putatively naturally monopolistic unbundled network elements[23] at "cost," in exchange for removal of the 1982 MFJ's prohibition of their offering interLATA services. It is worth reminding ourselves at the outset that, whatever the merits of the continuing claims that the ILECs have not fully cooperated in providing the promised *quid,* their receipt of the *quo* has proved to be a total success for consumers: long-distance service has become much more broadly and effectively competitive and cheaper than ever. Whether it is any longer capable of supporting an independent AT&T or MCI will presumably be a consideration in the antitrust agencies' appraisal of their mergers with SBC and Verizon, respectively.

It is only because the sufficiency of competition in "local" service to the great bulk of residential customers remains the subject of intense controversy that I am constrained to remind you of the dreary history of the last decade, during which the FCC and state commissions (1) progressively defined those "necessary" network elements as *all* elements capable of being unbundled and, eventually, *complete services* — the afore-mentioned UNE-P — and (2) prescribed rental charges equated to the equally ineffable TELRIC — set deliberately below the costs, both historical and incremental, of the incumbents themselves, enabling competitors such as AT&T and MCI simply to re-label the service with their own brands and sell them at attractive retail rates. And it was only after having been thoroughly rebuffed by the Supreme Court in 1999 and on two subsequent separate occasions by the Federal Circuit of Appeals for the District of Columbia that the Commission announced its abandonment of this last *reductio ad absurdum*. This was a victory, finally, for the now-former chairman Michael Powell and his colleague, Commissioner Kathleen Abernathy,[24] and a defeat — perhaps final —

22. This was the period between the effectuation of the Modified Final Judgment in the Department of Justice's antitrust suit against AT&T and its replacement by the Telecommunications Act of 1996.

23. Archetypically, their ubiquitous copper subscriber lines.

24. See their eloquent explanations of their dissents from the majority opinion, attached to the press release from the FCC, *FCC Adopts New Rules for Network Unbundling Obligations of Incumbent Local Phone Carriers* (Feb. 20, 2003), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-231344A3.pdf and *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-231344A4.pdf) and reproduced in part in KAHN, *supra* note 9, at 33, 73-74.

for a stand-alone AT&T and MCI. Such worthies as the *New York Times* editorially criticized Chairman Powell on the occasion of his announced departure for his ultimately successful effort:

> Mr. Powell should have been an advocate for reasonable regulations that protect consumers and promote competition. Instead, he brought to his position an extreme commitment to deregulation that seemed to serve big business's interests most of all. One high-profile example was his attempt to remove regulations on the Baby Bells that were designed to make local telephone service more competitive.[25]

It is worth reemphasizing, in response, that those policies constituted the simplest and most glaring illustration of the error of protecting or subsidizing competitors — "Potemkin competition," as John Wohlstetter characterized it[26] — at the expense of efficient competition.

In fact, the competition and consumer protection that the *Times* criticized Mr. Powell for abandoning was competition *at the retail level exclusively* — and subsidized competition at that. Moreover, as I have pointed out, the increased recourse to that mere reselling option on increasingly favorable terms after 2000 was a betrayal of the competitive carriers that had previously challenged the incumbent monopolists by constructing their own access lines, installing their own switches, and suffering losses totaling in the sixty to eighty billion dollar range[27] when the boom collapsed.

This returns us to the respect in which telecommunications offers, almost uniquely, the opportunities for the most effective kind of competition conceivable — competition among burgeoning technologies employing copper, fiber, cable, wireless — all already deployed on a massive scale — and, on the horizon, electric power lines, all of which

---

25. Editorial, *Another Powell Departs*, N.Y.TIMES, Jan. 24, 2005, at A16. A Times reporter later characterized those policies more accurately: "over the last four years, the Commission has moved away from trying to manage competition among the phone companies intended to encourage—and subsidize—smaller rivals [most prominently AT&T and MCI!] to the Bell companies," Stephen Labaton, *Reshaping Telecommunications: The Regulators: With Huge Proposed Mergers, the Regulatory Maze Ahead for a Recast F.C.C.*, N.Y.TIMES, Feb. 15, 2005 at C6.

26. John Wohlstetter, *Cleaning Kevin's Clock: The White House Wakes Up, Telecom Shakes Up*, BANDWIDTH, (July 12, 2004), *available at* http://www.discovery.org/scripts/viewDB/filesDB-download.php?id=114 (commenting on the decision of the White House not to appeal the February 28th decision of the Circuit Court of Appeals for the District of Columbia throwing out those rules).

27. James L. Gattuso, *The FCC's Local Competition Report: Surprise!,*C:/SPIN (Jan. 31, 2003), *available at* http://www.cei.org/gencon/016,03346.cfm.; *see also* Larry F. Darby et al., *The CLEC Experiment: Anatomy of a Meltdown*, WASHINGTON PROGRESS AND FREEDOM FOUNDATION (Sep. 23, 2002), *available at* http://www.pff.org/issues-pubs/pops/pop9.23clecexperiment.pdf.

were not merely ignored but actually repressed by the FCC's opportunistic subsidization of mere resale of existing switched wireline services. One would scarcely know from its critics about the effect of the FCC's wise deregulation of wireless and its decision to free up enough of the spectrum to permit as many as six facilities-based cell phone or "personal communications service" providers in each market.[28] Nor would one know about the revolutionary unregulated occurrence and prospect for competition at the local and long-distance levels (a distinction already technologically, though not regulatorily, meaningless) between unregulated cable and telephony — terrestrial, wireless, narrowband, and broadband VoIP.

This technological revolution recommends deregulation or something like it for reasons relating to both the demand and the supply side of these burgeoning services. On the demand side, the industry, however it is defined, is clearly universally offering or close to offering to consumers the range of competing options — at least three, generally — that makes exploitation of them difficult to impossible. First, of course, there are the ubiquitous incumbent wireline telephone companies. Second, are the wireless services: according to the FCC's 2004 wireless report about 97 percent of the U.S. population lives in counties with three or more providers of that service and about 30 percent in counties with seven or more.[29] The report explicitly concluded that competition amongst wireless providers and between them and providers of wired service[30] is highly effective.[31]

Finally, even more directly replicating familiar "telephone" service, almost ubiquitously and with a distinct cost advantage, are the cable companies. Their share of the broadband market remains much larger than that of the phone companies. Even more directly in point, cable companies are in a position to offer telephone service at very low incremental cost, as Neuchterlein and Weiser point out — quoting Comcast Cable President Burke to the effect that:

> Whereas a phone company has to go out and spend tens of billions of dollars to put in place an infrastructure that can

28. Amendment of the Commission's Rules to Establish New Personal Communications Services, *Notice of Proposed Rule Making & Tentative Decision*, 7 FCC Rcd. 5676 (1992).

29. Implementation of Section 6002(B) of the Omnibus Budget Reconciliation Act of 1993, *Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services*, 19 FCC Rcd. 20,597 (2004) (including resellers with facilities-based suppliers).

30. *See id.* Usually, at least one wired provider is a holder of a cellular license.

31. *See id.* According to John Kneuer, Deputy Assistant Secretary of Commerce, NTIA, however, we do not have precise data on how much competitive service is actually available in all markets, large and small across the country. *See* ROBERT M. ENTMAN, REFORMING TELECOMMUNICATIONS REGULATION: A REPORT OF THE NINETEENTH ANNUAL ASPEN INSTITUTE CONFERENCE ON TELECOMMUNICATIONS POLICY 25 (2005).

> deliver video in addition to voice and data, we've already made the investment. So for us to sell a Verizon customer phone service costs under $300. For Verizon to offer a customer fiber to the home costs in the thousands.[32]

Confirming that boast, Cablevision in June 2004 offered its customers cable modem service, digital TV, and unlimited local and long-distance calling for $90 a month. As the *Wall Street Journal* observed, "'Cablevision is effectively giving away phone service.'"[33]

Since, however, the availability of those choices inevitably varies between sparsely and densely populated areas and between business and residential consumers, the possibility remains that some continued, residual protections or subsidization may continue to be either desirable or politically unavoidable. In that event, the anomaly and competition-distorting effect of raising those subsidies by taxing only switched terrestrial services offered by the incumbent telephone companies must clearly be corrected.

As to the supply side, these revolutionary developments underscore the wisdom in these circumstances of three members of the FCC, led by former Chairman Powell, in exempting from mandatory sharing the huge, risky investments the ILECs are making in fiber to the premises, with its promise of much-needed competition with the video services of local cable companies. Any mandatory sharing obligations imposed on them, at regulatorily imposed rates, would inevitably discourage those investments, and by so doing, inhibit the inter-platform competition that makes deregulation conceivable, if not mandatory. Whether these considerations apply equally to the investments of the cable companies in broadband facilities, and the associated issue of whether they should be subjected to open access or common carrier obligations *vis-à-vis* independent providers of content, are questions about which I have as yet no informed opinion.

## IV. THE RETURNED RELEVANCE OF ANTITRUST

This burgeoning, dynamic technological competition among platforms undermines the need for continuing regulation and argues positively for deregulation. It is important to remind ourselves, however, that deregulation in turn shifts responsibility for preserving that

---

32. JONATHAN E. NEUCHTERLEIN & PHILIP J. WEISER, DIGITAL CROSSROADS: AMERICAN TELECOMMUNICATIONS AND POLICY IN THE INTERNET AGE 196 (2005) (quoting George Mannes, *Comcast Faces Long Haul on Phone Push*, TheStreet.com, July 6, 2004, *available at* http://www.thestreet.com/pf/tech/georgemannes/10169214.html).

33. *Id.* (quoting Ken Brown, *Cablevision to Offer Internet Phone-Call Bundle*, WALL ST. J., June 21, 2004, at B5, *available at* http://online.wsj.com/article_print/0,,SB108777034073042332,00.html).

competition against threatened private suppressions by collusion, mergers, or unfair exclusionary tactics to the agencies charged with enforcement of the antitrust laws.[34] At the same time, it clearly suggests that such assessments of the prospective effect on competition must take into account the broadening of the relevant market to incorporate those competing platforms. By far the most effective competition in the industry, arguing strongly for deregulation, is precisely the competition among companies that had previously seemed to be totally noncompetitive.

In such assessments, I find persuasive the perceptive statement of the FCC's former chairman Powell, as quoted by Neuchterlein and Weiser in their monumental *Digital Crossroads*, that "[m]agical things happen in competitive markets when there are at least three viable, facilities-based competitors."[35] A threshold question must surely be whether that standard — a sensible one, even in industries characterized by such turbulent technology — is or will be met.

I should like to know how the recent consolidations in the industry, both intra- and inter-modal, meet this rule-of-thumb test. Among the former, I lack a feel for the likely effects on competition of combining the wireless operations of Vodaphone and Bell Atlantic, Cingular and AT&T (#2 and #3), and Sprint and Nextel (#4 and #6). Most prominent among the latter would be the recent acquisitions of AT&T by SBC and of MCI by Verizon, the dominant Bell-successor ILECs in their respective market territories. While the last two mergers may merely demonstrate that independent long-distance carriers are no longer viable in the digital age, which has obliterated the distinction between the two kinds of business, I would still want to be satisfied about the likely effects of combining their previously directly competitive operations. Prominent among these, it seems to me, would be the likely effect on the retail business market in metropolitan areas, where the acquired companies had, by virtue of their previous respective purchases of Teleport and MFS, become important competitors of the incumbent Bells, where the penetration by cable companies is low and the substitutability of wireless uncertain. This concern should presumably be mitigated by the unlikelihood of either of these once-dominating long-distance carriers being able to survive as an independent entity and the dynamic competition that has taken over the industry and obliterated such historical distinctions as between "local" and "long-distance" service.[36] It is still an important question, however, whether the

34. I do not necessarily exclude involvement by the FCC itself.

35. NEUCHTERLEIN & WEISER, *supra* note 32, at 409.

36. As Professor Philip Weiser testified before Congress:

It is very important for policymakers to get past the "emotional logic" against a

acquisition of AT&T and MCI by their most powerful competitors in their respective local markets is the least anticompetitive available resolution of their arguably failing firm status.[37]

## V. POLITICALLY MANDATED CROSS-SUBSIDIZATIONS AND THE COSTS OF CONSUMER SOVEREIGNTY

In all of this, I have studiously avoided what we used to refer to as the $64,000 question (before I was given the job of controlling inflation): What of the massive politically dictated cross-subsidies embedded in still-regulated rate structures? I am strongly tempted to give the same reply as one gets upon asking a waiter in a restaurant in Israel the time of day: "*You're not my table!*"

In the case of the airlines, Congress adopted an explicit subsidy program designed to ensure that no community that had previously enjoyed certificated service would lose it — a program that was almost universally effective in achieving that goal when last I checked some 15 years ago. A similar scheme, such as was adopted in the 1930s to subsidize rural telephone service, or the telephone equivalent of food stamps, would be infinitely more cost-effective than the present cumbersome and increasingly unsustainable cross-subsidization. It would be entertaining if such sensible suggestions confronted the present administration in Washington with a conflict between its policy of "starving the beast" on the one side, and its commitment to economic deregulation on the other.

I feel only relief that I am not compelled to offer an integrated reform package at this point. The ultimate goal, however, must surely be the same as the one we adopted for surface and air transportation some

---

> merger of AT&T (or MCI) and a Bell company. Notably, AT&T and MCI were the firms who were supposed to be the main competition to the Bell companies and thus a merger between them strikes many as antithetical to the goals of the Telecom Act. This "supposed to," however, is increasingly at odds with reality, as AT&T and MCI's base of long distance customers is eroding and their future is increasingly cloudy.

Philip J. Weiser, Testimony before the U.S. House of Representatives Committee on Energy and Commerce at its hearing on Competition, *in* THE COMMUNICATIONS MARKETPLACE: HOW TECHNOLOGY IS CHANGING THE STRUCTURE OF THE INDUSTRY 7, *available at* http://energycommerce.house.gov/108/Hearings/03022005hearing1443/Weiser.pdf.

37. *See id.*; Letter from the American Antitrust Institute to the Senate Judiciary Committee *available at* http://www.antitrustinstitute.org/recent2/394.pdf (expressing the opinion that acquisition of MCI by the competitive unsuccessful bidder, Qwest, would not only be less objectionable because of the smaller overlap of direct competition between the two carriers in their metropolitan area business markets but also more likely to be beneficial, by creating a third competitor capable of challenging Verizon and SBC/AT&T in those markets). *See also* Jonathan Rubin, *The Competitive Threat of the Telecommunications Mergers*, AMERICAN ANTITRUST INSTITUTE (Mar. 24, 2005), *available at* http://www.antitrustinstitute.org/recent2/398.pdf.

25 years ago.

One inefficiency of the emerging deregulated system—a true cost of deregulation—is rarely weighed in the balance. Oscar Wilde is fabled to have said, "the trouble with Socialism is that it takes up too many evenings."[38] The same is true of the dazzling proliferation of communications service varieties, combinations and packages encouraged by deregulation. It has surely become a problem of increasing dimensions, making even me nostalgic about the time when AT&T offered its subscribers their choice of any color phone they wanted, so long as it was black. Rational choosing among product and service innovations and price packages has become a major cost of the deregulated competitive process.[39] Consumer organizations are doubtless making every effort to help; but availing oneself of their services likewise "uses up too many evenings."

Having dutifully thrown these last costs onto the regulation/deregulation scale, I now delicately remove them, because they seem to me truly inescapable in a consumer-sovereign economy — an external consequence of free consumer choice itself. It is because when confronted, for example, with the availability of wireless telephony along with packaged local/long-distance and a host of other attached services, consumers have opted for them in sufficient quantity that the costs of wise choosing has been forced on all of us thereafter — costs in a sense external to those original decisions. To the extent that the market does not itself fill the new gap,[40] I know of no way of sensibly weighing them in the regulation/deregulation balance — all the more so in view of the manifest enormous benefits of unregulated competition and, particularly, of the kind of technological competition that is the most important source of those costs.

## CONCLUSION

In the case of the airlines, deregulation was concentrated in a one- or two-year period and, once sanctioned by Congress, universal (within the United States) and complete. Small wonder then that it began within a very short number of years to confer benefits on travelers to the

38. While this quote is widely used, no one seems to really know in which context or where Wilde said this.

39. One intriguing recent exposition and treatment of this problem is Jeff Sovern, *Towards a New Model of Consumer Protection: The Problem of Inflated Transaction Costs* (Jan. 2005), *available at* http://ssrn.com/abstract=648052.

40. The market's response to the predictably increased difficulty of shippers making least-cost choices among competitive truckers and rail carriers, freed by deregulation from the legal obligation to adhere to posted tariffs, was the emergence of thousands of freight bookers; in the case of airline service it was travel agents, computerized reservations systems, and such Internet services as Expedia, Orbitz and Travelocity.

tune of billions upon billions of dollars a year. Perhaps small wonder as well, that deregulation eventually exposed the once-dominant incumbent carriers to catastrophic losses.

In telecommunications, the process has been much more gradual. Over a period of more than 45 years, each step brought very large benefits to consumers in the markets affected. The process is by now virtually complete, except for the incumbent former monopolists remaining subject to direct regulation including the obligations of common carriage and provider of last resort. The obligation to offer UNE-Ps is long phased out, and they have over time succeeded in varying degrees in obtaining regulatory forbearance on the ground that sufficient competition prevailed to remove the threat of monopolistic exploitation of consumers. Understandably, while the benefits of these successive deregulations over decades have been huge, it is hardly to be expected that the mere removal of restraints on the incumbent former monopolists can produce comparably large benefits, since it is now only they who have been limited in their ability to compete.

The fact remains that the incumbent former monopolists' resources continue to be capable of making a huge contribution to inter-modal competition — and particularly competition with the video offerings of the still-dominating cable companies. It is clearly time to consider when, where, and how to complete the fifty-year process of deregulation.

# BREAKING THE ICE: RETHINKING TELECOMMUNICATIONS LAW FOR THE DIGITAL AGE

KEVIN WERBACH*

ABSTRACT

Telecommunications is a trillion-dollar industry undergoing a massive transformation, both in its technological underpinnings and its market dynamics. As technology and market developments undermine longstanding business models and value chains, existing legal frameworks are failing. A "layered" model for communications policy would provide a better foundation for competition, investment, and innovation than the legacy "silo" model.

Just as water exists in three forms – solid ice, liquid water, and gaseous steam – digital networks manifest themselves in functional layers of physical connectivity, applications, and content, which interact with one another through technical interfaces. The unstable conversion points between forms of water are called phase transitions. The phase transitions in digital communications networks are the logical layer, which connects users and resources to networks, and the interface layer, which connects users and information to devices. Legislators and regulators traditionally ignore these "connective layers." Yet as the layered model reveals, they are central to the emerging policy challenges of a converged world. Phone numbers, Internet protocol routing techniques, and digital rights management technologies are examples of logical and interface-layer features that are determining the complexion of converged digital networks, and the business opportunities that depend on them.

A layered approach would use connective layer tools to reconceptualize traditional elements of communications policy. This would eliminate uncertainties about the legal status of voice over IP, mitigate concerns about a subsidy shortfall for rural phone customers, and lay the groundwork to address emerging competitive, governance, privacy, and other issues around digital identity. Moreover, by pinpointing these hid-

* Assistant Professor of Legal Studies, The Wharton School, University of Pennsylvania. Email: kevin@werbach.com.

den chokepoints, a layered approach would reduce the overall level of regulation. Adopting the layered model would ensure that emerging technologies can flourish while creating a transition path from the communications world of the past to the converged digital universe of the future.



## INTRODUCTION

Telecommunications is a trillion-dollar industry undergoing a massive transformation, both in its technological underpinnings and its market dynamics. As technology and market developments undermine longstanding business models and value chains, existing legal frameworks are failing as well. The current structure of American communications regulation is a direct descendent of railroad laws developed in the 19th century. As we move deeper into the 21st century, such a framework is no longer tenable. Moreover, the harmful consequences of the legacy legal environment are not limited to the telecommunications sector. The Internet and nascent digital media services operate on top of communications networks. Decisions about telecommunications policy are crucial to the future of these markets as well.

Despite all this, the debate over reforming America's telecommunications laws is trapped in the assumptions of the past.[1] The primary dis-

1. This paper focuses on the U.S. legal environment, although the thrust of the argument is applicable globally.

cussion in Washington today concerns whether—and how far—to "deregulate" incumbent network operators, and whether – and how much – to "regulate" the Internet, all the while presuming a constant meaning for "regulation." Meanwhile, new technologies such as Voice over Internet Protocol (VoIP) create both regulatory uncertainty and significant economic dislocations. A change in approach is warranted. That new approach must offer not just fresh policy recommendations, but an entirely new way to think about – and talk about – the challenges facing the converging telecommunications and Internet markets.

This paper maps out a new grammar for telecommunications policy. Part II analyzes the inter-connected technology, legal, and business developments responsible for the current impasse. Part III introduces the layered model, outlining prior work and further developing the concept with an analogical assist from high school chemistry. Part IV drills down on two previously under-appreciated transition points: the logical layer and the interface layer, reinterpreting historical policy initiatives in layered terms. Part V identifies some of the key questions likely to emerge in these connective layers in the future, and offers suggestions for policymakers.

## I. TELECOM IN THE AGE OF CONVERGENCE

The telecommunications industry is facing a dramatic upheaval thanks to one basic phenomenon: convergence.[2] In essence, convergence means that historical distinctions between communications networks are melting away.[3]

In analog form, every communications medium is unique. An analog telephone call, for example, cannot be turned into a cable television broadcast. And even though a recorded telephone call could be played over a radio channel, the broadcast radio transmitter couldn't be used to send a call between just two individuals, as the phone network does countless times each day.[4]

---

2. For an early overview of the impacts of the Internet and convergence on the telecommunications industry and its regulation, *see* KEVIN WERBACH, DIGITAL TORNADO: THE INTERNET AND TELECOMMUNICATIONS POLICY (FCC Office of Plans and Policy, Working Paper No. 29, Mar. 29, 1997), *available at* http://www.fcc.gov/Bureaus/OPP/working_papers/oppwp29pdf.html [hereinafter DIGITAL TORNADO].

3. *See* JONATHAN NUECHTERLEIN & PHILIP J. WEISER, DIGITAL CROSSROADS: AMERICAN TELECOMMUNICATIONS POLICY IN THE INTERNET AGE 24 (2005) (describing convergence as "the coming together of different technologies to provide similar services").

4. Even in analog form, all communications networks used one of two fundamental mechanisms for transmitting information: electrical signals across a wire (telephone and cable), or electrical signals across the air (radio, TV, mobile phones, and satellite). Today networks also use optical signals across both the airwaves and wires. My point is that, even though a radio broadcast and a mobile phone conversation in the analog domain have certain technical commonalities, each network is optimized and locked into a particular service. Radio equip-

Everything starts to change when information is transmitted in digital form. Digital communications are fundamentally just strings of ones and zeroes. They are ultimately interchangeable, meaning that any communications platform can, in theory, offer any service. Networks may still be physically distinct and offer unique attributes, such as the mobility that only wireless connections can deliver. From a user perspective, however, the divisions between different network technologies are becoming far less significant.

In a converging world, network platforms which formerly had no competitive overlap now can offer the same services. Your cable TV operator can be your phone company, while your wireless phone provider gives you Internet access, and your wired telephone company provides your television. Moreover, it becomes significantly easier for all of those platforms to add new functionality. Intelligence moves to the edges of the network, thereby reducing the need for network-wide upgrades to core infrastructure, allowing many more companies to create new services, and taking advantage of common standards.[5] Convergence also means that, instead of expensive, proprietary equipment, telecommunications networks can use the same kinds of software and hardware as computer networks. As a result, prices fall, new competitors enter, service offerings multiply, and walls between industries collapse.[6]

The telecommunications industry that developed over the course of the 20th century, before convergence, was based on vertical integration of the carrier function.[7] Traffic was subject to a variety of different rules and pricing regimes because of legacy business structures and regulatory imperatives, rather than underlying economics.[8] Each phone company operated as a silo of its own. The carrier determined the suite of services it would offer to customers, and managed the internal addressing and directory processes as an integral part of those offerings. Because voice telephony was the primary purpose of the network, and could be rated in terms of time and distance, operators developed intricate billing systems to meter calls.

When carriers interconnected with one another to hand off traffic, they did so pursuant to inflated regulated rates, designed in part to maintain cross-subsidies between local and long-distance calls. Regulators

---

ment is designed for one-to-many broadcast, not one-to-one telephony.

5. See David Isenberg, *The Rise of the Stupid Network* (1998), *available at* http://www.rageboy.com/stupidnet.html.

6. *See* Ken Belson, *Phone Line Alchemy: Copper Into Fiber*, N.Y. TIMES, Oct. 11, 2004, at C1.

7. For example, the AT&T divestiture created a patchwork of administratively-defined "local access and transport areas" (LATAs), in order to create a competitive long-distance market alongside the still-monopolized local market.

8. *See* Kevin Werbach, *A Layered Model for Internet Policy*, 1 J. TELECOMM. & HIGH TECH. L. 37, 58–64 (2002) [hereinafter, *Layered Model*].

could collect universal service subsidy levies from operators based on interstate revenues, because traffic was easy to segment and track. Even when the market began to change, with the end of the AT&T monopoly and the early stages of convergence, the need to preserve existing revenue and subsidy flows was a strong roadblock to any changes.

Today, technological and business trends have undermined both pillars of the old order – vertical integration and cross-subsidies. The layered nature of digital networks, as described below, disaggregates the vertically integrated structure of telephone companies.[9] It becomes possible to deliver voice – the core telephone offering – on top of an Internet data stream, which itself rides on top of the existing telephone transport infrastructure. This indirection, known as voice over IP, decouples telephony from network infrastructure.[10] It also makes it difficult, if not impossible, to continue splitting up and metering traffic on a geographic basis. Unlike a circuit-switched telephone call, which always has a definite origination and termination point, a VoIP communication flows over multiple indeterminate paths determined in real-time by swarms of routers.[11] Moreover, although a VoIP connection may originate and terminate at identifiable machines, those machines have no necessary connection to physical geography.

As VoIP grows, the traditional business model for telecom operators is coming under pressure.[12] Residential VoIP providers such as AT&T and Vonage charge roughly $25 per month for unlimited nationwide VoIP calls, significantly below what incumbents charge for their traditional telephony services.[13] And competitive pressure is bound to drive that number lower, perhaps even to zero.[14] Moreover, because VoIP is nothing more than a data application, it can be delivered entirely through application-level software.[15] The leading example of software-based VoIP is Skype, a peer-to-peer application from the same team that developed the popular Kazaa file-sharing software.[16] Remarkably, even

---

9. *See id.*

10. *See* IP-Enabled Services, *Notice of Proposed Rulemaking*, 19 FCC Rcd. 4863 (Feb. 12, 2004); Voice Over Internet Protocol: Hearing Before the Sen. Comm. on Commerce, Sci. and Transp. (Feb. 24, 2004) (testimony of Kevin Werbach), *available at* http://commerce.senate.gov/hearings/testimony.cfm?id=1065&wit_id=2993.

11. *See* DIGITAL TORNADO, *supra* note 2.

12. *See The Phone Call is Dead; Long Live the Phone Call*, THE ECONOMIST, Dec. 4, 2004.

13. This cost savings is due, in part, to the fact that VoIP customers already purchase broadband Internet access. Thus, the base-level transport functionality is already paid for.

14. If voice services were free, carriers would generate revenue through other means, such as advertising and value-added services. *See* Alex Salkever, *Phone Service the "Zero Cost" Way*, BUS.WK., Jan. 6, 2004.

15. *See* Thomas J. Fitzgerald, *Should Your PC Be Your Telephone?*, N.Y. TIMES, Dec. 2, 2004, at G1.

16. http://www.skype.com; James Fallows, *In Internet Calling, Skype Is Living Up to*

though it uses a distributed peer-to-peer architecture and rides on shared public Internet links, Skype often provides higher-quality voice transmissions than the public switched network. Skype does not charge for basic phone calls between Skype users, since it rides on top of an existing broadband connection.[17] It also confounds the traditional linkage between telephone companies and physical geography. The software is produced by a Luxembourg company, managed from London and Stockholm, with software development in Estonia, and with a truly global user base unlike any phone company in history. As of October 2004, the software had over 12 million users worldwide, had handled over two billion minutes of traffic, and typically had over one million simultaneous online users at any given time.[18]

And Skype, at least in its current form, may be a relatively easy case for regulators to address. At least Skype is selling the familiar ability to make phone calls. Other examples of VoIP, though technically similar to Skype, look nothing like the phone services of yesteryear. For example, Microsoft and Sony both provide built-in VoIP capabilities for their multi-player online console gaming services. Every customer of Microsoft's Xbox Live service receives a headset that plugs into the game console. Players of certain games can chat with one another across the Internet to coordinate their activities in the game, or just have a conversation. With over one million Xbox Live subscribers, this arguably makes Microsoft the largest paid voice over broadband service provider in the U.S.[19] Yet none of those users think of Microsoft as their phone company. Instead, XBox Live is effectively a species of instant messaging (IM). And, as it turns out, leading IM services such as Yahoo! Messenger now offer voice chat among their capabilities.

The mobile phone market provides a final vision of where the telecom industry as a whole might be going: toward flat-rate pricing based more on data usage than voice. Mobile phone usage has grown rapidly, with worldwide subscribers passing landline subscribers in 2004.[20] A significant and growing number of subscribers, especially young people,

---

*the Hype*, N.Y. TIMES, Sept. 5, 2004; Andy Reinhardt, *Net Phone Calls, Free—And Clear: Skype's Radical Technology and Marketing Threaten the Very Foundations of Telecom*, BUS.WK. Nov. 1, 2004, at 60.

17. Skype does charge per-minute for making calls to non-Skype users, a service it calls "SkypeOut." This service works through interconnection points with the public switched telephone network. *See* Kevin Werbach, *Tune In, Turn On, Skype Out*, TECH CENTRAL STATION (July 1, 2004), *at* http://www.techcentralstation.com/070104F.html.

18. Press Release, Skype, One Million Simultaneous Users on Skype (Oct. 20, 2004), *at* http://www.skype.com/company/news/2004/1million_online.html.

19. *See* Kevin Werbach, *Not Your Parents' Phone System*, TECH CENTRAL STATION (Aug. 25, 2004), *at* http://www.techcentralstation.com/082504E.html.

20. *See Battling for the Palm of Your Hand - Mobile Phones*, THE ECONOMIST, May 1, 2004, at 71.

use their mobile phone as their sole phone line.[21] In recent years, mobile phone operators have upgraded their networks to offer increasingly sophisticated data capabilities. Although data still represents the minority of operator revenues, it is growing significantly faster than voice revenues. Competition and network capacity growth have produced a pricing model that looks more like residential broadband than traditional phone service. Carriers originally charged high per-minute rates, but in recent years service plans have shifted almost entirely to flat monthly fees.

Moreover, ancillary services such as downloadable ringtones and games are fast becoming a significant chunk of the mobile phone business model. Ringtones alone now generate over $3 billion in annual revenue, roughly ten percent of the size of the entire global music industry.[22] It's not that far-fetched to imagine a mobile phone market in the not-to-distant future where users get the calls for free, but pay for the ringtones.

These examples demonstrate that what it means to operate as a telecom company is changing dramatically. A sector that used to be based on one well-defined product (phone calls), a well-defined unit of measurement (minutes), and a strong connection to physical geography is turning into something else entirely. That something is data-centric, distributed, application-agnostic, self-organizing, and rapidly evolving. In other words, it is the Internet.[23]

## II. THE LAYERED APPROACH

The radical upheaval in telecom described in the previous section calls for new conceptual models.[24] The engineering concept of layers provides a useful heuristic for analyzing and answering the policy challenges of the Internet and convergence.

---

21. *See* MICHAEL R. WARD & GLENN A. WOROCH, USAGE SUBSTITUTION BETWEEN FIXED AND MOBILE TELEPHONY IN THE U.S., (CRTP, Working Paper, Oct. 2004), http://elsa.berkeley.edu/~woroch/usage%20substitutiongawvita.pdf; Geoffrey Nairn, *The Cost of Cutting the Cord*, FINANCIAL TIMES, Oct. 6, 2004. This trend has been a significant factor in the recent decline in wireline access lines.

22. *See* Jason Ankeny, *Interoperable MMS Set to Explode*, TELEPHONY, Nov. 8, 2004; *Music's Brighter Future*, THE ECONOMIST, Oct. 30, 2004 at 71.

23. *See Layered Model*, *supra* note 8 (claiming that telecommunications policy will become a subset of Internet policy).

24. Other scholars have recognized the need for a new approach to telecom policy. *See, e.g.*, Philip J. Weiser, *Toward a Next Generation Regulatory Regime*, 35 LOY. U. CHI. L.J. 41 (2003).

### *A. Introduction to Layers*

A layered analysis divides a networked information system into a hierarchical "stack." Each layer describes a category of functionality that is self-contained, but necessary to deliver the functions available higher up. Layers are connected to one another through technical interfaces known as protocols.

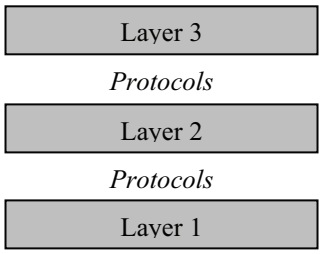


Figure 1

Conceptually, layers can be thought of as modules.[25] Instead of a system that is tightly integrated, and created by a single provider as a unit, a modular structure is disaggregated into separate markets, with competition in each of them. The personal computer industry is a classic case of a modular business.[26] Dell may sell the PC to a user, but Intel provides the microprocessors, Microsoft the operating system, Hitachi the disk drives, and so forth. Dell's primary functions are to select and integrate the component modules, and to provide customer support and other ancillary services. This market structure has proven extremely effective for promoting innovation and price/performance improvements.[27]

Layers are a special case in which there is a fixed, linear relationship between the modules. Also, in a layered environment, there need not be a single integration point, analogous to Dell in the PC example, where all the modules come together into a package sold to end-users.

There are several technical benefits to a layered approach.[28] Layering as a design concept allows developers and providers to separate out

---

25. I use modularity here in the sense developed by Carliss Baldwin and Kim Clark. *See* CARLISS BALDWIN & KIM CLARK, DESIGN RULES: THE POWER OF MODULARITY (2000).

26. *See id.*

27. *See id.* Another take on this market dynamic is that the company controlling the crucial "platform" integration point has incentives not only to extract monopoly rents, but to facilitate activity and innovation by companies using the platform. *See* Joseph Farrell & Philip J. Weiser, *Modularity, Vertical Integration and Open Access Policies: Towards a Convergence of Antitrust and Regulation in the Internet Age*, 17 HARV. J.L. & TECH. 85 (2003).

28. *See Layered Model*, *supra* note 8.

levels of functionality, each of which can be optimized independently.[29] A service provider at one layer – say, an e-commerce retailer such as Amazon.com – need not concern itself with the mechanisms by which data moves from its servers to its customers, or the difference between telephone wires and coaxial cable for carrying data traffic. Each provider can focus on what it does best. Moreover, a market that does not depend on a small number of vertically integrated providers can produce greater innovation, by unlocking the potential of all market participants.[30]

Layering also establishes the competitive stage for firms that operate in and around those networks. For example, a "layer two" device, such as an Ethernet bridge, performs only basic traffic forwarding between two machines, while "layer three" equipment, such as switches and routers, handle more complex tasks. A "layer four" switch adds an understanding of end-to-end network traffic flows and performance, while a "layer seven" switch differentiates among the applications the traffic is carrying. Layers effectively define the value chain through which products and services are ultimately delivered to end-users.[31] Amazon.com, as a provider of Web-based applications and content, relies on physical connections from ISPs and broadband network operators, as well as logical addressing mechanisms, to ensure its information reaches its customers.

Although the layers of the communications stack are distinct, they are composed of the same basic stuff. All of the layers are, fundamentally, software code that manipulates bits of information to form a networked communications system.[32] Even the physical layer, the most rigidly fixed, includes software and protocols that define how information travels across physical links. Moreover, functions that were previously delivered at one layer may, in some cases, migrate to other layers. In the legacy telephone network, basic voice communications were hard-wired into the physical infrastructure. With VoIP, they become an application that can ride on any physical-layer platform.

---

29. *See* Ashish Shah, et al., *Thinking About Openness in the Telecommunications Policy Context*, Paper Presented at The Thirty-First Telecommunications Policy Research Conference 13 (Sept. 20, 2003), *available at* http://intel.si.umich.edu/ tprc.org/papers/2003/244/openness2.pdf.

30. Baldwin and Clark explain this value proposition in connection with modularity. *See* BALDWIN & CLARK, *supra* note 25.

31. One complication is that the same functionality can sometimes be delivered at different layers. Voice over IP, an application-layer reformulation of the voice telephony functionality formerly tied to the physical layer, is an example.

32. *Cf.* LAWRENCE LESSIG, CODE AND OTHER LAWS OF CYBERSPACE (1999) (arguing that the "West Coast Code" of software regulates online activity as much as traditional laws).

### *B. Layers and Communications Policy*

Historically, communications regulation developed around a series of unconnected vertical silos.[33] Telephone networks were regulated as "common carriers," based on models first developed in the 19th century for railroads and the telegraph.[34] Wireless communications systems were subjected to an entirely different set of regulations, designed with radio broadcasting in mind.[35] Newer communications networks, including cable television, cellular telephony, and satellite communications, were each given their own set of tailor-made rules. A federal agency, the Federal Communications Commission (FCC) regulated interstate and international communications, while many local activities fell under the purview of state public utility commissions and municipal authorities.

In the days when each network delivered a different service, using different basic technologies, this division made sense.[36] Connections started and stopped at discrete points, allowing for relatively neat geographical separations. The issues confronting telephone companies were different from those facing cable television operators, and the companies operated in distinct markets. Data services, such as they were, could be kept outside the legacy regulatory system altogether, without causing much disruption.[37]

Today, however, telephone and cable companies compete head-to-head in broadband Internet access. They will soon compete in most markets for voice telephony (traditionally the sole province of phone companies), as well as for multi-channel video programming (the traditional birthright of cable). Data represents the major growth area for most communications companies. Applications such as VoIP, which is inextricably both voice and data, straddle the legacy legal divisions. The result is a series of distortions and uncertainties, as like services are regulated differently, and as the FCC struggles to define a coherent framework within the bounds of its statutory authority.

In the past five years, legal and policy analysts have appropriated the

---

33. I have previously described the silo model as "horizontal" and the layered model as "vertical." *See Layered Model*, *supra* note 8. However, most other commentators find the opposite terminology more intuitive. *See* Whitt, *infra* note 45. Therefore, I adopt it here. The difference is purely semantic.

34. *See* Adam Candeub, *Network Interconnection and Takings*, 54 SYRACUSE L. REV. 369 (2004).

35. *See* Kevin Werbach, *Supercommons: Toward a Unified Theory of Wireless Communication*, 82 TEX. L. REV. 863 (2004).

36. *See Layered Model*, *supra* note 8.

37. *See* DIGITAL TORNADO, *supra* note 2; JASON OXMAN, THE FCC AND THE UNREGULATION OF THE INTERNET (FCC Office of Plans and Policy, Working Paper No. 31, July 1999), *available at* http://www.fcc.gov/Bureaus/OPP/working_papers/oppwp31.pdf; Robert Cannon, *The Legacy of the Federal Communications Commission's Computer Inquiries*, 55 FED. COMM. L.J. 167 (2003).

concept of layers as a means to address these challenges.[38] A layered model for communications policy is a schematic of layer divisions, along with rules or guidelines for policy-makers. Layered thinking helps tackle difficult communications policy questions by separating out questions, and by revealing previously un-recognized issues. Moreover, the history of the Internet shows the value of respecting layer independence.[39] Actions by service providers to erase the distinctions between layers tend to threaten innovation, because they reduce opportunities for new competitive entry at different layers.[40] Similarly, actions by regulators should be targeted to the appropriate layer for the problem at hand to avoid unnecessary spillover effects.[41]

By shifting regulatory structures from vertical silos based on network platform to horizontal layers, the layered approach tracks the reality of convergence. The important question is not whether bits fly through the air or over a wire, let alone whether that wire is twisted pair or coax, but what is happening to those bits. A layered model defines a hierarchy of stepping stones, with basic physical connectivity on the bottom and content at the top. Every step serves as a platform for the step above it.

Layered models are becoming a common tool for analyzing questions in telecommunications policy, Internet regulation, and cyberlaw.[42] After several legal scholars developed the basic contours of the layered approach, policy advocates began to translate those arguments into concrete proposals.[43] The European Union independently used a framework similar to the layered model as the basis for its overhaul of communications regulation.[44] MCI became a particular champion of the layered

---

38. *See* Yochai Benkler, *From Consumers to Users: Shifting the Deeper Structures of Regulation Toward Sustainable Commons and User Access*, 52 FED. COMM. L.J. 561, 562 (2000); Jeff Mackie-Mason, *Leveraging and Layering: Making Sense of Telecom, Computing and Data Market Structure*, Unpublished Presentation to the FCC (July 23, 1996), *available at* http://www-personal.umich.edu/~jmm/presentations/fcc96-layering.pdf; LAWRENCE LESSIG, THE FUTURE OF IDEAS: THE FATE OF THE COMMONS IN A CONNECTED WORLD 23-25 (2001); Timothy Wu, *Application-Centered Internet Analysis*, 85 VA. L. REV. 1163, 1164 (1999); Lawrence B. Solum & Minn Chung, *The Layers Principle: Internet Architecture and the Law*, 79 NOTRE DAME L. REV. 815, 815 (2004).

39. *See* Solum & Chung, *supra* note 38.

40. *See id.*

41. *See id.*

42. *See id.*

43. *See* Richard S. Whitt, *Codifying the Network Layers Model: MCI's Proposal for New Federal Legislation Reforming U.S. Communications Law*, (March 2004), *available at* http://global.mci.com/about/publicpolicy/presentations/layersmodelfederallegislation.pdf.

44. *See* Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002 on a Common Regulatory Framework for Electronic Communications Networks and Service (L. 108/33); Doug Sicker & Joshua Mindel, *Comparing the Layered Model for Telecommunications Policy with the EU's Newly Adopted Framework* (2005), *available at* http://spot.colorado.edu/~sicker/PolicyPubs.html (pending publication in TELECOMM. POLICY); Rob Frieden, *Adjusting the Horizontal and Vertical in Telecommunications Regu-*

model, developing white papers, model statutes, and other materials extolling the virtues of a layered approach.[45]

Predictably, MCI's advocacy provoked a response from the local phone companies that are MCI's traditional enemies in regulatory debates. A group called the New Millennium Research Council assembled an entire book of essays criticizing the layered model.[46] The thrust of most of the attacks is that a layered approach mandates heavy-handed regulatory disaggregation of networks into commodity components, thwarting market efficiencies.[47] Yet this conclusion is specious. Just because MCI supports the layered model doesn't mean all of MCI's positions necessarily flow from that approach. In particular, there is nothing in the model that necessarily precludes combinations of multiple layers. The layered model simply frames the analysis under which such actions can be evaluated.

A great virtue of the layered approach to communications policy is that it aligns legal structures with the real world. Data networks *are* designed, deployed, and used with layers. And the infrastructure of telecommunications increasingly is comprised of data networks. Virtually every phone call is already carried over a digital connection. Major carriers are beginning a slow but inevitable transition away from the circuit-switched telecom architecture dating back to Alexander Graham Bell, deploying VoIP in its place.[48] Business factors are driving this shift as much as technological ones. For the first time, wireline access lines are declining, and competition is putting pressure on telephone service margins.[49] To make up the slack, carriers are investing heavily in broadband as a new growth area.[50] The plasticity of digital communications – everything ultimately reduces to identical ones and zeros – means that different services can more easily be combined into packages. Add rapid industry consolidation, and the near-to-intermediate-term future of telecom looks to be a "battle of the bundles" among providers of integrated

---

*lation: A Comparison of the Traditional and a New Layered Approach*, 55 FED. COMM. L.J. 207, 246 (2003).

45. *See* Richard S. Whitt, *A Horizontal Leap Forward, Formulating A New Public Policy Framework Based On The Network Layers Model*, 56 FED. COMM. L.J. 587 (2004) (identifying author as working for MCI).

46. *See* New Millennium Research Council, *Free Ride: Deficiencies of the MCI 'Layers' Policy Model and the Need For Principles that Encourage Competition in the New IP World* (July 2004), *at* http://www.newmillenniumresearch.org/news/071304_report.pdf.

47. *See id.*

48. *See The Phone Call is Dead*, *supra* note 12; Bernard Simon, *A Bright New Day for the Telecom Industry, if the Public Will Go Along*, N.Y. TIMES, Jan. 12, 2004, at C3.

49. *See* Seth Schiesel, *The Bells Struggle to Survive A Changing Telephone Game*, N.Y. TIMES, Nov. 24, 2003, at C1.

50. *See* Julie Creswell, *Is the Most Powerful Man in Telecom Pulling a Megabluff?*, FORTUNE, May 31, 2004; Ken Belson, *Bells Are Catching Up In Battle for Broadband*, N.Y. TIMES, July 28, 2004, at C4.

data-centric offerings.[51]

If they are to continue performing their mission, communications regulators need a way to define rules governing the industry, and to evaluate actions by industry participants. Layered models fill that role.

### *C. A Double-Necked Hourglass*

In the past, I have described a four-layer model: physical, logical, applications, content.[52] This model, with some variations, is the most commonly used set of layers in current scholarship and policy advocacy.[53] As a conceptual tool, however, layered models need not be uniform. We need not agree completely on the best way to slice the pie, so long as we agree the pie must be sliced, and in which direction. Different conceptual models may be appropriate for different situations. For example, a layered model that serves as a blueprint for legislation might not be the best model for engineers to use in designing networks.

In this paper, I would like to develop a modified layered model. The four-layer framework is still the best compromise between accuracy and simplicity. However, it – and most of the other layered models proposed heretofore – suffers from the limitation of treating all layers equally. There is a subtle but significant difference between the roles certain layers play in the overall stack.

The modified layered model is shaped like a double-necked hourglass. Depending on one's viewpoint it has either three or five layers:

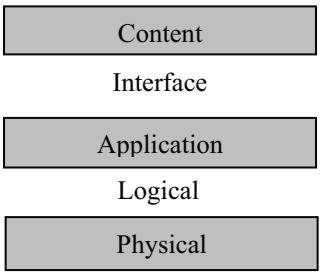


Figure 2

---

51. *See* Ken Belson, *Cable's Rivals Lure Customers With Packages*, N.Y. TIMES, Nov. 22, 2004, at C1; Blair Levin, *The Broadband Bundle Battles Ahead*, Presentation to the Council for Entrepreneurial Development (Oct. 8, 2004), http://www.cednc.org/conferences/infotech/2004/speakers/blair_levin.ppt; Sandra Ward, *Battle of the Nets: An Interview with Blair Levin*, BARRON'S, July 18, 2003.

52. *See Layered Model*, *supra* note 8.

53. *See, e.g.*, Benkler, *supra* note 39; LESSIG, *supra* note 38; Whitt, *supra* note 45. The four-layer model appears to have gained traction because it balances simplicity and accuracy, highlighting the network components most important for policy-makers.

The PHYSICAL layer is the baseline infrastructure that transports bits from place to place.[54] It comprises the physical "roadbeds" of the information superhighway: the twisted pair copper loops, coaxial cables, fiber optic lines, radio transmissions, and other carrier technologies.[55] It can be called the "where" layer.

A step up is the LOGICAL layer, which is the "who." The logical layer ensures that the right bits get to the right place.[56] It therefore includes identity and identifier information, such as phone numbers and other addresses, which allows the network to know where bits should flow.

Next is the APPLICATION layer.[57] This is the "why," in that it defines the purpose of moving those bits between those users of the network. Applications control how information is used. They produce the valuable functionality, whether it be sharing photographs or real-time voice conversations, that the network delivers. Voice telephony, in a data-centric network, resides at the application layer, as does AOL's instant messaging service and eBay's virtual marketplace.[58]

Above that is the INTERFACE layer, the "how." Interfaces are how users interact with applications.[59] Some manifestations of the interface layer are physical: the standards for connecting devices to the network.

---

54. A bit, as defined by Claude Shannon in his foundational works on information theory, is the basic unit of digital information. *See* Claude Shannon, *A Mathematical Theory of Communication*, 27 BELL SYS. TECH. J. 379, 623 (1948), *available at* http://cm.bell-labs.com/cm/ms/what/shannonday/shannon1948.pdf. It is typically represented as a counter that can show either zero or one. Bits are distinguished from atoms, the units of physical entities. *See* NICHOLAS NEGROPONTE, BEING DIGITAL (Vintage 1996).

55. There is software at the physical layer, in the form of low-level protocols that define how packets are encoded on the physical transport mechanisms. The key distinction is not between software and hardware, but between pure physical location and other constructs.

56. I use the term "logical layer" in a slightly different way than Benkler and Lessig. They use it to describe all the software code in the network, as distinguished from the physical hardware. *See* Benkler, *supra* note 38; LESSIG, *supra* note 38.

57. I am not using "application" here in the common sense of an individual software program. Skype is a software application that users install on their personal computers, but the conceptual "application" involved, from the perspective of the network, is real-time voice communication.

58. Applications can be combined or manipulated in various ways. What is important is not the particular software involved, but the capabilities made available to users.

59. As with "application," *see supra* note 57, the term "interface" is used here in a special sense. In common parlance, software programs have "user interfaces" such as windows and menus and they also have "application programming interfaces" (APIs) to connect with other software. The interface layer is both narrower and broader. It is narrower because it refers only to interactions between applications and end-users; interfaces between applications reside at the application layer. The interface layer is broader than the common usage, however, in that it describes everything between the user and the application, not just the elements displayed on screen. That is why the computer operating system, a piece of software that controls how users interact with both local software and network-based applications, falls within the interface layer for purposes of this model.

This layer also includes the operating system software that manages applications on the user's local computer, as well as hooks between that device and the rest of the network.[60] As will be discussed below, digital rights management looms as a significant area of interface-layer communications regulation.

Finally, the CONTENT layer is the "what." It is the content of the phone calls, the text of Web pages, the books purchased on Amazon.com, and the music transferred to an iPod. The content layer is largely unregulated, with the large exception of over-the-air radio and television broadcasting.

The salient feature of the modified layered model is that it distinguishes between two kinds of layers: functional and connective. The three functional layers – content, application, and physical – represent the primary services delivered to end-users. The two connective layers – interface and logical – face inward, toward the other parts of the network. Their primary mission is to interconnect the layers above and below. As such, these connective layers are often viewed as merely "glue:" behind-the-scenes code that performs un-interesting clerical or logistical functions. Nothing could be further from the truth. As will be discussed below, the connective layers are, in fact, the most crucial points in the communications system stack for purposes of public policy. Communications policy heretofore has largely concerned itself with the functional layers and ignored the connective layers. In the future, that balance should be reversed.

### *D. The End of the Ice Age*

The chemical properties of water represent a good analogy to a layered communications system. Water, as most people remember from high-school chemistry, is a substance comprised of two hydrogen atoms and one oxygen atom. Depending on temperature, water exists in one of three forms: solid, liquid, or gas. The solid is ice; the liquid is water; and the gas is steam. Though chemically identical, the three phases exhibit very different physical properties. To an observer, it is far from obvious that ice, water, and steam are even related.

Between the three states of water are two "phase transitions," where water changes from one form into another, known as the boiling point and the melting point. The system therefore mirrors the connective layers of networked communications systems described above:

---

60. Thus, both the interface and application layers can be composed of software. The distinction is that applications provide a capability users desire, while interfaces modulate how users take advantage of that capability.

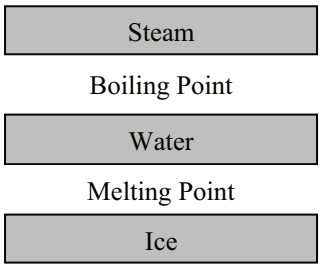


Figure 3

Phase transitions are points of rapid change. Physical properties shift dramatically once key temperature thresholds have been passed.[61] The boiling point and melting point of any substance are important identifying characteristics because they shape the practical uses of the substance and also reveal aspects of molecular structure.

The water analogy helps to illustrate the differences among layers in the data communications stack. Ice and steam are both forms of the same substance, but their properties vary dramatically. Similarly, all layers of the communications policy stack are essentially software code, but they exhibit very different features.

The physical layer, like ice, is the most rigid. It is tied to lines and switches located in particular physical locations, and subject to particular technical constraints. Being built more on atoms than bits, the physical layer is subject to somewhat different economic factors than the layers above. Physical infrastructure has high fixed costs, for example: every mile of wiring or telephone switch is a significant additional cost. And once deployed, physical infrastructure is difficult to modify. These characteristics tend to facilitate concentrations of market power.[62] Moreover, higher layers are dependent on lower layers. An application like eBay's online auctions needs network addressing and physical connectivity in order to serve its users.

As a result, the physical layer has historically been the focus of communications regulation. The FCC, for the most part, regulates owners of physical networks, not the users of those networks. In the world of telephony, it regulates providers of "telecommunications," which essentially means transmission.[63] The owners of the physical networks are the

---

61. Careful procedures can produce strange intermediate states, but these are artificial.

62. High fixed costs relative to variable costs mean that there are likely to be significant economies of scale. This gives larger players an advantage, and can create a feedback loop that fosters monopolies. *See* Eli Noam, *How Telecom is Becoming a Cyclical Industry, And What To Do About It* (June 28, 2002), *at* http://www.citi.columbia.edu/elinoam/articles/cyclicality.htm.

63. "The term 'telecommunications' means the transmission, between or among points specified by the user, of information of the user's choosing, without change in the form or content of the information as sent and received." 47 U.S.C. § 153(43) (Supp. V 1999).

ones providing that transmission function. The FCC does not directly regulate other companies that purchase that transmission capacity, whether to access the network as end-users, or to deliver "enhanced services" such as voicemail or Internet access to their own customers.[64] Similarly, in wireless communication, the FCC oversees the allocation and use of spectrum frequencies, the physical infrastructure of the air, and the associated transmitters that operate in those frequencies. It has not traditionally exercised direct regulation over receivers, such as television sets.[65]

The Commission's proclivity toward regulating the physical layer continued amid the early stages of convergence. Even though DSL and cable modem service are direct competitors in many markets, the FCC treated each under entirely separate legal rules.[66] It required DSL operators to provide "unbundled network elements" to competitors, and to offer "line-sharing" specifically for independent providers of DSL.[67] There were good competitive and legal reasons for these steps. However, at the same time, the Commission continued to treat cable modem service under the rules governing cable television, which has no unbundling obligations.[68] This decision was consistent with the legislative history of the 1996 Act, and reflected an understandable desire to protect cable operators from "double regulation" under both Title II and Title VI of the statute. However, it created a clear arbitrage situation. Phone companies had every incentive to roll back unbundling obligations on their data offerings, while cable companies had a strong incentive to block efforts to

---

64. *See* MTS and WATS Market Structure, *Memorandum Opinion and Order,* 97 F.C.C.2d 682, 711-22 (1983), *reconsidered in part*, MTS and WATS Market Structure, *Memorandum Opinion and Order,* 97 F.C.C.2d 834 (1984) (concluding that "enhanced service providers" should be treated as end-users for regulatory purposes); DIGITAL TORNADO, *supra* note 2, at 50.

65. *See* FCC SPECTRUM POLICY TASK FORCE REPORT, ET Dkt. No. 02-135, (Nov. 15, 2002), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-228542A1.pdf. The exceptions are generally cases, such as the "V-Chip," to block violent or sexual television content, where Congress has specifically directed the FCC to adopt rules governing receivers.

66. The Commission, to be fair, had little leeway on this matter. The Telecommunications Act of 1996 largely preserved the silo-oriented framework of the 1934 Communications Act. *See Layered Model*, *supra* note 8.

67. *See* Implementation of the Local Competition Provision of the Telecommunications Act of 1996, *Third Report and Order and Fourth Further Notice of Proposed Rule Making*, 15 FCC Rcd. 3696 (1999) (establishing rules for unbundled network elements); Deployment of Wireline Services Offering Advanced Telecommunications Capability and Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, *Third Report and Order in CC Dkt. No. 98-147 and Fourth Report in CC Dkt. No. 96-98*, 14 FCC Rcd. 20912, 20916, para.20,912 ¶ 5 (1999) (requiring line sharing).

68. *See* BARBARA ESBIN, INTERNET OVER CABLE: DEFINING THE FUTURE IN TERMS OF THE PAST (FCC Office of Plans and Policy, Working Paper No. 30, Aug. 1998), *available at* http://www.fcc.gov/Bureaus/OPP/working_papers/oppwp30.pdf.

impose unbundling obligations on their offerings.

The first significant battle over the physical layer began in late 1998, under the rallying cry of "open access."[69] As cable operators built out their broadband infrastructure, advocates, including myself, argued that they should be required to allow independent Internet service providers access to their networks. The argument was that the open platform model used for the phone network had been the foundation for the Internet's spectacular growth.[70] Open access to networks not only fostered innovation by small new entrants, it created a virtuous circle that benefited incumbents as well. Allowing cable operators to build closed access into their physical plant would forever foreclose that kind of open connectivity in the cable broadband environment, which, then and now, represents the largest share of residential broadband customers.[71] Moreover, once cable had established its freedom from open access, phone companies were bound to push hard for similar rules as a matter of competitive parity.[72] And that is precisely what happened.

When Michael Powell took over as FCC Chairman in 2001, he made clear his desire to eliminate many of the unbundling requirements and wholesale pricing restrictions on incumbent local phone companies.[73] Powell pushed through FCC decisions in separate proceedings classifying both DSL and cable modem offerings as unregulated "information services," meaning they were not subject to unbundling requirements.[74] As with the Commission's previous decisions, Powell could claim a strong public policy foundation for his actions. The previous unbundling requirements were blamed for facilitating the vast capital destruction of

---

69. *See* Mark A. Lemley & Lawrence Lessig, *The End of End-to-End: Preserving the Architecture of the Internet in the Broadband Era*, 48 UCLA L. REV. 925 (2001); Mark Cooper, *Open Access to the Broadband Internet: Technical and Economic Discrimination in Closed, Proprietary Networks*, 71 U. COLO. L. REV. 1011 (2000). One reason for the virulence of the open access debate in 1998-2000 was AT&T's acquisition during that time period of TCI and MediaOne, two of the largest cable television operators. The fear at the time was that AT&T would use its leverage as the largest cable player against unaffiliated service providers. As it turns out, AT&T's strategy failed for business reasons, and the company later sold its cable assets to Comcast.

70. *See Layered Model*, *supra* note 8.

71. *See id.*

72. *See id.* This point addressed the argument of cable operators that, even if the cable broadband platform was proprietary, competing ISPs had the option of reaching their customers through interconnection with the phone network. *See* James Speta, *The Vertical Dimension of Cable Access*, 71 U. COLO. L. REV. 975, 1004-07 (2000).

73. *See* Yochi Dreazen, *FCC's Chairman Axes Long-term Policy*, WALL ST. J., May 1, 2001, at A28; Paul Krugman, *Digital Robber Barons?*, N.Y. TIMES, Dec. 6, 2002, at A35.

74. *See* Appropriate Framework for Broadband Access to the Internet over Wireline Facilities, *Notice of Proposed Rulemaking*, 17 FCC Rcd. 3019, 3027 (2002) (concerning DSL service); Inquiry Concerning High-Speed Access to the Internet over Cable and Other Facilities, *Declaratory Ruling and Notice of Proposed Rulemaking*, 17 FCC Rcd. 4798, 4802 (2002) (concerning cable modem service).

the telecom bust. The FCC's earlier decisions had been rejected by courts repeatedly.[75] Incumbents complained that they had no economic incentive to invest in new infrastructure if they had to share the benefits with competitors, while the erstwhile competitors who supposedly benefited from the policy were filing for bankruptcy at a rapid pace.

Unfortunately for Powell, his actions proved both politically and legally difficult to sustain. In *Brand X Internet Services v. FCC*, the Ninth Circuit rejected the FCC's conclusion that cable modem offerings are unregulated information services.[76] The FCC's efforts to fix the telephone unbundling rules created similar confusion when a dissident block of Commissioners were able to reverse Powell's proposed decision, only to have the subsequent order – itself a response to a judicial remand – overturned by the courts.[77]

Meanwhile, a new concept, network neutrality, began to enter the communications policy debate.[78] Unlike open access, which focused on physical interconnection with Internet service providers, network neutrality considers whether network operators can block or disadvantage competing providers of higher-level functionality. Specifically, the concern is that broadband providers, seeking to capture rents, will restrict users' ability to run applications, access resources, transmit content, or connect devices that are not affiliated with the broadband provider itself.[79] Chairman Powell has stated forcefully that broadband providers should not interfere with what he calls the Internet's "Four Freedoms:" end-users' freedom to access content, use applications, attach personal devices, and obtain service plan information.[80] However, he has so far

---

75. United States Telecom Ass'n v. F.C.C., 290 F.3d 415 (D.C. Cir. 2002), *cert. denied sub nom.*, WorldCom, Inc. v. United States Telecom Ass'n, 538 U.S. 940 (2003).

76. *See* Brand X Internet Servs. v. F.C.C., 345 F.3d 1120 (9th Cir. 2003). The decision was based largely on the application of *stare decisis* to an earlier Ninth Circuit decision finding cable modem service to be a "telecommunications service." *See* AT&T Corp. v. City of Portland, 216 F.3d 871 (9th Cir. 2000). The Supreme Court subsequently reinstated the FCC ruling. *See* Nat'l Cable & Telecomms. Assoc. v. Brand X Internet Servs., 535 U.S. 467 (2005). However, the damage to Chairman Powell's agenda, and to investor confidence that the regulatory system could facilitate significant broadband adoption, had already been done.

77. *See* Review of the Section 251 Unbundling Obligations of Incumbent Local Exch. Carriers, *Report and Order and Order on Remand and Further Notice of Proposed Rulemaking*, 18 F.C.C.R. 16,978 (2003), *reversed.* United States Telecom Ass'n v. F.C.C., 359 F.3d 554 (D.C. Cir. 2004).

78. *See* Timothy Wu, *Network Neutrality, Broadband Discrimination*, 2 J. TELECOMM. & HIGH TECH L. 141 (2003); Declan McCullagh, *Tech Companies Ask for Unfiltered Net*, NEWS.COM (Nov. 18, 2002), *at* http://news.com.com/2100-1023-966307.html?tag=fd_top (describing network neutrality advocacy by the Coalition for Broadband Users and Innovators, a group of technology companies including Microsoft).

79. *See id.*

80. Michael Powell, *Remarks at the Fall 2004 Voice on the Net Conference*, October 19, 2004, *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-253325A1.pdf; Michael Powell, *Preserving Internet Freedom: Guiding Principles for the Industry*, Remarks

resisted calls to make that policy mandatory.[81] As with open access, broadband operators claim they need the ability to bundle services, and disclaim any intention to limit user choice.

The root problem the FCC faces in the unbundling mess is that there simply is no good answer under the current regulatory paradigm.[82] The silo-based classification into telecommunications and information services is a blunt instrument. Either something is "telecommunications" – and subject to the full panoply of FCC regulation – or it is information service – and thus in a vaguely defined zone of "unregulation."[83] That creates strong pressure to keep as much as possible out of the telecommunications abyss.

This decision, moreover, is essentially a muddled layering exercise. Under the 1996 Act, "telecommunications" essentially represents physical transmission, and "information services," which are offered "via telecommunications" represent some combination of higher-level functionality.[84] However, because the statute doesn't subdivide the network stack further, or provide any guidance for the treatment of non-telecommunications services, the decision is always subject to challenge.

In essence, the legacy regulatory structure harbors a nascent two-layer framework.[85] The bottom half, the physical layer, is heavily regulated, while the upper half is regulated only in specific, well-defined cases. Broadcast media content, for example, is regulated under public interest and indecency guidelines because of its pervasiveness and its association with government-granted spectrum licenses.[86] Cable TV programming is subject to pro-competitive regulation under the 1992 Cable Act, to address concerns about market power in the video programming market.[87] These are essentially special-case regulations of the content

---

at the Silicon Flatirons Symposium, Feb. 8, 2004, *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-243556A1.pdf.

81. *See id.* (challenging the broadband network industry to adopt the "four freedoms", but not advocating any formal FCC action to enshrine them). The Commission recently adopted a policy statement that promotes principles similar to former Chairman Powell's "Four Freedoms." *See* News Release, FCC Adopts Policy Statement, Aug. 5, 2005, *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-260435A1.pdf. However, the policy statement still lacks any binding legal force.

82. For a different approach that addresses many of the same questions, *see* Farrell & Weiser, *supra* note 27.

83. *See Layered Model*, *supra* note 8. For a detailed analysis of the FCC's "unregulation" policy, *see* OXMAN, *supra* note 38.

84. 47 U.S.C. § 153 (20), (43) (Supp. V 1999).

85. *See Layered Model*, *supra* note 8.

86. *See* Red Lion Broad. Co. v. FCC, 395 U.S. 367 (1969) (explaining "pervasiveness" rationale); FCC v. Pacifica Found., 438 U.S. 726 (1978) (upholding indecency regulation); Nat'l Broad. Co. v. United States, 319 U.S. 190 (1943) (authorizing content regulation on the basis of scarcity of spectrum)

87. Cable Television Consumer Protection and Competition Act of 1992, Pub. L. No. 102-385, 106 Stat. 1460 (codified in scattered sections 47 U.S.C. §§ 521-611 (Supp. V

layer. The interface, application, and logical layers are essentially ignored under the current statutory scheme. That is one reason issues such as open access are so troublesome. Most of the concerns about anti-competitive behavior by physical network owners concern leveraging that physical-layer dominance not just into content, but through the other layers in between.[88] There is no good way to analyze problems at the logical layer in a regime that does not acknowledge that layer exists.

Moreover, layer-violating activity does not necessarily proceed in one direction. The legacy regulatory structure, by treating the physical layer as the place to impose regulation, implies that layer is the necessary source of anti-competitive activity. While that is certainly a possible scenario, it is not the only one. The program access rules in the 1992 Cable Act, for example, were designed to prevent cable operators from using their dominance of certain high-value content to prevent competition at the physical layer, from competitors such as direct broadcast satellite providers[89]

The issues become even harder in the future. A company such as Microsoft could use its dominance of the operating system, an artifact of the interface layer, to exercise market power over both content above and everything below.[90] Or a company such as VeriSign, which controls key logical-layer assets associated with the domain name system and the ENUM protocol for translating between phone numbers and Internet addresses, could exert market power up and down from its leverage point.[91] There is simply no way to even analyze such competitive issues under the current communications policy framework. Neither Microsoft nor VeriSign controls any physical infrastructure. Neither is a carrier under any reasonable definition. Yet, under some scenarios, both could exercise a level of market power that raised the same public policy concerns as the physical layer carrier networks the Commission has long regulated.[92]

---

1993)).

88. The potential use of deep packet inspection at the logical layer is an example.

89. *See* John H. Barton, *The International Video Industry: Principles For Vertical Agreements And Integration*, 22 CARDOZO ARTS & ENT. L.J. 67 (2004). Similar concerns arise in the United Kingdom, where there have been accusations that Rupert Murdoch is using his control over valuable sports content to block competition by cable against his BSkyB satellite service. *See* Alex Salkever*, Microsoft: Your Next Phone Company?*, BUS.WK., March 2, 2004; Microsoft's Full-Court Broadband Press, TELECOM POLICY REPORT (Nov. 17, 2004), *available at* http://www.findarticles.com/p/articles/mi_m0PJR/VOIPis_44_2/ai_n7586312.

91. *See* Alex Salkever, *Microsoft: Your Next Phone Company?*, BUS. WK., March 2, 2004; *Microsoft's Full-Court Broadband Press*, TELECOM POLICY REPORT (Nov. 17, 2004), http://www.findarticles.com/p/articles/mi_m0PJR/is_44_2/ai_n7586312.

91. *See* Kevin Werbach, *The Microsoft of VOIP?*, VON MAG. (Feb. 2005), *at* www.vonmag.com/issue/2005/feb/columns/werbach.htm.

92. *See supra* pp. 67-68.

What is needed, therefore, is not just a layered model, but a way of thinking about telecommunications policy that doesn't presuppose a hard division between a regulated physical layer and everything else. In the "Ice Age" of telecommunications, through most of the 20th century, the physical layer was a reasonable proxy for the kind of market power that necessitated regulation. The competitive issues of today and the future, however, are different.

## III. THE CONNECTIVE LAYERS

### *A. Making the Connective Layers Primary*

Historically, communications policy has failed to acknowledge the connective layers. In fact, legacy communications regulation collapses the layered model entirely, by regulating applications (such as voice telephony and broadcast video) through differential treatment of physical-layer networks. This approach quickly breaks down when the same application (such as VoIP) runs on any transport platform. A less-obvious consequence of convergence, however, is the growing significance of the connective layers. When networks are no longer separated from one another, the key to seamless delivery of services is the connective tissue among networks, identity, and user experience.

A successful next-generation communications regulatory framework must incorporate effective targeting. In other words, law should concentrate on the most efficient leverage points for effecting public policy objectives. The silo model of regulation presupposes that physical infrastructure is the source of market power, and that high-level categorization decisions should trigger a laundry list of regulatory obligations. In both cases, the regulatory obligations involved may have been reasonable for the problem and market environment they were originally designed to address. Now, however, they create significant distortions and strong incentives for regulatory arbitrage.

The layered model reveals two critical leverage points—the connective layers – that have not traditionally factored into communications policy. Neither one does much of anything that users see. Yet, as discussed above, both are increasingly important competitive control points. In the silo model of regulation, the Commission is often forced either to regulate heavily or not at all. The open access debate is a good example. Because the issue was framed in terms of market power based on physical infrastructure, the issues before the FCC were whether to mandate physical layer network unbundling and mandatory interconnection with unaffiliated ISPs. The cable operators and their supporters understandably made the case that any such mandated open access would inevitably

force the Commission to establish regulated prices, terms, and conditions.[93] The return to such interventionist price regulation would have been at odds with the process of deregulation the Commission has undertaken for the past twenty years. By importing mandatory interconnection concepts from the telephone world, it also would have conflicted with the silo model and its embodiment in the Communications Act, under which different networks are subject to different rules and obligations.

So the Commission rejected open access. Only later has it become apparent that the real threat from closed broadband networks is not their ability to disadvantage unaffiliated ISPs, but instead is their ability to foreclose innovation and competition on top of the network. Open access was a case of horizontal foreclosure, involving two participants operating at the same layer. Even under such conditions, ISPs still have some alternatives, including interconnecting with DSL providers, using wireless to route around incumbent last-mile infrastructure entirely, and negotiating access arrangements privately.

More worrisome is the possibility of vertical distortions. When a company that dominates one layer of the broadband communications stack forecloses or disadvantages innovation at other layers, users lose out entirely. They simply cannot get the functionality they might otherwise receive, unless they can find a complete substitute for the competitive bottleneck. This makes network neutrality in many ways more critical than open access.[94]

When network operators provide their own applications and content, they do not necessarily crowd out competitors. Because the Internet is an open platform, their offerings can compete with those nonfacilities-based providers. Comcast can strike a deal with Barnes & Noble to refer customers to the BN.com online bookstore through its customer portal, but customers are always free to ignore that link and use their Web browser to go directly to Amazon.com. Even bundling of the higher-level offerings with the physical access doesn't necessarily raise competitive concerns. SBC's partnership with Yahoo! for DSL access and content, though apparently beneficial for both parties, hasn't foreclosed opportunities for innovation and competition by competitors at either level. Not so, however, if the connective layers are involved. If SBC's DSL service were bundled at the interface layer with Microsoft's Windows Media technology for rich media and digital rights management, it would create a roadblock to competing technologies.[95]

---

93. *See* James B. Speta, *Handicapping the Race for the Last Mile?: A Critique of Open Access Rules for Broadband Platforms*, 17 YALE J. ON REG. 39 (2000).

94. *See* Wu, *supra* note 78.

95. If SBC simply offered the Windows Media Player software to its customers, that

Moreover, a focus on the connective layers would reduce the aggregate level of regulation. Openness at these two key chokepoints would ensure sufficient competition to allow for less regulatory intervention at other layers. To take one example from the world of cellular telephony, Qualcomm owns key patents in a technology called Code Division Multiplexing (CDMA), which is used by many digital cellular networks. CDMA is proprietary, giving Qualcomm a powerful and lucrative position. Nonetheless, Qualcomm's dominance at the physical layer does not necessarily create the kind of market power that calls for regulation. Logical layer interconnection of mobile phone networks is open, thanks to standards-based telephone numbers and SS7 signaling networks. Application layer interconnection is also widely available. For example, roaming arrangements among SMS text messaging services and competing application software platforms such as Microsoft's Windows Mobile, Nokia's Series 60, PalmSource's PalmOS, Sun's Java J2ME, and Qualcomm's own BREW.

### *B. Historical Cases*

Although the FCC and other governmental entities haven't expressly acknowledged the layered nature of the networks they are addressing, they have at times taken steps targeted to the connective layers, in particular the logical layer. These actions have a mixed track record. A review of historical cases shows that delving deeply into the logical layer and directly organizing markets or protocols is dangerous, but policing the logical layer as a competitive boundary is generally effective.

#### 1. Network-attached equipment (Part 68)

Until 1968, AT&T and its affiliated telephone companies had provisions in their tariffs prohibiting "foreign attachments" to the network.[96] In other words, users could not plug into the network anything not specifically approved by the phone company. At the time, AT&T was the dominant monopoly provider of both local and long-distance phone service for the vast majority of Americans. The foreign attachment rules thus effectively prevented the creation of a third-party market for phone equipment such as telephone handsets. Customers could purchase only

---

would constitute applications layer functionality. Customers could always download and use competing media players. If, however, the media player and its associated digital rights management technology were embedded in the interface layer, it would be tightly coupled with the broadband access service itself. It might be difficult or impossible to use competing technologies.

96. Use of the Carterfone Device in Message Toll Telephone Services, *Decision*, 13 F.C.C.2d 420 (1968), *reconsideration denied*, 14 F.C.C.2d 571 (1968) [hereinafter Carterfone].

from AT&T's affiliated manufacturing arm, only on a monthly rental basis, with no ability to add additional features.

All that changed with the adoption of the FCC's *Carterphone* rules in 1968.[97] As recently as 1956, the FCC had upheld the use of the foreign attachment rules to prohibit the sale of the Hush-a-phone, a simple rubber cup that fit on a telephone receiver to provide greater privacy.[98] By 1968, however, the winds had shifted. Presented with the Carterphone, a device for patching wireline telephone calls into a two-way wireless radio connection, the Commission reversed its prior decision.[99] Not only did it find the Carterphone no threat to the phone network, it struck down all the foreign attachment provisions as anti-competitive. In their place, the FCC created the Part 68 rules, which governed the end-user phone equipment market for more than 30 years.[100]

The Part 68 rules are an example of interface-layer regulation. The FCC set the terms under which users and their "content" (speech) could connect to the voice application that defined the phone network. In fact, it was Part 68 that arguably created the interface layer in communications networks. Without it, everything up to and including the equipment at a user's premises was an extension of the physical network and its hidden logical interfaces. Once the connective interface layer was created through Part 68, the content and application layers followed. Only with a choice of equipment could users specify different applications or alternate forms of content.

Part 68 was thus a success story for regulation of the interface layer. Two characteristics of the FCC's action stand out: it was user-empowering, and it involved clear guidelines and well-understood technical standards. Part 68 intervened in the logical layer to give users more choices, and to create more opportunities for manufacturers selling to those users. It expanded opportunities rather than reducing them. Furthermore, Part 68 was implemented in a way that minimized possibilities for confusion and regulatory gamesmanship. The rules themselves included technical drawings to assist would-be equipment vendors. The standards for connecting equipment were derived from existing internal

---

97. *See id.*

98. *See* Hush-A-Phone Corp. v. United States, 238 F.2d 266, 268 (D.C. Cir. 1956). The Commission's – and AT&T's – rationale was that the Hush-a-Phone could slightly distort the sound that the other party in the conversation heard. This was considered "harm to the network," equivalent to electrical manipulation that could injure phone company personnel or damage phone company equipment.

99. *See* Carterfone, *supra* note 96.

100. In 2000, the FCC found there was no need for the government to continue to manage the technical standards for phone equipment, because the market was sufficiently robust and competitive. Therefore, it devolved its authority to a private standards body. *See* 2000 Biennial Regulatory Review of Part 68 of the Commission's Rules and Regulations, *Report and Order*, 15 FCC Rcd. 24,944 (2000).

AT&T interfaces, preventing any requirement of network re-engineering. Manufacturers could use a streamlined process, largely involving self-certification, to put their products into the market. And Part 68 replaced the blanket prohibitions in the foreign attachment tariff provisions with a limited set of conditions that would justify rejection of a device – primarily direct physical harm to phone company employees or equipment.[101]

Part 68 made possible a network equipment business that today generates billions of dollars in annual revenues. Even more important, it opened up the possibility of attaching devices to the phone network that offered new and different functionality. Fax machines, answering machines, and computer modems are all children of Part 68.[102] The consumer Internet could not have happened if users didn't have the ability to attach devices to their telephone lines that transformed the phone network into a channel for data communications.

### 2. The Computer Inquiries

The *Computer III* rules are another example of successful regulation of the connective layers. The FCC's *Computer Inquiry* line of proceedings began in the late 1960s and continues to this day.[103] *Computer I* created an initial, flawed model for the treatment of computer processing functions in the phone network.[104] *Computer II* established a new framework that distinguished unregulated "enhanced services" from the regulated "basic services" the phone companies provided.[105] This division was, in an unacknowledged way, the FCC's first foray into layered policy-making. Essentially, the basic/enhanced distinction tracked the division between the content, interface, and application layers on one side, and the logical and physical layers on the other. Network operators could not use their control over the lower layers to preclude competition at the higher layers, nor would the FCC impose the same regulatory obligations on companies operating at the higher levels as it traditionally had on phone companies.

*Computer II* imposed "structural separation" of enhanced services

---

101. 47 C.F.R. §§ 68.1-.506 (2005).

102. *See* Tim Wu & Lawrence Lessig, *Ex Parte Submission in CS Dkt. No. 02-52* (2003), http://faculty.virginia.edu/timwu/wu_lessig_fcc.pdf.

103. *See* Cannon, *supra* note 37.

104. Regulatory and Policy Problems Presented by the Interdependence of Computer and Communication Services and Facilities, *Final Decision and Order*, 28 F.C.C.2d 267 (1971). *Computer I* failed because it presumed most services could be divided into pure communications or pure data processing, a division that became untenable as computer processing became an integral element of virtually all communications functions.

105. Amendment of Section 64.702 of the Commission's Rules and Regulations (Second Computer Inquiry), *Final Decision*, 77 F.C.C.2d 384 (1980).

provided by the incumbent Bell Operating Companies.[106] They could only offer enhanced services through wholly separate subsidiary companies, through arms-length relationships, in order to safeguard against anti-competitive behavior. *Computer III* left the basic framework in place, but shifted to non-structural safeguards such as Comparably Efficient Interconnection (CEI), which required phone companies to document and make available to competitors any basic services they used for their own enhanced services.[107]

Just as Part 68 helped make the Internet possible by giving users the opportunity to connect data communications devices to the network, *Computer III* did the same by giving Internet service providers the opportunity to route their data traffic easily over the phone network.[108] Where Part 68 operates at the interface layer, the *Computer III* rules work at the logical layer, ensuring that applications are able to work across existing physical networks. The *Computer III* rules, like Part 68, are credited for spurring innovation and competition. However, because *Computer III*'s non-structural safeguards involve a great deal of complexity and ongoing FCC management of interconnection terms, the implementation road has been bumpier. The courts have vacated and remanded some of the FCC's implementation decisions for not providing sufficient justification.[109]

The Commission experienced even greater difficulty with Open Network Architecture (ONA), which was supposed to be the follow-on to *Computer III*'s safeguards.[110] With ONA, the FCC envisioned breaking up the telephone network into modular components. Phone companies would make new modules available on request by independent enhanced service providers, with a private process available to resolve potential technical disputes. The ONA vision was, in short, to turn the phone network into a truly modular system.[111] It represented a bold effort to re-architect the telecom industry through an open logical layer, which would be the entry point for new innovations and competitive opportunities.

---

106. *See id.*

107. Amendment of Sections 64.702 of the Commission's Rules and Regulations (Third Computer Inquiry), *Report and Order*, 104 F.C.C.2d 958 (1986); Computer III Further Remand Proceedings: Bell Operating Company Provision of Enhanced Services, *Order*, 14 FCC Rcd. 21,628 (1999) [hereinafter Computer III Further Remand Order].

108. *See* Cannon, *supra* note 37.

109. *See* California v. FCC, 39 F.3d 919, 933 (9th Cir. 1994), *cert. denied*, 514 U.S. 1050 (1995). Specifically, the court found the FCC had not sufficiently justified the elimination of Computer II structural safeguards.

110. *See* Computer III Further Remand Order, *supra* note 107, ¶ 8 n.17 (defining ONA).

111. *See* BALDWIN & CLARK, *supra* note 25.

ONA never really got off the ground.[112] It was an inspiring vision, but in practice implementation was a nightmare. Phone companies rejected requests for new modules, claiming excessive technical and economic burdens relative to the demand level. Enhanced service providers felt the phone companies were stonewalling, deliberately frustrating the FCC's intentions. Both sides went back to the Commission, seeking clarifications and modifications. In the end, although the phone companies did file the required ONA plans and make some changes to their network architecture, the vision of a modular phone network was never realized.

The lesson here is that regulation that requires detailed supervision and technical implementation may not be worth it, even when the objective of that regulation is worthwhile. Many of the benefits expected from ONA are starting to be realized today through VoIP, which generally operates at the higher application layer, independent of the network operators. The phone network is indeed advancing towards a more modular system, but it is happening more gradually, based on economic decisions of the network providers.

The problem with the fully modular ONA vision is that it sounds to phone companies much the way Napster sounds to record companies. If everything is broken up, modularized, standardized, and commoditized, the traditional opportunities for revenue generation and competitive differentiation go away. The fact that end-users pay less in a world where infrastructure providers make no money is cold comfort for those infrastructure providers. They can be expected to fight any effort perceived to put them in that position, not just at the FCC, but in implementation.

### 3. Numbering and Addressing

A final example of existing regulation in the connective layers is numbering. Phone numbers are the identity mechanism of the legacy telephone network. Numbers are subject to a technical standard, E.164, and to overlapping national, supra-national, and international regulatory mechanisms.[113] The FCC oversees the process of assigning numbers in the US, under a regional organization called the North American Numbering Plan.[114] At the highest level, the International Telecommunications Union (ITU), a UN agency, defines global numbering policy

---

112. *See* Chris L. Kelley, Comment, *The Contestability of the Local Network: The FCC's Open Network Architecture Policy*, 45 FED. COMM. L.J. 89 (1992).

113. International Telecommunication Union Telecommunications Standardization Sector ("ITU-T"), *ITU-T Recommendation E.164, The International Public Telecommunication Numbering Plan* (1997), *at* http://www.itu.int/itudoc/itu-t/rec/e/e164.html.

114. *See* Telephone Number Portability, *First Report & Order & Further Notice of Proposed Rulemaking*, 11 FCC Rcd. 8352, 8358 (1996).

through its governmental members.

Numbering sounds like a mundane and mechanical area. In reality, it raises a host of important policy issues. Without a number, a connection to the phone network is meaningless. Numbers as standard, unique identifiers make it possible for any new phone subscriber to connect to any other subscriber anywhere, regardless of service provider or location. There are, however, only so many valid phone numbers. Exhaustion of available numbers in an area forces either an overlay of a new area code – which creates confusion since neither code has a unique geographical location – or a split of the existing area code, which forces a large number of subscribers to change their phone numbers. Both steps are thus controversial, and raise competitive concerns. Moreover, numbers are valuable as advertised contact points for businesses. Yet, technically, subscribers do not own phone numbers.[115] The numbers are a public resource, managed by carriers and loaned to subscribers.

Finally, numbers are a source of competitive lock-in. If you have to change your phone number in order to switch carriers, you will be much less likely to switch. For that reason, the FCC required long-distance number portability (known as "equal access") when it implemented the AT&T breakup, and the 1996 Communications Act required local number portability to enable competition for local phone service.[116] The Commission has also recently supervised the implementation of wireless number portability for mobile phone carriers.[117]

The hidden difficulties of number assignment became apparent when toll-free "800" numbers came near exhaustion. AT&T developed toll-free calling in 1967, and it was a huge hit. Today, toll-free calls represent more than half of US long-distance traffic.[118] By 1995, almost all the available 800 numbers had been assigned. The FCC established a process to open up a series of new toll-free area codes, starting with 888.[119] The problem was that many businesses associated their brands and goodwill with their 800 numbers, either through the number itself, or through a mnemonic association such as 1-800-FLOWERS. A company that spent millions of dollars building brand equity in its phone number, and seeing it as a key intangible asset, wouldn't take kindly to

---

115. *See* Toll Free Service Access Codes, *Notice of Proposed Rulemaking*, 10 FCC Rcd. 13,692, 13,702 (1995); Burris v. S. Cent. Bell Tel. Co., 540 F. Supp. 905, 908 (S.D. Miss. 1982).

116. *See* Telephone Number Portability, *supra* note 114, at 8354.

117. *See* Telephone Number Portability, *Memorandum Opinion & Order & Further Notice of Proposed Rulemaking*, 18 FCC Rcd. 23,697, 23,698 (2003).

118. Toll-Free Numbers FAQ, *at* http://www.whoscalling.com/cmm_tollFree_FAQ.php.

119. *See* Toll Free Service Access Codes, *Second Report & Order & Further Notice of Proposed Rulemaking*, 12 FCC Rcd. 11,162 (1997).

some other business obtaining the equivalent 888 number. So the FCC created a process to allow businesses with valuable numbers to free the equivalent number in the new area code.[120] This limited the new numbers that became available. Not surprisingly, it created incentives for companies to claim that their numbers were valuable even if they really weren't. Although the new toll-free codes eventually launched, the process was fraught with difficulty.[121]

The next frontier of numbering is the convergence of telephone numbers with Internet identifiers. Addressing on the Internet works differently than on the phone network. Instead of a single telephone number, users have multiple identifiers for different purposes. A single user might have several email addresses, an instant messaging screen name, a website domain name, and a numeric Internet Protocol (IP) address dynamically assigned to his or her computer at each Internet log-in. Many of those addressing systems are privately managed, or based on compliance with open technical standards. The domain name system (DNS), however, is subject to a contentious governance mechanism.[122]

The DNS was originally managed by a private company under contract with the National Science Foundation, back in the days when the Internet was a non-profit research network.[123] Later, the US government established a quasi-private international governance organization called the Internet Corporation for Assigned Names and Numbers (ICANN).[124] ICANN oversees the difficult processes of creating new top-level domain names, resolving disputes over the proper ownership of individual domain names, ensuring the system's reliability, and addressing other policy issues that get dragged into the discussion.

The details of ICANN challenges and failings have been amply discussed elsewhere.[125] Yet perhaps ICANN's greatest challenge lies in the future. With the growth of VoIP, the phone network and the Internet

---

120. *See* Diana Lock, Comment, *Toll-Free Vanity Telephone Numbers: Structuring a Trademark Registration and Dispute Settlement Regime,* 87 CALIF. L. REV. 371, 378 (1999).

121. *See id.*

122. IP addresses also require some governance. Because they are subject to greater technical constraints and do not raise the intellectual property and branding issues that domain names do, however, those governance issues have been much less significant than for domain names.

123. *See* MILTON L. MUELLER, RULING THE ROOT: INTERNET GOVERNANCE AND THE TAMING OF CYBERSPACE 10 (2002); Michael Froomkin, *Wrong Turn in Cyberspace: Using ICANN to Route Around the APA and the Constitution*, 50 DUKE L.J. 17, 21-22 (2000); Jonathan Weinberg, *ICANN and the Problem of Legitimacy*, 50 DUKE L.J. 187, 198 (2000).

124. *See* MUELLER, *supra* note 123, at 3; Froomkin, *supra* note 123, at 209; Weinberg, *supra* note 123, at 20*;* Susan P. Crawford, *The ICANN Experiment,* 12 CARDOZO J. INT'L & COMP. L. 409, 413 (2004).

125. *See* MUELLER, *supra* note 123; Froomkin, *supra* note 123; Weinberg, *supra* note 123.

are coming together. Today, VoIP providers can create their own private online addresses, but they cannot directly assign E.164 phone numbers. To allow calls to and from phone numbers, they must interconnect with a carrier that controls numbering resources, and translate their VoIP traffic onto or off the public switched telephone network. A protocol called ENUM, for electronic numbering, promises to streamline that process. It would directly map between IP addresses and phone numbers.[126] And it wouldn't stop there. The ENUM system involves a database lookup every time an ENUM identifier is invoked.[127] That database lookup can retrieve other information beyond the simple voice/data translation. For example, a user's ENUM record could contain all that user's network identifiers, along with instructions about which of those identifiers to make available to others. The ENUM record could also be used for advanced call routing, allowing a user to specify parameters for which contact mechanism will be used under which circumstances.

All well and good. The problem with ENUM is that it raises all the challenges of domain names, and then some. Because ENUM bridges the gap between Internet addresses and phone numbers, it gives governments that want a greater role in Internet regulation a hook to become involved.[128] If ENUM is a successor to E.164 phone numbers, they argue, the governmental organizations and processes that hold sway for E.164 should apply to ENUM. Though the FCC has so far shied away from the ENUM debate, expressing an unwillingness to dive to far into the murky realm of Internet governance, it will inevitably be dragged in. That makes it all the more important for the FCC to think through its approach toward regulation of the connective layers.

## IV. HOW TO BREAK THE ICE

Both the legacy regulatory system and the legacy business models for the industry encouraged segregation and metering of traffic in ways that are increasingly unsustainable in a converged world. Not only does a layered framework help to diagnose these problems, it points the way toward solutions.[129] Below, I describe some of the impending conflicts

---

126. *See* Craig McTaggart, *The ENUM Protocol, Telecommunications Numbering, And Internet Governance*, 12 CARDOZO J. INT'L & COMP. L. 507, 509 (2004); Anthony M. Rutkowski, *The ENUM Golden Tree: The Quest For A Universal Communications Identifier* (2001), *available at* http://www.ngi.org/enum/pub/info_rutkowski.pdf; Robert Cannon, *ENUM: The Collision of Telephony and DNS Policy*, *in* COMMUNICATIONS POLICY AND INFORMATION TECHNOLOGY (Lorrie Faith Cranor & Shane Greenstein eds., 2002).

127. The technical architecture is similar to that of domain names.

128. *See* McTaggart, *supra* note 126.

129. For example, Solum and Chung derive a set of principles from the layered model, including disfavoring layer-violating regulation and targeting regulatory intervention to the appropriate layer. *See* Solum and Chung, *supra* note 38.

arising at the connective layers, and suggest how to extend the focus on these critical areas into affirmative policy reforms.

### *A. The Interface Layer*

The interface layer is the first major phase transition, where content meets networks. In the argot of network engineers, content is fundamentally "data at rest:" information accessed at a single location. The user experience of listening to a CD playing locally on your computer, an MP3 music file that was downloaded over the Internet, and a streaming audio file that is delivered across the network as you listen to it, is basically the same. What you as the user care about is the music, not how it got there. How it gets there, however, is precisely the function of the network. The interface layer turns content into "data in motion," capable of being transmitted in real-time or asynchronously across the global network.

There are two major public policy issues arising today at the interface layer: privacy and digital access controls.

The "content" delivered through digital networks is not just commercial broadcast programming, such as Hollywood feature films and television shows. Converged digital networks are bidirectional, allowing users to send as well as receive content. Many people use the Internet to share digital photos, send email or instant messages, and operate Websites. Going forward, VoIP and video (both live webcam transmissions and pre-recorded video mail) will be an increasingly significant share of traffic.[130] Moreover, even when they aren't sending content of their own, users often send important personal information such as credit card numbers over the network. Privacy and security are thus important considerations. For the most part, such questions are in the purview of the Federal Trade Commission rather than the FCC.

Digital access controls address the opposite problem: instead of how to secure the user's content through the network, they try to secure the content the user receives by preventing unauthorized use or redistribution through digital access controls, and in particular digital rights management. The FCC has waded into this mire with its Broadcast Flag proposal.[131] Under pressure from content owners, who argued that they

---

130. *See* Kevin Werbach, *The Implications of Video P2P on Network Usage*, *in* VIDEO PEER TO PEER, Columbia Institute for Tele-Information (forthcoming 2005), *available at* http://werbach.com/docs/VideoP2P.pdf. Already 35 percent of overall Internet traffic is estimated to be associated with BitTorrent, the most popular video peer-to-peer technology. *See* Andrew Parker, *The True Picture of Peer-to-Peer Filesharing*, *at* http://www.cachelogic.com/press/CacheLogic_Press_and_Analyst_Presentation_July2004.pdf.

131. *See* Digital Broadcast Content Protection, *Report & Order & Further Notice of Proposed Rulemaking*, 18 FCC Rcd. 23,550 (2003).

would not make digital programming available without assurances that receivers would be capable of enforcing DRM, the FCC adopted rules mandating that all devices capable of receiving digital television transmissions incorporate a so-called "Broadcast Flag."[132] Devices capable of receiving over-the-air digital television streams would have to incorporate technology that recognized and obeyed embedded right management instructions in the stream itself.

The broadcast flag is a classic interface layer issue. What sorts of legally-mandated restrictions should be interposed between content and the applications that process that content? Yet because the current structure of telecom law doesn't expressly incorporate a layered model, let alone one that recognizes the existence of connective layers, the Commission was forced to cast in the dark for justifications. And in the end, the District of Columbia Circuit Court of Appeals concluded that the Commission did not have sufficient legal authority for its actions.[133]

A legal and regulatory framework that surfaces the interface layer would not necessarily provide greater justification for the Commission's broadcast flag decision. On the contrary, a layered analysis could well provide a more direct route to the conclusion that such rules are a harmful roadblock to connectivity between two network layers, with spillover effects far beyond the intended problem. The value of the layered approach is that it focuses the debate on these issues, allowing policymakers to weigh the proper pros and cons before moving forward. It also emphasizes the value of open connectivity to the network as a whole.

### *B. The Logical Layer*

The logical layer is the point of demarcation between systems that talk to the network and systems that talk to users. It is also the point that transforms streams of bits passing between machines into information moving to and from people. This is because the logical layer includes addressing and routing functions which associate traffic with individuals and their devices at the edges of the network. To the extent the logical layer has been regulated in the past, it is through the management of telephone numbers, as discussed below, and law enforcement access. Under the Communications Assistance to Law Enforcement Act (CALEA), telephone companies are required to modify their digital networks to facilitate authorized wiretapping by law enforcement.[134] Recently, the FBI has expressed concern that VoIP calls might not be sub-

---

132. *See id.;* Susan P. Crawford, *The Biology of the Broadcast Flag,* 25 HASTINGS COMM. & ENT. L.J. 603 (2003).

133. Am. Library Assoc. v. FCC, 406 F.3d. 689, 708 (D.C.Cir. 2005).

134. 47 U.S.C. §§ 1001-1021 (2000).

ject to CALEA, and has strongly urged the FCC to bring VoIP within the law's scope.[135] In August, the FCC tentatively concluded that "managed" VoIP and broadband access services are subject to CALEA obligations.[136]

Like the interface layer, the logical layer seems bound to play a greater role in communications policy in the future. Until recently, it has been difficult for any company to turn the logical layer into a point of control because of the way the Internet works. Unlike the circuit-switched phone network, the Internet employs packet switching. Traffic is broken up into small chunks and reassembled at the receiving end.[137] There is no necessary distinction between one kind of traffic and another. Thus, a packet carrying a tiny snipped of a voice conversation looks essentially identical to a packet carrying a snippet of a Web page or music file. The opacity of Internet traffic can be accentuated through encryption, which hides the content of packets from anyone except the intended recipient. Furthermore, applications can make traffic identification more difficult by shifting port numbers and other technical parameters.[138] This last technique is especially common for peer-to-peer file-sharing applications, which seek to avoid interference by both content owners fighting copyright violations and service providers facing huge bandwidth utilization. Even when traffic can be identified, the sheer speed of transmissions across network backbones makes it technically challenging to classify traffic flows while they are actually moving across the network.

A new technology called deep packet inspection promises to overcome some of these limitations.[139] Deep packet inspection uses specialized high-speed hardware and software that can identify packets in real-time. A service provider could use deep packet inspection to distinguish peer-to-peer traffic, or even just traffic from a single peer-to-peer file-sharing application, and either block it or reduce its available bandwidth. Without deep packet inspection, service providers and others could only resort to crude application-level techniques, such as cutting off all streaming video clips using standard formats after a certain time.[140]

---

135. *See* Department of Justice, Federal Bureau of Investigation, and Drug Enforcement Administration, *Joint Petition for Expedited Rulemaking*, RM 10,865, (March 10, 2004), *available at* http://www.askcalea.com/docs/20040310.calea.jper.pdf.

136. *See* Communications Assistance for Law Enforcement Act and Broadband Access and Services, *Notice Of Proposed Rulemaking & Declaratory Ruling*, 19 FCC Rcd. 15,676, 15,677 (2004).

137. *See* DIGITAL TORNADO, *supra* note 2.

138. *See* Werbach, *supra* note 130.

139. *See* id.

140. This is in fact what early cable broadband provider @Home did. *See* Lemley & Lessig, *supra* note 70, at 393.

Deep packet inspection allows true logical-layer control based on ownership of the physical layer.

Service providers may deploy deep packet inspection gear for several reasons.[141] With peer-to-peer applications representing more than half of the total traffic on the Internet,[142] broadband service providers have incentives to limit those applications' bandwidth utilization. Separately, the FCC's CALEA proposal would require network owners to facilitate wiretapping of VoIP calls. Deep packet inspection could make that easier to accomplish, by isolating VoIP traffic flows. Cisco recently paid $200 million to acquire P-Cube, a deep packet inspection startup, indicating the level of interest in the potential market for such technology.[143]

CALEA implementation and traffic peer-to-peer shaping are relatively innocuous uses of deep packet inspection, at least from a competition policy standpoint. Once these devices are installed in the network, however, they can be employed for entirely different purposes. Segmenting applications at the logical layer could allow broadband providers to either block or degrade independent application and content providers. In particular, deep packet inspection could be employed against third-party VoIP providers.[144] Network owners have incentives to favor their own VoIP offerings, which they can promote as offering higher quality than competitors.[145] An indication of the attitude that operators harbor toward independent VoIP providers was suggested in mid-2004, when a P-Cube executive told *Barron's* that VoIP services "raped" cable broadband networks.[146]

### *C. By the Numbers*

In addition to policing the connective layers, the FCC could use numbers as an affirmative basis for a new policy approach. A number-based approach would be particularly valuable for addressing the thorny challenge of universal service. As noted at the outset, the perceived need to preserve universal service subsidy flows is a significant factor propping up the anachronistic geographic- and minutes-based structure of the telecom industry. Moreover, so long as new forms of competition and innovation are seen as a threat to the stability of universal service subsi-

---

141. *See* Werbach, *supra* note 130.

142. *See* Parker, *supra* note 131.

143. *See Cisco Systems to Acquire P-Cube, Inc.,* BUS. WIRE, Aug. 23, 2004, (LEXIS, News Library).

144. *See* Nuvio, Corp., *Notice of Written Ex Parte Presentation in IP-Enabled Services*, WC Dkt. No. 04-36, filed Sept. 13, 2004, *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516483690.

145. *See* Wu and Lessig, *supra* note 103.

146. Eric J. Savitz, *Talk Gets Cheap*, BARRON'S, May 24, 2004, at 19.

dies, there will be calls to regulate those innovations first and ask questions later.[147]

One basic problem is that universal service contribution rates are currently derived from minutes of use. This metric makes no sense in an Internet environment, because the Internet does not tie up specific resources for defined periods of time. Moreover, a minutes-based system either requires all VoIP traffic to be tracked and metered in order to facilitate collection of universal service subsidies, or it faces a downward spiral as traffic leaks out into VoIP networks. Already, because access lines are falling, universal service surcharges have increased substantially.[148]

An alternative approach is to impose universal service contributions not on networks, but on numbers. When a user signs up for a phone number, or to renew an existing number, he or she would pay an annual fee, which would be used to fund subsidy programs for high-cost areas. The arrangement would resemble the current process of obtaining an Internet domain name. Users would gain limited property rights in the numbers they use, but would have to pay to maintain their rights.

Such an approach would provide a stable foundation for universal service funding, because it would make no distinction between circuit-switched and VoIP calls. Any connection involving a phone number would pay in. On the other hand, connections to private services using their own identifiers would not be subject to universal service contribution obligations. Few users will give up the ability to receive calls from the two billion or so E.164 phone number users, which dwarfs any private VoIP or IM service.

If, over time, users start to migrate away from phone numbers, the FCC has two options. It can bring the largest addressing systems into the universal service funding pool. Or, it can decide that, with phone service now decisively changed from a service tied to the physical layer into an application for broadband connections, the justification for physical-layer subsidy flows has been eroded. By drastically reducing the cost of voice communication, VoIP may also reduce the need for subsidies to keep prices in rural areas at affordable levels. Perhaps there will remain a need to subsidize local broadband access in rural areas. Any such subsidy program, however, can and should be distinguished from an effort to en-

---

147. *See* Jonathan Weinberg, *The Internet and "Telecommunications Services," Universal Service Mechanisms, Access Charges, and Other Flotsam of the Regulatory System*, 16 YALE J. ON REG. 211 (1999). A good example of this dynamic was the effort by Senator Ted Stevens, then chairman of the Senate Appropriations Committee, to pressure the FCC to regulate VoIP, out of concern about universal service subsidies. *See Layered Model*, *supra* note 8.

148. *See* Donny Jackson, *Universal Concerns*, TELEPHONY (Dec. 13, 2004), *available at* http://telephonyonline.com/mag/telecom_universal_concerns/index.html.

sure universal deployment of basic telephone connections.

Beyond universal service, numbers could be used a dividing line for other regulatory obligations. Rather than engage in a metaphysical debate about the nature of "telecommunications" and "information services," the FCC could use a bright line test. Either a service incorporates E.164 phone numbers, or it doesn't. Furthermore, by raising the profile of numbering in its regulatory calculus, the FCC would be in a better position to address the significant logical-layer questions that are likely to come before it in the near future.

## CONCLUSION

Whichever direction telecom policy goes in the years ahead, the status quo is not a satisfactory option. The industry and its underlying technology have changed too dramatically to function under a regulatory paradigm that traces its history directly back to the 1800s. Following the spectacular boom and equally spectacular crash between 1998 and 2002, the telecom world is continuing to gradually warm up. New technologies such as VoIP and peer-to-peer video are changing the way networks are used, and new competitive lines are being drawn among the providers of those networks. Through this process, the old silo approach to regulation is melting away.

The layered model provides a fresh way of thinking about telecom policy. It is perhaps most useful in framing questions, helping policymakers identify hidden tension points and giving them a better vocabulary to craft solutions. As telecom comes to a boil, the challenge is to use the layered model as a framework for a new policy agenda. That agenda should start with the interface and logical layers. They ought to be the centerpieces of 21st century communications policy, just as restraining the exercise of market power based on control of the physical layer was the dominant theme in the last century.

# COMMUNICATIONS' COPYRIGHT POLICY

MOLLY SHAFFER VAN HOUWELING*



* Acting Professor of Law, University of California, Berkeley (Boalt Hall). Thanks to Philip J. Weiser for his helpful comments and for inviting me to explore these ideas at the Silicon Flatirons Telecommunications Program's 2005 conference on "The Digital Broadband Migration: Rewriting the Telecom Act." Thanks to Tim Wu, whose work inspired this essay. *See* Tim Wu, *Copyright's Communications Policy*, 103 MICH. L. REV. 278 (2004). Wu explores copyright law's under-recognized role in regulating competition between rival disseminators of creative works. Here, I begin to explore the flip side of this relationship—the FCC's role in promoting creativity. *See generally* Jonathan Weinberg, *Digital TV, Copy Control, and Public Policy*, 20 CARDOZO ARTS & ENT. L.J. 277 (2002) (also exploring the intersection between copyright and communications policy). And thanks to Kenneth A. Bamberger, Julie E. Cohen, Susan Crawford, Alison A. Minea, Robert P. Merges, Howard A. Shelanski, Robert P. Van Houweling, Fred von Lohmann, and Jonathan L. Zittrain for their insightful comments.

## INTRODUCTION

The legal treatment of technologies designed to prevent unauthorized uses of creative works—often referred to as "technological protection measures" (TPMs)—has been one of the most controversial issues in copyright policy over the past decade.[1] The Federal Communications Commission (FCC or Commission) boldly but futilely attempted to enter this fray with its 2003 "Broadcast Flag" Order, which aimed to require and regulate the deployment in consumer electronics equipment of technologies designed to control redistribution of broadcast digital television programming.[2]

The Court of Appeals for the District of Columbia Circuit recently invalidated the Order on jurisdictional grounds.[3] But despite the demise of the Broadcast Flag Order itself, this episode raises what is likely to be a recurring question: What role, if any, should the FCC play in regulating TPMs?[4] More broadly, should Communications meddle in copyright?

To many FCC critics, the answer is clearly *no*: the FCC has no proper role in the regulation of TPMs or in copyright policy more

---

1. The role of technological protection of creative works has not captured the public's attention to the degree that some other recent copyright controversies have (especially those involving unauthorized distribution of copyrighted works using peer-to-peer technology). But the issue has attracted exhaustive treatment by copyright scholars. For a sampling, *see* JESSICA LITMAN, DIGITAL COPYRIGHT (2001); LAWRENCE LESSIG, CODE AND OTHER LAWS OF CYBERSPACE (1999); Stefan Bechtold, *Digital Rights Management in the United States and Europe*, 52 AM. J. COMP. L. 323 (2004); Yochai Benkler, *An Unhurried View of Private Ordering in Information Transactions*, 53 VAND. L. REV. 2063 (2000); Dan L. Burk & Julie E. Cohen, *Fair Use Infrastructure for Rights Management Systems*, 15 HARV. J.L. & TECH. 41 (2001); Pamela Samuelson, *Intellectual Property and the Digital Economy: Why the Anti-Circumvention Regulations Need to Be Revised*, 14 BERKELEY TECH. L. J. 519 (1999); Tom W. Bell, *Fair Use vs. Fared Use: The Impact of Automated Rights Management on Copyright's Fair Use Doctrine*, 76 N.C.L. REV. 557 (1998); Julie E. Cohen, *Lochner in Cyberspace: The New Economic Orthodoxy of "Rights Management,"* 97 MICH. L. REV. 462 (1998); Margaret Jane Radin & R. Polk Wagner, *The Myth of Private Ordering: Rediscovering Legal Realism in Cyberspace*, 73 CHI.-KENT L. REV. 1295 (1998); Joel R. Reidenberg, *Lex Informatica: The Formulation of Information Policy Rules Through Technology*, 76 TEX. L. REV. 553, 566-68 (1998).

2. Digital Broadcast Content Protection, *Report and Order and Further Notice of Proposed Rulemaking*, 18 FCC Rcd. 23,550 (2003) [hereinafter Broadcast Flag Order].

3. American Library Ass'n v. FCC, 406 F.3d 689 (D.C. Cir. 2005).

4. Supporters of the broadcast flag approach hope it will be revived by congressional action. *See*, *e.g.*, Declan McCullagh, *Politicians Want to Raise Broadcast Flag*, ZDNET NEWS, Sept. 30, 2005, *at* http://news.zdnet.com/2100-9595_22-5886722.html (describing lobbying efforts by the Motion Picture Association of America); National Ass'n of Broadcasters President and CEO Edward O. Fritts's Statement in Response to "Broadcast Flag" Decision (May 6, 2005), *at* http://www.nab.org/Newsroom/PressRel/Statements/050605BroadcastFlag.htm ("We will work with Congress to authorize implementation of a broadcast flag that preserves the uniquely American system of free, local television.").

generally.[5] In this essay I take a more equivocal view. Although the Broadcast Flag Order was flawed—substantively as well as jurisdictionally—its failure does not necessarily suggest that the FCC cannot play a useful role in this area. Some regulation of TPMs may in fact be an important component of balanced copyright policy and the FCC has expertise that it might usefully contribute to this regulatory task.

Specifically, regulation may be justified to constrain TPMs that threaten the copyright balance by limiting behavior that copyright law privileges, especially in circumstances where market constraints on TPMs are weak. Although the Broadcast Flag Order was aimed primarily in the opposite direction—at imposing a TPM scheme that might otherwise not have existed—the Order also hinted at the idea that some overreaching TPMs should be proscribed. The FCC implemented this idea more fully in its little-noted 2003 "Plug and Play" Order, which regulated TPMs in a context—cable and satellite television—in which relying on the market to constrain TPMs is especially problematic.

I begin in Part I by describing TPMs and the FCC's failed attempt to mandate and regulate them in the Broadcast Flag Order. In Part II, I explain why, notwithstanding the failure of that Order, regulation of TPMs may sometimes be a necessary element of balanced copyright policy; in fact, elements of the Broadcast Flag Order and (more so) the Plug and Play Order illustrate the useful role that government can play in restraining TPMs that threaten the copyright balance, especially where market constraints on TPMs are ineffective. In Part III, I explain how the FCC's expertise is relevant to the task of assessing TPMs and the market conditions in which they arise, and to regulating TPMs where regulation is warranted. Part IV returns to the specifics of the Broadcast Flag Order, suggesting how a revised order could guard the copyright balance in yet another way.

---

5. *See*, *e.g.*, Petitioner's Opening Brief at 20, American Library Ass'n, 406 F.3d 689 (No. 04-1037), *available at* http://www.publicknowledge.org/pdf/bf_filing_100404.pdf (describing copyright law as "a domain clearly not [the FCC's] own"); *cf.* Declan McCullagh & Milana Homsi, *Leave DRM Alone: A Survey of Legislative Proposals Relating to Digital Rights Management Technology and Their Problems*, 2005 MICH. ST. L. REV. 317 (arguing against any government regulation of TPMs). *But see* John M. Williamson, *Rights Management in Digital Media Content: Case for FCC Intervention in the Standardization Process*, 3 J. TELECOMM. & HIGH TECH. L. 309 (2005) (arguing that the FCC should intervene in the TPM standard-setting process); Chad Woodford, Comment, *Trusted Computing or Big Brother? Putting the Rights Back in Digital Rights Management*, 75 U. COLO. L. REV. 253, 291-300 (2004) (proposing that Congress authorize the FCC to regulate TPMs).

# I. TECHNOLOGICAL PROTECTION AND THE BROADCAST FLAG ORDER

## *A. Copyright, Technological Protection Measures, and Anti-Circumvention Law*

Copyright law proscribes certain unauthorized uses of creative works. It prohibits, for example, the unauthorized reproduction of a book until 70 years after the death of its author.[6] This prohibition is enforced ex post—through lawsuits against alleged infringers.[7] But use of creative works can be controlled ex ante as well, by technologies that constrain user behavior.

The content industry has worked with technologists to develop such tools as encryption methods and other types of TPMs designed to control use of creative works. For example, the motion picture industry has adopted the Content Scrambling System (CSS), a TPM that involves encrypting movie files and licensing decryption technology only to manufacturers of DVD players that do not permit the files to be copied.[8] Content industry representatives claim that CSS and other TPMs are important components of their efforts to prevent copyright infringement.[9]

The Clinton administration endorsed emerging TPM efforts in its 1995 report on Intellectual Property and the National Information Infrastructure.[10] Congress reinforced TPMs by prohibiting

6. 17 U.S.C. § 102 (2005) (subject matter of copyright); 17 U.S.C. § 106 (2005) (copyright holders' exclusive rights); 17 U.S.C. § 302 (2005) (duration of copyrights).

7. 17 U.S.C. § 501 (2005).

8. CSS (and its ultimate circumvention) is described in more detail in Universal City Studios, Inc. v. Reimerdes, 111 F.Supp.2d 294 (S.D.N.Y. 2000).

9. *See, e.g.*, Motion Picture Association of America, *Anti-Piracy*, *at* http://www.mpaa.org/anti-piracy/ (last visited July 21, 2005) ("Copy protection benefits consumers as well as the industry because without these safeguards, the industry would not be able to release their high-quality digital content for fear of widespread and rampant piracy. . . . The motion picture industry has pursued those who distribute devices that break copy protection in any format. While no technology has yet proven foolproof, the industry continues to implement protection technologies which raise the threshold of difficulty and expense for the pirate and therefore help reduce piracy."); Associated Press, *Recording Industry: CD-Burning a Bigger Problem than File-Sharing*, SAN JOSE MERCURY NEWS (Aug. 13, 2005), *available at* http://www.mercurynews.com/mld/mercurynews/news/local/states/california/northern_california/12371578.htm (quoting Recording Industry Association of American chief executive Mitch Bainwol's prediction that copy protection technology "is an answer to the problem" of CD-burning "that clearly the marketplace is going to see more of").

10. INFORMATION INFRASTRUCTURE TASK FORCE, INTELLECTUAL PROPERTY AND THE NATIONAL INFORMATION INFRASTRUCTURE: THE REPORT OF THE WORKING

circumvention of certain technological controls (and provision of tools that make circumvention possible) in the Digital Millennium Copyright Act of 1998 (DMCA).[11]

Critics object to TPMs and to the government's efforts to bolster them. One complaint is that TPMs do not necessarily respect the limits that are built into copyright law. The exclusive rights that the Copyright Act gives to copyright holders[12] are deliberately constrained in a variety of ways: copyrights eventually expire and works become part of the public domain[13]; the scope of copyright protection is limited to a work's "expression" and does not extend to any underlying "idea, procedure, process, system, method of operation, concept, principle, or discovery"[14]; and some unauthorized uses are excused as "fair use."[15] The Supreme Court has explained that these limits preserve a crucial balance within copyright—between encouraging the production of creative works and ensuring their broad availability, and between encouraging one generation of creators and leaving open expressive opportunities for the next.[16] The Court has described fair use as a "guarantee of breathing space within the confines of copyright,"[17] and the idea/expression dichotomy as "the means by which copyright advances the progress of science and art"[18] and as "'the essence of copyright.'"[19] TPMs, by contrast, can constrain behavior in ways that do not reflect this careful balance. Technology that prevents copying of DVDs, for example, can be applied to works that are in the public domain.[20] TPMs can also prevent uses (like reverse engineering) that are necessary to reveal a copyrighted work's unprotected elements,[21] or that are otherwise

---

GROUP ON INTELLECTUAL PROPERTY RIGHTS (1995), *available at* http://www.uspto.gov/web/offices/com/doc/ipnii.

11. The relevant provisions are codified at 17 U.S.C. §§ 1201-1205 (1999).

12. Those exclusive rights, which include, inter alia, reproduction and public distribution of copyrighted works, are enumerated at 17 U.S.C. § 106 (2005).

13. 17 U.S.C. §§ 302-305 (2005).

14. 17 U.S.C. § 102 (2005).

15. 17 U.S.C. § 107 (2005).

16. *See, e.g.*, Twentieth Century Music Corp. v. Aiken, 422 U.S. 151, 156 (1975) ("The limited scope of the copyright holder's statutory monopoly, like the limited copyright duration required by the Constitution, reflects a balance of competing claims upon the public interest: Creative work is to be encouraged and rewarded, but private motivation must ultimately serve the cause of promoting broad public availability of literature, music, and the other arts.").

17. Campbell v. Acuff-Rose Music, Inc., 510 U.S. 569, 579 (1994).

18. Feist Publ'ns, Inc. v. Rural Tel. Serv. Co., Inc., 499 U.S. 340, 350 (1991).

19. *Id.* at 349, (quoting Harper & Row Publishers, Inc. v. Nation Enters., 471 U.S. 539, 589 (1985) (Brennan, J., dissenting)).

20. *See generally* Pamela Samuelson, *Mapping the Digital Public Domain: Threats and Opportunities*, 66 LAW & CONTEMP. PROBS. 147, 160-61 (2003).

21. *See generally* Pamela Samuelson & Suzanne Scotchmer, *The Law and Economics of*

privileged as fair uses.[22] A common criticism of the DMCA is that it can operate to reinforce even these TPMs that constrain non-infringing behavior.[23]

Meanwhile, some content producers complain that the law does not yet do enough to support their technological protection efforts. Some technological protection techniques will not work without the affirmative cooperation of consumer electronics manufacturers. For example, schemes in which a publisher merely labels content with digital "do not copy" tags do not work unless copying equipment is built to recognize and comply with such tags.[24] But consumer electronics manufacturers are often reluctant to take on the expense, complexity, and risk of consumer dissatisfaction involved in building TPM-compliant equipment.[25] So content industry representatives like the Motion Picture Association of America have lobbied Congress to require the manufacturers' cooperation.[26] With a few narrow exceptions, Congress has thus far declined to require equipment manufacturers to adopt TPMs.[27] The FCC stepped into this breach with its 2003 Broadcast Flag Order.[28]

### *B. The Broadcast Flag Order*

The Broadcast Flag Order is part of the FCC's effort to speed the transition to digital television (DTV). DTV promises a host of advantages over traditional analog television, not least of which is its

---

*Reverse Engineering*, 111 YALE L.J. 1575, 1608-13, 1642-45 (2002).

22. *See generally* Burk & Cohen, *supra* note 1, at 49-51.

23. *See*, *e.g.*, Samuelson, *supra* note 20, at 160-61.

24. *See generally* Mike Godwin, *Harry Potter and the Prisoners of the DTV Transition* (Dec. 18, 2003), *at* http://www.publicknowledge.org/news/analysis/harrypotter (explaining why "[w]ithout government regulation and oversight, of course, the marking solution can't work").

25. *See*, *e.g.*, Drew Clark & Bara Vaida, *Digital Divide: Hollywood Versus Silicon Valley*, NAT'L JOURNAL, Sept. 7, 2002, at 2532 (describing disagreement within the consumer electronics industry about whether to corporate with content-industry TPM schemes). *See generally* Williamson, *supra* note 5, at 354-55.

26. *See* Mike Musgrove, *Hollings Proposes Copyright Defense*, WASH. POST, Mar. 22, 2002, at E03 (describing lobbying efforts).

27. In 2002, Senator Hollings introduced a bill that would require that digital media devices include content security technologies. Consumer Broadband and Digital Television Promotion Act, S. 2048, 107th Cong. § 5 (2002). To date, the bill has not been enacted. The two narrow areas in which Congress has mandated the adoption of TPMs are the Audio Home Recording Act's imposition of the Serial Copy Management System, 17 U.S.C. § 1002(a) and the Digital Millennium Copyright Act's requirement of automatic gain control copy control technology for analog video cassette recorders, 17 U.S.C. § 1201(k).

28. *See* Broadcast Flag Order, *supra* note 2.

thrifty use of electromagnetic spectrum.[29] Once analog broadcasting is entirely replaced by DTV, a wide swath of spectrum will be freed up for other uses.[30]

The full transition to DTV cannot proceed until television viewers have the equipment necessary to receive it—that is, new digital television receivers or analog receivers equipped with conversion technology.[31] But some consumers will of course be reluctant to purchase new equipment until there is desirable programming broadcast via DTV.

The Broadcast Flag Order expressed the FCC's concern that this programming would not be forthcoming because "the potential threat of mass indiscriminate redistribution will deter content owners from making high value digital content available through broadcasting outlets absent some content protection mechanism."[32] In other words, the FCC worries that broadcasters may not broadcast anything worth watching in DTV because of fears that viewers will post it on the Internet.[33] That kind of "mass indiscriminate redistribution" is a threat, according to the FCC, because "digital media can be easily copied and distributed with little or no degradation in quality," and because redistribution of these perfect copies could undermine authorized secondary markets for the programming (syndication, DVD sales, etc.).[34]

To address that perceived threat, the Order required (as of July 2005) that all devices capable of receiving broadcast DTV signals include pre-approved technology that would limit the redistribution—but not the copying—of any DTV programming whose broadcast signal included a special bit of data (the Broadcast Flag).[35] In August 2004, the FCC approved thirteen technologies as compliant with the Broadcast

---

29. *See generally* Advanced Television Systems and Their Impact upon the Existing Television Broadcast Service*, Fourth Further Notice of Proposed Rulemaking and Third Notice of Inquiry*, 10 FCC Rcd. 10,540, 10,541 ¶ 4 (1995); FCC, Media Bureau Staff Report Concerning Over-the-Air Broadcast Television Viewers, ¶ 2 (Feb. 28, 2005), http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-257073A1.pdf.

30. These transition issues are discussed in more detail in Susan P. Crawford, *The Biology of the Broadcast Flag*, 25 HASTINGS COMM. & ENT. L. J. 603, 608-09 (2003).

31. *See* 47 U.S.C. § 309(j)(14)(B)(iii) (2005) (authorizing the FCC to allow an extension of the deadline for ending analog broadcasts in markets in which 15-percent or more of the television households cannot receive digital television).

32. Broadcast Flag Order, *supra* note 2, at 23,552, ¶ 4.

33. Critics of the Broadcast Flag Order noted that there was in fact a significant amount of DTV broadcast programming available even before the Order took effect. *See* Petitioner's Opening Brief, *supra* note 5, at 14.

34. Broadcast Flag Order, *supra* note 2, at 23,552-3, ¶¶ 4, 6.

35. *See* Broadcast Flag Order, *supra* note 2, at 23,570, ¶ 40; *id.* at 23,576, ¶ 57. *See generally* STUART MINOR BENJAMIN ET AL., 2004 CUMULATIVE SUPPLEMENT TO TELECOMMUNICATIONS LAW AND POLICY 148-49 (2004).

Flag regime.[36]

A group of organizations, including the American Library Association, challenged the Broadcast Flag Order before the United States Court of Appeals for the District of Columbia. The petitioners argued that the Order was outside of the FCC's statutory authority,[37] that the FCC's conclusions in the Order were arbitrary and capricious because redistribution of DTV programming via the Internet was not a realistic threat and even if it were the Order would not stop it,[38] and that "the broadcast flag regime impermissibly conflicts with copyright law."[39] The court agreed that the FCC lacked statutory authority to promulgate the broadcast flag rules; it did not reach the petitioners' other arguments. Judge Edwards' opinion explains that "all relevant materials concerning the FCC's jurisdiction—including the words of the Communications Act of 1934, its legislative history, subsequent legislation, relevant case law, and Commission practice—confirm that the FCC has no authority to regulate consumer electronic devices that can be used for receipt of wire or radio communication when those devices are not engaged in the process of radio or wire transmission."[40]

In the wake of the Court of Appeals decision, supporters of the Broadcast Flag Order have lobbied Congress, so far without success, to give the FCC the authority that the court held it lacks.[41] Meanwhile, opponents have argued that, even apart from the jurisdictional problems with the Broadcast Flag Order, the FCC does not have a useful role to play in TPM policy. It should not mandate compliance with any TPM scheme; it should not regulate the types of TPM schemes that can be adopted; it should just stay out.[42] I am not so sure that the FCC should never make TPM policy. Under some circumstances, failure to regulate TPMs may harm the interests of consumers, creativity, and competition. The FCC has expertise that is relevant to identifying those circumstances, and to protecting those interests.

---

36. Digital Output Protection Technology and Recording Method Certifications, *Order*, 19 FCC Rcd. 15,876, 15,879, ¶ 4 (2004) [hereinafter Certifications Order].

37. *See* Petitioner's Opening Brief , *supra* note 5, at 21-43.

38. *See id.* at 50-56.

39. *See id.* at 43-50.

40. *American Library Ass'n* 406 F.3d at 708.

41. *See* McCullagh, *supra* note 4; Michael Grebb, *Broadcast Flag at Half Mast?*, WIRED ONLINE, (June 1, 2005), *at* http://www.wired.com/news/technology/0,1282,67712,00.html; Eric A. Taub, *After Ruling, Broadcasters May Seek Congress's Help in HDTV Anti-Piracy Effort*, N.Y. TIMES, May 9, 2005, at C2.

42. *See, e.g.* Petitioner's Opening Brief, *supra* note 5, at 20. (describing copyright law as "a domain clearly not [the FCC's] own"); *cf.* McCullagh & Homsi, *supra* note 5 (arguing against any regulation of TPMs).

## II. THE CASE FOR TPM REGULATION

### *A. Regulation may preserve the copyright balance.*

The deployment of TPMs does not necessarily depend on government intervention. A number of TPMs have been adopted without any mandate from the government; several were developed and deployed prior to enactment of the anti-circumvention provisions of the DMCA. For example, CSS, the encryption method that the motion picture industry uses to control access to DVDs, predates the DMCA.[43] Of course, CSS was vulnerable to circumvention (and indeed was circumvented even after the deterrence of the DMCA was in place).[44] But many people do not have the knowledge and/or audacity to circumvent TPMs, or to acquire and use tools that would do the circumventing for them,[45] or to navigate the "darknets" where illegally unlocked content circulates.[46] TPMs can therefore constrain some people's behavior even in the absence of reinforcement like the DMCA or the Broadcast Flag Order. These constraints can extend beyond copyright infringement to uses of creative works that would be considered non-infringing under copyright law. This possibility is troubling given that the wisdom and constitutionality of copyright has repeatedly been held to depend on its preservation of these uses.[47]

In light of technology's potential to constrain even non-infringing behavior, a laissez faire attitude toward TPMs may not be the best way to preserve the balance that has long been understood as essential to good copyright policy.[48] This is an application of Lawrence Lessig's well-known argument about the power of code. Lessig contends both that technological code has the power to constrain more powerfully than legal code, and that the dangers posed by overreaching technological

43. *See* Universal City Studios, Inc. v. Corley, 273 F.3d 429, 436-37 (2nd Cir. 2001).

44. *See generally id.*

45. *See* Burk & Cohen, *supra* note 1, at 82 ("Even the most user-friendly circumvention technologies will require some threshold level of technological competence.")

46. *But see* Fred von Lohmann, *Measuring the Digital Millennium Copyright Act Against the Darknet: Implications for the Regulation of Technological Protection Measures*, 24 LOY. L.A. ENT. L. REV. 635, 642 (2004) (arguing that "the use of digital rights management and other TPMs to control unauthorized reproduction and distribution of digital content is largely a waste of time and resources" because one sophisticated circumventer can overcome a TPM and make the unlocked work available to everyone).

47. *See supra* notes 17-19 and accompanying text.

48. *See generally* Julie E. Cohen, *DRM and Privacy*, 18 BERKELEY TECH. L.J. 575, 613-17 (2003). *But see* Crawford, *supra* note 30, at 649 ("There is nothing wrong with the content industry building gates around its own content, which is what private DRM systems are.")

constraints may justify governmental intervention.[49]

To date, however, most of the United States government's interventions related to TPMs have not taken the form of TPM limitations designed to preserve non-infringing uses. Instead, they have been TPM reinforcements like the DMCA, which is controversial in part because of its potential to bolster even those private TPM efforts that constrain non-infringing behavior.[50]

The main thrust of the Broadcast Flag Order went even farther in the direction of TPM reinforcement. Unlike the DMCA, which aimed to limit circumvention of voluntarily imposed TPMs, the Broadcast Flag Order was the government's first major attempt to require the adoption of TPMs.[51] But the Broadcast Flag Order also contained the kernel of another type of TPM regulation, aimed not at bolstering TPMs, but at limiting them in order to preserve the copyright balance.

Specifically, the Broadcast Flag Order said that the flag was to be used only to prevent redistribution of digital broadcasts, not mere copying.[52] The Order explained the importance of this limitation in

---

49. *See* LESSIG, *supra* note 1, at 220 ("When government steps aside, it is not as if nothing takes its place. Paradise does not prevail. It's not as if private interests have no interests, as if private interests don't have ends they will then pursue. To push the antigovernment button is not to teleport us to Eden. When the interests of government are gone, other interests take their place."); *see also* Reidenberg, *supra* note 1, at 583-93 (describing the relationship between law and technological constraints). *See generally* Jack M. Balkin, *Digital Speech and Democratic Culture: A Theory of Freedom of Expression for the Information Society*, 79 N.Y.U. L. REV. 1, 6 (2004) ("Increasingly, freedom of speech will depend on the design of the technological infrastructure that supports the system of free expression and secures widespread democratic participation. Institutional limitations of courts will prevent them from reaching the most important questions about how that infrastructure is designed and implemented. Safeguarding freedom of speech will increasingly fall to legislature, administrative agencies, and technologists.").

50. *See generally* Burk & Cohen, *supra* note 1, at 53-54 ("The use of technology to block public access to public domain elements of managed content and/or to block fair uses of such content is equivalent to the unauthorized fencing of public lands. Unlike nineteenth-century fence-cutting laws, however, the anti-circumvention provisions [of the DMCA] do nothing to ensure that the public continues to enjoy the 'easements' or 'rights of way' that copyright holders have no legitimate right to withdraw from public access.").

51. There are two minor TPM mandates that predated the Broadcast Flag Order: the Audio Home Recording Act's imposition of the Serial Copy Management System, 17 U.S.C. § 1002(a) (2005); and the Digital Millennium Copyright Act's requirement of automatic gain control copy control technology for analog video cassette recorders, 17 U.S.C. § 1201(k) (2005); *cf.* 17 U.S.C. 1201(c)(3) (2005) (clarifying that the DMCA's anti-circumvention and anti-tool provisions do not require consumer electronics equipment to take affirmative steps to enable TPM schemes).

52. Broadcast Flag Order, *supra* note 2, at 23,569, ¶ 38 ("We clarify here and in Part 73 of the Commission's rules that to the extent broadcasters wish to use the ATSC flag to protect unencrypted DTV broadcasts, they may do so provided they do not transmit the optional additional bits provided for in ATSC A/65B. We believe that this approach is commensurate

terms of preserving valuable uses of broadcast programming: "[C]onsumers will continue to have the ability to make copies of broadcast content, including news and public interest programming."[53] The Order did not make it entirely clear how this purported limitation on the degree of permissible TPM constraint would be enforced. And, as it turned out, the FCC later approved as compliant with the flag regime some technologies that limited copying, explaining that the technologies "were developed prior to adoption of the *Broadcast Flag Order*" and therefore "carry with them certain legacy attributes that, while less than ideal from a broadcast flag perspective, may have been appropriate or necessary at the time and in the context that they were developed."[54] But the Commission insisted that the approval of this first round of technologies "should not be interpreted as precedent supporting the future adoption of technologies that impose copy restrictions on digital broadcast television content," and that "[the Commission] will consider such restrictions as a factor weighing strongly against the technology's approval."[55]

The Broadcast Flag Order thus gives us a glimmer of the idea, albeit imperfectly implemented, that government should sometimes make TPM policy that limits TPMs in order to preserve the non-infringing uses of creative works that TPMs might otherwise constrain. In a related context, the FCC has more forcefully limited the ways in which TPMs can be used to constrain consumer behavior.

In September 2003, the FCC issued its Plug and Play Order, which aims primarily to facilitate compatibility between digital cable television infrastructure and competitively-supplied hardware.[56] But along with

---

with the encoding rules adopted in our recent *Digital Cable Compatibility Order and FNPRM* which prohibit MVPDs from encoding unencrypted broadcast content for copy control purposes."); *see also id.* at 23,555, ¶ 9 ("[W]e wish to reemphasize that our action herein in no way limits or prevents consumers from making copies of digital broadcast television content."); *id.* at 23,555, ¶ 10 ("We also wish to clarify our intent that the express goal of a redistribution control system for digital broadcast television be to prevent the indiscriminate redistribution of such content over the Internet or through similar means. This goal will not . . . interfere with or preclude consumers from copying broadcast programming and using or redistributing it within the home or similar personal environment as consistent with copyright law . . . .").

53. *Id.* at 23,569, ¶ 38.

54. Certifications Order, *supra* note 36, at 15,910, ¶ 76; *see also* Petitioner's Opening Brief, *supra* note 5, at 47-48.

55. Certifications Order, *supra* note 36, at 15,910, ¶ 77.

56. Implementation of Section 304 of the Telecommunications Act of 1996, Commercial Availability of Navigation Devices, Compatibility Between Cable Systems and Consumer Electronics Equipment, Second *Report and Order and Second Further Notice of Proposed Rulemaking,* 18 FCC Rcd. 20,885 (2003) [hereinafter Plug and Play Order].

adopting industry-negotiated standards for interoperability between cable systems and consumer equipment (digital television receivers, for example), the Order adopts rules designed to limit the reach of TPMs.

The Plug and Play Order is an outgrowth of a Communications Act provision requiring the FCC to adopt regulations to ensure the competitive retail availability of equipment used to access the services of multichannel video programming distributors (MVPDs),[57] a category that includes primarily cable and direct broadcast satellite (DBS) operators. The idea is that consumers should be able to get access to cable and DBS without buying set-top boxes or other navigation equipment from their MVPDs. In its initial 1998 Navigation Devices Order,[58] the FCC required MVPDs to separate out the security functions of navigation devices from their other functions and to supply modular security components that could be plugged into televisions and other competitively-supplied navigation devices.[59] It also required MVPDs to provide any interface information necessary for equipment manufacturers to make navigation devices that would work with the MVPD systems.[60] Consumers could thus use competitively-supplied navigation equipment, while the MVPDs retained control (via the modular security components they supplied) over security measures necessary to prevent unauthorized access to their systems.[61]

In the wake of the Navigation Devices Order, cable companies offered modular security components and developed interface specifications. But they only offered the technological keys necessary to unlock their digital cable programming to equipment manufacturers who agreed to a license (the "DFAST" license) that would require the manufacturers to make their navigation devices compliant with the cable operators' specified TPM schemes.[62] Circuit City and others argued to the FCC that the DFAST license violated the Navigation Devices

57. 47 U.S.C. § 549(a) (2005).

58. Implementation of Section 304 of the Telecommunications Act of 1996, Commercial Availability of Navigation Devices, *Report and Order*, 13 FCC Rcd. 14,775 (1998).

59. *Id.* at 14,793-94, ¶ 49.

60. *Id.* at 14,787-88, ¶ 34.

61. *See generally* BENJAMIN ET AL., *supra* note 35, at 147 ("The idea is to separate the market for 'multichannel video programming'—think cable and satellite television—from the market for the hardware that supports it. Thus, if the Commission is successful, it will soon become common for consumers to purchase cable service from their local cable franchisee while purchasing, say, a combined VCR/set-top box from some unrelated competitive firm."); Weinberg, *supra* note *, at 287-88.

62. *See* Implementation of Section 304 of the Telecommunications Act of 1996, Commercial Availability of Navigation Devices, *Further Notice of Proposed Rulemaking and Declaratory Ruling*, 15 FCC Rcd. 18,199, 18,209-10, ¶ 27 (2000) [hereinafter Declaratory Ruling]. *See generally* Weinberg, *supra* note *, at 288.

Order.[63]

In a 2000 Order, the FCC rejected the challenge to the DFAST license, declaring that cable companies' practice of requiring navigation device manufacturers to adopt TPM schemes in order to get access to cable programming was not inconsistent with the Navigation Devices Order per se.[64] The 2000 order left open the possibility, however, that specific TPM schemes might be unacceptable.[65]

The 2003 Plug and Play Order revisited the TPM issue by imposing "encoding rules" that limit the reach of TPMs that may be embedded in navigation devices.[66] The encoding rules specify caps on the level of constraint that may be imposed on various types of MVPD programming.[67] For example, no copy restrictions are permitted for content that is also broadcast for free over the air.[68] "Down resolution" of unencrypted broadcast television is banned.[69] Consumers must be permitted to make at least a single generation copy of subscription television programming.[70] And an especially controversial type of TPM known as "selectable output control" is banned altogether.[71] The Order explains:

> [E]nacting limits on the amount of copy protection that may be applied to different categories of programming strikes a measured balance between the desire of content providers and MVPDs to prevent the unauthorized redistribution or copying of content distributed by MVPDs and the preservation of consumer expectations regarding the time shifting of programming for home viewing and other permitted uses of such material.[72]

The FCC is thus regulating TPMs in a way that limits their reach in order to preserve certain consumer uses that TPMs might otherwise prohibit. Although it claims in the Order not to be engaged in copyright

63. *See* Declatory Ruling, *supra* note 62 at 18,205-06, ¶ 18.

64. *Id.* at 18,210-11, ¶¶ 28-29.

65. *Id.* at 18,211, ¶ 29. *See generally* Weinberg, *supra* note *, at 287-94 (describing the 2000 order and arguing that the FCC "should have recognized that restrictions on program copying and redistribution implicate important policy issues within its jurisdiction").

66. Plug and Play Order, *supra* note 56, at 20,904-18, ¶ 42-74.

67. Although the controversy over the DFAST license involved only cable operators, the encoding rules apply both to cable operators and to other MVPDs.

68. Plug and Play Order, *supra* note 56, at 20,914, ¶ 65.

69. *Id.* at 20,912-13, ¶¶ 62-64.

70. *Id.* at 20,914, ¶ 65.

71. *Id.* at 20,910-12, ¶¶ 58-61.

72. *Id.* at 20,891, ¶ 11.

policy-making,[73] the FCC's reference to "time shifting of programming for home viewing" is clearly a nod to the Supreme Court's determination in *Sony Corp. of America v. Universal City Studios* that time shifting is fair use.[74] Indeed, the FCC acknowledges that "the line separating communications law and copyright law is not always a clear one"[75] and promises to be "sensitive to this intricate and complex issue."[76]

The Plug and Play Order demonstrates, to an even greater extent than the Broadcast Flag Order, how regulation of TPMs can be used to limit the degree to which technological measures constrain consumer behavior. To the extent that preservation of certain consumer freedoms is important to maintaining the copyright balance, these limits on TPMs may be justified. On the other hand, the market may itself shape deployment of TPMs in a way that preserves consumer freedoms without imposing the administrative costs, uncertainty, and potential chilling of innovation that can accompany regulation.[77] Both the Motion Picture Association of America[78] and some consumer groups[79] argued against the Plug and Play Order's encoding rules on the ground that deployment of TPMs for digital cable should be left to the market and not regulated by the FCC. But there are reasons to doubt that market forces will always temper socially detrimental TPMs.

---

73. *Id.* at 20,908-09, ¶ 54.

74. 464 U.S. 417, 447-55 (1984).

75. Plug and Play Order, *supra* note 56, at 20,908-09, ¶ 54.

76. *Id.* at 20,909, ¶ 54.

77. *See* Crawford, *supra* note 30, at 651 & n.127.

78. Comments of the Motion Picture Association of America, Inc., Implementation of Section 304 of the Telecommunications Act of 1996, Commercial Availability of Navigation Devices, Compatibility Between Cable Systems and Consumer Electronics Equipment, at 7 (Mar. 28, 2003), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513783768 [hereinafter MPAA comments] (arguing that "private arrangements make FCC regulation of content protection in this instance unwarranted and would substitute regulation for the give and take operation of the marketplace, thus stifling innovation").

79. Comments of Public Knowledge and Consumers Union, Implementation of Section 304 of the Telecommunications Act of 1996, Commercial Availability of Navigation Devices, Compatibility Between Cable Systems and Consumer Electronics Equipment, at 9 (Mar. 28, 2003), *available at* http://www.publicknowledge.org/pdf/pap_fnprm_comments_pkcu.pdf ("[T]he Commission should refrain from endorsing a set of encoding rules or any copy-protection technology that entails a particular set of encoding rules."). *But see* Reply Comments of the Electronic Frontier Foundation, Implementation of Section 304 of the Telecommunications Act of 1996, Commercial Availability of Navigation Devices, at 2 (April 28, 2003), *available at* http://www.eff.org/IP/Video/HDTV/20030430-fcc-reply.pdf [hereinafter EFF Reply comments] ("[T]he Commission cannot abandon the public to unilaterally imposed access and use restrictions dictated to the [multichannel video programming distributor] marketplace by a motion picture industry oligopoly.").

*B. Regulation may be necessary where market constraints are weak.*

Some observers of recent developments in TPM deployment and policy argue that TPMs are best regulated by market forces.[80] If making back-up copies of CDs is important to consumers, this logic goes, they will not buy copy-proof CDs and the market will respond with less constraining TPMs.[81] Some market optimists point to the variety of TPM schemes available for online music as an example of these market forces at work.[82] They also point to consumer resistance to, and subsequent content industry abandonment of, particularly rigid TPM schemes.[83] But the market optimists have not established that the conditions necessary for market discipline of socially detrimental TPMs exist across all content industries.[84]

The prospect of restrictive TPMs insufficiently constrained by competitive forces appears especially relevant to the FCC's Plug and Play Order. The extent and implications of concentration in the MVPD industry are contested issues that I do not intend to resolve here.[85] But suffice it to say that where over seventy percent of MVPD subscribers in the United States receive their service via cable,[86] very few locations are served by multiple cable providers,[87] the upfront costs of the DBS alternative are prohibitively high for some consumers,[88] and long-term

80. *See*, *e.g.*, McCullagh & Homsi, *supra* note 5.

81. *See generally* CARL SHAPIRO & HAL R. VARIAN, INFORMATION RULES 97-102 (1999) (concluding that "[c]opy protection schemes impose costs on users and are highly vulnerable to competitive forces").

82. *See*, *e.g.*, Michael A. Einhorn, *Digitization and its Discontents: Digital Rights Management, Access Protection, and Free Markets*, 51 J. COPYRIGHT SOC'Y U.S.A. 279, 279-91 (2004).

83. *See*, *e.g.*, R. Polk Wagner, *Information Wants to be Free: Intellectual Property and the Mythologies of Control*, 103 COLUM. L. REV. 995, 1015 (2003). *See generally* John A. Rothchild, *Economic Analysis of Technological Protection Measures*, 84 OR. L. REV. (forthcoming 2005) (manuscript at 49-53, *available at* http://ssrn.com/abstract=742864) (describing failed TPM efforts).

84. *See*, *e.g.*, Crawford, *supra* note 30, at 651 & n.127 (acknowledging that "the assumption of a competitive market for DRM systems is an optimistic one"). *See generally* Rothchild, *supra* note 83.

85. For a snapshot of industry conditions, see Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming, Eleventh Annual Report, 20 FCC Rcd. 2755, 2828, ¶ 136 (2005) (identifying DBS as "the major wireless MVPD technology that is available to subscribers nationwide" and observing that "few consumers . . . have a second wireline alternative, such as an overbuild cable system"); *see also id.* at 2829, ¶ 137 ("Most consumers may choose between over-the-air broadcast, one cable provider, at least two DBS providers, and, in limited cases, an overbuilder or other delivery technology.").

86. *See id.* at 2759, ¶ 7.

87. *See id.* at 2828, ¶ 136.

88. *See* MARK COOPER, MEDIA OWNERSHIP AND DEMOCRACY IN THE DIGITAL INFORMATION AGE 140 (2003), *available at* http://cyberlaw.stanford.edu/blogs/cooper/

contracts and other switching costs may cause subscribers to stick with an MVPD despite frustration with its policies,[89] it is not necessarily the case that consumer dissatisfaction with TPM policies will be communicated clearly through their subscription behavior.

Even if we imagine that the MVPD market is competitive enough to encourage cable and DBS operators to offer consumer-friendly TPM choices, the MVPDs face a countervailing pressure: they are competing with each other as buyers in the market for popular television programming. In that marketplace, the operator who is willing to impose TPMs that are most useful to programming providers (and not necessarily to consumers) is at a competitive advantage. As the National Cable & Telecommunications Association explained in comments to the FCC, "[cable operators] could not unilaterally abandon [restrictive TPMs] without disadvantaging themselves in competing against DBS for program acquisition."[90] Thus, instead of constraining the imposition of TPMs, the interaction between the MVPD and programming markets can have the opposite effect: encouraging the adoption of restrictive TPMs that are favored by the content industry but that do not necessarily satisfy consumers or serve the public interest.

Indeed, the tension between consumer expectations and content owner demands explains the otherwise mysterious position cable companies took in the Plug and Play proceeding: they asked the FCC to impose encoding rules upon their industry (and, of course, upon their competitor DBS providers).[91] Only if all of the MVPDs' hands were tied by the FCC could they safely resist the content industry's demands that their programs be wrapped with restrictive TPMs. Without FCC regulation, the MVPDs' ability to respond to consumer dissatisfaction with restrictive TPMs would have been limited by their need to please sellers of "must have" programming by promising those content owners restrictive TPM terms. It therefore seems likely that the TPMs regulated by the Plug and Play order are less restrictive, more consistent with the intentionally limited protections granted by copyright law, and

archives/mediabooke.pdf.

89. *See generally* Joseph Farrell & Paul Klemperer, *Coordination and Lock-in: Competition with Switching Costs and Network Effects Part II* (Dec. 2004) (preliminary draft), *available at* http://www.paulklemperer.org.

90. Comments of the National Cable & Telecommunications Association, Implementation of Section 304 of the Telecommunications Act of 1996, Commercial Availability of Navigation Devices, Compatibility Between Cable Systems and Consumer Electronics Equipment, at 15 (March 28, 2003), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513783773 [hereinafter NCTA comments]; *see also* EFF Reply Comments, *supra* note 79, at 3-4.

91. *See* NCTA Comments, *supra* note 90, at 13.

also closer to consumer preferences than the market-regulated alternatives would have been.[92]

This description of the market situation leading up to adoption of the Plug and Play Order demonstrates a more general point. The degree to which TPMs will be voluntarily constrained depends on market conditions. Sometimes the market will do little to constrain TPMs and the alternative to government regulation is voluntary adoption of restrictive TPMs that dissatisfy consumers and upset the copyright balance.

A final note on market constraints: the relationship between TPMs and market conditions is dynamic; TPMs can reinforce market power. For example, if a content publisher or technologist with a large market share deploys a proprietary TPM with which its competitors cannot interoperate, it may hurt their ability to compete and further limit the competitive pressures on the incumbent's TPM choices.[93]

### *C. Regulation may be necessary to serve non-market values.*

There is a final reason not to rely on markets alone to constrain

---

92. *See* EFF Reply Comments, *supra* note 79, at 8. ("[I]n the absence of 'encoding rules' to set a ceiling for all MVPDs on the use of content protection restrictions, this anti-consumer technology infrastructure would be used by content owners to undermine innovation and frustrate legitimate consumer expectations."); Comments of the Home Recording Rights Coalition, Implementation of Section 304 of the Telecommunications Act of 1996, Commercial Availability of Navigation Devices, Compatibility Between Cable Systems and Consumer Electronics Equipment, at 2 (Mar. 28, 2003), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513783843 ("The alternative is a reversion to the standoff in which individual MVPDs, anxious to secure content, have felt compelled to impose one-sided license terms on competitive entrants."); Joint Reply Comments of the Consumer Electronics Association and the Consumer Electronics Retailers Coalition, Implementation of Section 304 of the Telecommunications Act of 1996, Commercial Availability of Navigation Devices, Compatibility Between Cable Systems and Consumer Electronics Equipment, at 8 (April 28, 2003), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6514082231 ("These Encoding Rules are entirely for the purpose, and of the effect, of limiting and tempering the consequences for manufacturers and consumers of the Compliance and Robustness rules in MVPD device licenses, which are largely dictated by content providers.").

93. *See, e.g.*, Fred von Lohmann, *FairPlay: Another Anticompetitive Use of DRM*, Deep Links (May 25, 2004), *at* http://www.eff.org/deeplinks/archives/001557.php. Music files downloaded from Apple's iTunes music store are protected by a TPM that does not interoperate with portable music players other than Apple's iPod. And iPods do not in turn interoperate with the TPM used by some competing online music stores. *See* Digital Media Project, *iTunes: How Copyright, Contract, and Technology Shape the Business of Digital Media--A Case Study* 44-48 (rev. version, 2004), *available at* http://cyber.law.harvard.edu/media/uploads/81/iTunesWhitePaper0604.pdf; *see also* Hilary Rosen, *Steve Jobs, Let My Music Go*, Huffington Post (May 9, 2005), *at* http://www.huffingtonpost.com/theblog/archive/2005/05/steve-jobs-let-.html. *See generally* Rothchild, *supra* note 83, at 17.

TPMs. The limits built into copyright—with which TPMs can interfere—may be justified by concerns that are not well-addressed even by competitive markets.[94] For example, a fair use parody may have expressive value that is not reflected in its creator's willingness to pay for permission to make it because some of the value spills over to society as a whole, or because the creator is a poorly-financed amateur who is unlikely successfully to translate the value of his parody into money.[95] The social value of such a use is unlikely to be reflected in consumers' willingness to pay extra for works that are unencumbered by fair-use-inhibiting TPMs.

## III. THE FCC'S INSTITUTIONAL ADVANTAGES

Given the potential for voluntary industry adoption of restrictive and incompatible TPMs, it is possible that government regulation that specifies what consumer behaviors TPMs may and may not limit might sometimes be justified. But why should the FCC have anything to do with it? In theory, TPM regulation could be done by Congress, without help from an administrative agency. Or Congress could deputize the Copyright Office (within the Library of Congress) to work out the details. I do not mean to suggest that the FCC should be single-handedly responsible for TPM policy. But the Commission does have some institutional advantages that make it well-equipped to at least contribute to the task.[96]

First, consider that Congress has tried, to a very limited extent, to do detailed regulation of TPMs. Section 1201(k) of the DMCA requires analog video recorders to adopt a specific copy control technology.[97] It also specifies that the technology may only be used to prevent consumer copying of pay-per-view television programming or prerecorded video cassettes, or serial copying (that is, copying a copy) of subscription

94. *See generally* Cohen, *supra* note 1, at 539 ("Creative and informational works affect individual and social self-determination in a variety of ways, many of which are not registered, much less measured, by markets."); Wendy J. Gordon, *Fair Use as Market Failure: A Structural and Economic Analysis of the Betamax Case and its Predecessors*, 82 COLUM. L. REV. 1600, 1631 (1982) ("When defendant's use contributes something of importance to public knowledge, political debate, or human health, it may be difficult to state the social worth of that contribution as a dollar figure.").

95. *See generally* Molly Shaffer Van Houweling, *Distributive Values in Copyright*, 83 TEX. L. REV. 1535 (2005).

96. *See generally* Williamson, *supra* note 5, at 359-77 (praising the Broadcast Flag and Plug and Play orders and offering them as examples of the FCC's expertise at TPM standard-setting); Woodford, *supra* note 5, at 291-300 (proposing that Congress authorize the FCC to regulate TPMs and arguing that the FCC has relevant technical and policy expertise).

97. 17 U.S.C. § 1201(k)(1) (2005).

television programming.[98] It may not be used, for example, to prevent copying of free broadcast television programming.

Section 1201(k) thus shares the feature I have highlighted in the Broadcast Flag and Plug and Play orders: it limits the imposition of a TPM (even as it requires equipment manufacturers to adopt it). It ensures that everyone in the industry can rely on technological protection, while it protects against the voluntary adoption of technological measures that would impose especially onerous constraints on end-user behavior. Unfortunately, Congress in 1201(k) applied this rule only to one quickly obsolete technology (analog video recorders), and did so by insisting on the use of a single copy-control system offered by Macrovision Corporation—raising concerns about fairness and competition.[99]

The Broadcast Flag Order, by contrast, seemed to envision an open-ended certification process, whereby new technologies for recognizing and responding to the flag could be approved over time (although the Order requested further comment on the precise mechanism for that certification).[100] Many observers worried initially that only technology backed by the motion picture industry would be favored by this process.[101] But the FCC approved thirteen technologies in its interim certification process (and declined none), including technology that was actively opposed by the MPAA.[102]

Congress cannot manage this type of ongoing technology

98. 17 U.S.C. § 1201(k)(2) (2005).

99. *See* 3 NIMMER ON COPYRIGHT § 12A.07[D][2] (2005).

100. *See* Broadcast Flag Order, *supra* note 2, at 23,578-79, ¶¶ 61-64.

101. *See*, *e.g.*, Crawford, *supra* note 30, at 615.

102. Certifications Order, *supra* note 36, at 15,879, ¶ 4 (approving technologies); Opposition to the Application of TiVo for Interim Authorization of TiVoGuard by the Motion Picture Association of America, Inc., et al., Digital Output Protection Technology and Recording Method Certification, TiVoGuard Digital Output Protection Technology (Apr. 3, 2004), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516086818.; Motion Picture Association of America, Inc., et al, Legal and Policy Issues Raised by TiVoGuard (July 16, 2004), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516284434. Although all of the proposed technologies were ultimately approved, the process may nonetheless have been shaped by content owner objections. The Center for Democracy and Technology observes in a recent report that "the process did chill some technologies—because in advance of the decision, a number of applicants scaled back the capabilities of their technologies as requested by opponents." Center for Democracy & Technology, *Broadcast Flag Authorization Legislation: Key Considerations for Congress* 4 (Sept. 2005), *available at* http://www.cdt.org/copyright/20050822BroadcastFlag.pdf; *see also* Center for Democracy & Technology, *Lessons of the FCC Broadcast Flag Process: Background for the Legislative Debate* (Sept. 2005), *available at* http://www.cdt.org/copyright/20050919flaglessons.pdf (analyzing and critiquing approval process in detail).

certification process itself—hence the troubling 1201(k) alternative of selecting one single TPM product. The Copyright Office, upon which Congress relies to work out many details of copyright policy, has little or no experience certifying equipment for compliance with technical standards.[103] The FCC, by contrast, has experience and capacity for assessing electronics equipment on an ongoing basis, often in conjunction with private standards organizations. For example, the Commission's Part 68 rules establish a process for certifying equipment that attaches to the public telephone network (phones, fax machines, etc.).[104] The Part 68 certification process has evolved over time, and is now managed by private standards bodies within a framework established by FCC rules and subject to appeals to the FCC.[105]

Relatedly, the FCC is accustomed to assessing and reassessing data about industry conditions and practices, and to changing policy in response to that data. To be sure, Congress amends the Copyright Act quite frequently—but almost always in the direction of increased protection for copyright holders. The more agile FCC, by contrast, has a record of experimenting with copyright-related regulations and sometimes abandoning them in light of changed conditions.[106]

Furthermore, the FCC has its own substantive expertise relevant to copyright policy. First, the agency knows the television and radio industries. This knowledge could usefully augment congressional copyright law-making that often imposes uniform rules on industries whose various incentive and cost structures might justify more specialized treatment.[107]

---

103. *See generally* U.S. Copyright Office, *United States Copyright Office: A Brief Introduction and History*, *at* http://www.copyright.gov/circs/circ1a.html; Joseph P. Liu, *Regulatory Copyright*, 83 N.C. L. REV. 87, 137-38 (2004) (describing the Copyright Office's limited role and noting that the Office "lacks the economic and technological expertise that would make it an even more effective source for informed copyright policy").

104. 47 C.F.R. pt. 68; *see also* FCC, *Part 68 Frequently Asked Questions*, *available at* http://www.fcc.gov/wcb/iatd/part68faqs.pdf [hereinafter Part 68 FAQ].

105. 2000 Biennial Regulatory Review of Part 68 of the Commission's Rules and Regulations, *Report and Order*, 15 FCC Rcd. 24,944 (2000); *see also* Part 68 FAQ, *supra* note 104.

106. *See generally* United Video v. FCC, 890 F.2d 1173, 1176-78 (D.C. Cir. 1989) (describing ebb and flow of FCC policy protecting broadcasters' exclusive rights to present syndicated programming); STUART M. BENJAMIN ET AL., TELECOMMUNICATIONS LAW AND POLICY 446 (2001) (describing many repealed, and some reinstated, FCC rules "designed to balance cable operators', broadcasters', and copyright holders' respective rights"); Weinberg, *supra* note *, at 278-84 (describing FCC involvement in copyright policy).

107. The Copyright Act does have some industry-specific features, most notably relating to musical works and sound recordings. *See*, *e.g.*, 17 U.S.C. §§ 114, 115 (2005). And there are entire sui generis regimes for semiconductors, 17 U.S.C. § 901 (2005) et seq., and boat hulls, 17 U.S.C. 1301 et seq. But many fundamental features (the basic subject matter

Second, the FCC is charged with promoting universal access to fundamental communication services[108]—a goal that is consistent with copyright law's often professed, but difficult to achieve, goal of assuring that creative works and creative opportunities are widely disseminated.[109]

Third, the FCC has historically played a role not only in ensuring access to channels of communication, but also in encouraging the production and diversity of programming to be delivered via those channels[110]—just the kind of creativity that copyright is also designed to promote.

Fourth, and perhaps most importantly: the degree to which TPMs must be regulated in order to preserve the copyright balance depends on competitive conditions in the markets in which the TPMs operate, which in turn depends in part on whether competing TPM schemes interoperate with each other.[111] The FCC is frequently called upon to assess the competitive position of industry in order to determine whether intervention is necessary to limit one company or sector's control over consumers and/or competitors.[112] It is also frequently called upon to

---

requirement, duration, fair use, etc.) are uniform across industries—although courts sometimes interpret these provisions in industry-specific ways. *See generally* Stacey L. Dogan & Joseph P. Liu, *Copyright Law and Subject Matter Specificity: The Case of Computer Software*, 61 N.Y.U. ANN. SURV. AM. L. 203 (2005); Michael W. Carroll, *One for All: The Problem of Uniformity Cost in Intellectual Property Law* (draft manuscript, on file with author). *Cf.* Jonathan Zittrain, *The Un-Microsoft Un-Remedy: Law Can Prevent the Problem That It Can't Patch Later*, 31 CONN. L. REV. 1361, 1372-73 (1999) (decrying the inappropriateness of a 95-year duration for computer software copyrights).

108. *See, e.g.*, Federal Commc'ns Comm'n, *A New Federal Communications Commission for the 21st Century* (1999), *available at* http://www.fcc.gov/Reports/fcc21.html ("Our fourth goal is to ensure that all Americans—no matter where they live, what they look like, what their age, or what special needs they have—should have access to new technologies created by the communications revolution."). *See generally* Jerry Hausman & Howard Shelanski, *Economic Welfare and Telecommunications Regulation: The E-Rate Policy for Universal-Service Subsidies*, 16 YALE J. ON REG. 19, 21-26 (1999) (describing the development of "the modern meaning of 'universal services,'" which "refers to the policy that fundamental communications services should be available to everyone on 'fair' terms, even if some customers must be served below cost").

109. *See generally* Van Houweling, *supra* note 95 (drawing parallel between universal service efforts in communications policy and the distributive goals of copyright).

110. *See*, *e.g.*, *United Video,* 890 F.2d at 1181 (discussing FCC's efforts to increase supply of television programming from diverse sources).

111. *See supra* note 93 and accompanying text.

112. *E.g.*, 47 U.S.C. § 160 (2005) (providing for regulatory forbearance in competitive telecommunications markets); 47 U.S.C. § 271 (2005) (providing that a regional bell operating company may provide long distance service originating in its region only after satisfying the FCC of various pro-competitive conditions within its local market). *See generally* BENJAMIN ET AL., *supra* note 106, at 289-324 (describing FCC attempts to assess and foster competition in broadcasting). Several commentators have suggested that the FCC focus even more heavily on identifying instances of abuse of market power that call for regulation (as opposed to

determine whether lack of voluntary interoperability justifies government imposed or facilitated standardization.[113] The FCC therefore seems uniquely qualified to perform the kind of analysis necessary to determine whether regulation of TPMs is justified within a given market.

The FCC's critics will surely respond that while the Commission has experience with technology certification, copyright policy making, standardization, etc., it often performs these tasks poorly: it gets bogged down in bureaucratic red tape, captured by the industries it regulates, overwhelmed by complex technology, and so on. With regard to TPM policy-making, skeptics are especially concerned that bureaucratic ineptitude and capture could stifle innovation and creativity and create barriers to entry. I share these concerns to some extent. But I also worry that unregulated TPMs could stifle innovation and creativity and create barriers to entry. The companies that deploy TPMs are not committed to ensuring an accessible communications system, or promoting new and diverse programming, or providing universal service, or fostering competition, or preserving the copyright balance. The FCC is at least cognizant of these issues, even if it does not always succeed perfectly in addressing them.

## IV. THE BROADCAST FLAG REVISITED

What I have said so far suggests that the government might be justified, under some circumstances, in intervening to constrain and/or standardize TPMs, and that the FCC may be relatively well situated to identify those circumstances and impose the necessary regulations. In the Plug and Play context, for example, voluntary TPMs were being deployed even without government intervention. And it seems likely that the scheme the FCC put in place guarantees more consumer freedoms than the voluntary alternative would have. As I explained above, the voluntary scheme was not subject to normal competitive constraints (even assuming these exist in the MVPD market) because MVPDs' desire to compete by using consumer-friendly TPMs was tempered by their need to satisfy content producers who insisted on restrictive TPMs. The FCC recognized this situation and intervened to fulfill consumer expectations and, tacitly, to preserve the copyright balance.

---

presuming abuse and regulating preemptively). *See*, *e.g.*, The Progress & Freedom Found., Proposal of the Regulatory Framework Working Group, *Digital Age Communications Act* (June 2005), *available at* http://www.pff.org/issues-pubs/other/050617regframework.pdf.

113. *See generally* JONATHAN E. NUECHTERLEIN & PHILIP J. WEISER, DIGITAL CROSSROADS 385-406 (2005) (describing various FCC experiences with standard-setting).

In the broadcast flag context, by contrast, it seems unlikely that the mandated broadcast flag rules would have been less restrictive than the voluntary alternative. The voluntary TPM schemes that arose in the MVPD context rely (as does CSS and other voluntary schemes) upon encryption.[114] The protected content is distributed in encrypted form, and can be decrypted only under the terms of the TPM scheme. This type of TPM can be imposed unilaterally by content publishers, backed up by the anti-circumvention provisions of the DMCA. By encrypting their content and making it impossible (legally) to access it without their key, they can dictate the terms by which the content is accessed (including specifying what limitations are imposed on copying and redistribution).

Unlike MVPD transmissions, broadcast signals are transmitted "in the clear"; that is, they are not encrypted when sent over the airwaves. Adopting an "encryption at the source" TPM scheme for digital broadcast television (a solution suggested by some critics of the Broadcast Flag Order[115]) would be controversial and difficult.[116] It is not clear that encryption for the purpose of limiting copying and/or redistribution would be consistent with broadcasters' public interest obligations. Furthermore, encrypted programming could not be unlocked by existing digital television receivers—which would punish the early adopters who have heeded the FCC's plea to move to DTV and might hurt broadcasters who rely on viewership to support their advertising revenues.[117]

Without encryption, consumer electronics manufacturers do not have the same technological imperative to cooperate with TPM schemes that they have in the MVPD context. They do not need to bargain with content owners or broadcasters over the keys to the content because it is broadcast in the clear.[118] So it seems unlikely that a restrictive TPM

114. *See* Declaratory Ruling, *supra* note 62, at 18,209-10, ¶ 27; *see generally* Bechtold, *supra* note 1, at 326-31 (discussing encryption-based TPMs); Rothchild, *supra* note 83, at 5-8 (same).

115. *See, e.g.* Crawford, *supra* note 30, at 606.

116. *See generally* Clark & Vaida, *supra* note 25 ("Technology companies argue that encryption can provide the anti-piracy solution for television signals, just as it has for DVDs, cable, and satellite systems. But few in Washington view that scenario as politically viable: The United States has a strong tradition of transmitting television unscrambled and available to everyone.").

117. *See generally* Broadcast Flag Order, *supra* note 2, at 23,560-61, ¶¶ 23-24 (describing transition problems that would be caused by encryption of DTV broadcasts at the source).

118. *See* Press Release, Final Report of the Co-Chairs of the Broadcast Protection Discussion Subgroup to the Copy Protection Technical Working Group, (June 3, 2002), *available at* http://www.mpaa.org/Press/Broadcast_Flag_BPDG.htm.

scheme would have been universally adopted for broadcast DTV without government intervention.[119] Unlike the Plug and Play Order, the Broadcast Flag Order probably did not avoid a more restrictive alternative. It imposed a TPM scheme where one otherwise would not have existed, albeit with a nod to some consumer freedoms.

Of course, the primary argument the FCC used to justify the Broadcast Flag Order was that without it the risk of massive redistribution of DTV programming would deter content owners from making their best content available via digital broadcasts. As opponents of the Order pointed out, however, that fear seemed premature (given the difficulty of redistributing DTV programming) and perhaps totally unfounded (given the amount of DTV content now available even without the protection of the broadcast flag).[120] I tend to agree that the FCC's speculation about the risk of infringement was insufficient to justify imposing a TPM scheme that would not otherwise have existed.

On the other hand, it is possible that a technology certification process like that contemplated by the Broadcast Flag Order could encourage innovation by giving agency imprimatur to consumer electronics equipment that might otherwise be stifled by the threat of secondary liability for copyright infringement. Indeed, part of the MPAA's opposition to the approval of TiVoGuard (one of the thirteen broadcast flag technologies approved by the FCC in 2004) was its fear that the FCC's approval could lend legitimacy to technology that might otherwise be suppressed by copyright owner disapproval. The group argued to the FCC that "[t]he harm to be considered . . . is not just that stemming from the millions of TiVo users, but from the users of other, similar, technologies as well, and the potential legitimization of technologies that operate in the absence of authorization from the copyright owners."[121] For those who favor technological innovation unconstrained by the demands of copyright owners, there are clear benefits from this "legitimization" of technology that might otherwise be chilled by the threat of copyright infringement lawsuits.

Of course, the Broadcast Flag Order's certification process did not formally insulate TiVo from copyright liability. But compliance with such a regulatory scheme could surely help to demonstrate that a technology is not being deployed "with the object of promoting its use to

119. *See* MPAA Comments, *supra* note 78, at 7 n.11 (distinguishing the plug and play situation "from that of digital broadcast television, where no private content protection solution is possible").

120. Petitioner's Opening Brief, *supra* note 5, at 51-54.

121. Legal and Policy Issues Raised by TivoGuard, *supra* note 102.

infringe copyright," one standard for secondary liability according to the Supreme Court's recent decision in *Metro-Goldwyn-Mayer Studios, Inc. v. Grokster*.[122] Looking forward, if Congress grants the FCC authority to regulate along the lines of the Broadcast Flag Order, it could do so in a way that does create a formal safe harbor from copyright liability for those technologies that comply with specified TPM schemes.[123]

## CONCLUSION

For those concerned with preserving the balance that has long been considered central to wise copyright policy-making, the practical impact of governmental TPM regulation depends on the complex interaction of the regulation with voluntary TPM measures and with the risks and incentives faced by technology developers and content creators. If industry might adopt restrictive TPMs in the absence of a government mandate (as it was doing in the Plug and Play context), then detailed regulations that endorse but also limit TPMs might be better than the unregulated alternative. And if copyright holders can use the threat of lawsuits to pressure electronics manufacturers into limiting product features, then a regulatory process that lends legitimacy and gives safe harbor to those features—as a revised Broadcast Flag Order could—might encourage more innovation than it inhibited.

In light of this complex interaction, the FCC may have a constructive role to play in digital copyright policy—especially when it comes to imposing limitations on restrictive TPMs that are unlikely to be disciplined by market forces. Both the Broadcast Flag Order and, even more so, the Plug and Play Order demonstrate the FCC's willingness to limit TPMs in an attempt to preserve consumer freedoms that have played an important part in balanced copyright policy.

As we move beyond the invalidated Broadcast Flag Order, we should keep in mind the possibility that the FCC can usefully contribute to good TPM policymaking. That said, I hope that any successor to the Broadcast Flag Order is crafted with more care than the first one was. The Broadcast Flag Order imposed a TPM scheme where one otherwise might not have arisen, without offering a compelling explanation for its necessity and effectiveness. And while the certification process created by the Order may have usefully legitimized some otherwise controversial technologies, it did not create the kind of safe harbor that might reliably

122. 125 S.Ct. 2764, 2780 (2005).

123. The notion of a safe harbor from secondary liability is already part of the Copyright Act. 17 U.S.C. § 512 specifies actions that Internet Service Providers can take to avoid secondary liability for materials transmitted though or residing on their systems.

incubate technological innovation.

The Broadcast Flag Order was a failure. But its failure should not prevent us from thinking creatively about the FCC's potential to regulate technological protection measures in the public interest. Preservation of the public's rights under copyright law may in some cases require more regulation, not less. And the FCC may be the right agency to take up that task, if only it acknowledges and takes seriously the intersection between Communications and copyright.

# THE QUESTION OF SPECTRUM: TECHNOLOGY, MANAGEMENT, AND REGIME CHANGE

GERALD R. FAULHABER*

ABSTRACT

There is general agreement that the traditional command-and-control regulation of radio spectrum by the FCC (and NTIA) has failed. There is no general agreement on which regime should succeed it. Property rights advocates take Ronald Coase's advice that spectrum licenses should be sold off and traded in secondary markets, like any other asset. Commons advocates argue that new technologies cannot be accommodated by a licensing regime (either traditional command-and-control or property rights) and that a commons regime leads to the most efficient means to deliver useful spectrum to the American public.

This article reviews the scholarly history of this controversy, outlines the evolution of FCC thinking, and parses the question of property rights vs. commons into four distinct parts: new technology, spectrum uses, spectrum management, and the overarching legal regime. Advocates on both sides find much to agree about on the first three factors; the disagreement is focused on the choice of overarching regime to most efficiently and effectively make spectrum and its applications available to the American public. There are two feasible regime choices: a property rights regime and a mixed licensed/commons regime subject to regulation.

* Professor, Business and Public Policy, Wharton School, University of Pennsylvania, Philadelphia, PA 19104. This research has been undertaken while the author is on scholarly leave at the Penn Law School. The author would like to thank Professor Gideon Parchomovsky (Penn Law) for his expert and very generous guidance in matters of legal scholarship, as well as Professor David J. Farber (Carnegie Mellon University), Professor Jason Johnston (Penn Law), Polk Wagner (Penn Law), Thomas Hazlett (Manhattan Institute), Evan Kwerel and John Williams (Federal Communications Commission). The Honorable Stephen F. Williams (DC Circuit Court of Appeals), Professors Chris Sanchirico (Penn Law), Philip Weiser (CU Boulder Law), Dale Hatfield (CU Boulder Interdisciplinary Telecommunications Program), Ellen Goodman (Rutgers-Camden Law) and the participants at the "Digital Broadband Migration: Rewriting the Telecom Act" conference at CU Boulder, Feb. 13-14, 2005 contributed comments both significant and helpful, for which I am appreciative.

The regime choice depends upon four factors: (1) dispute resolution, (2) transaction costs, (3) tragedies of the commons and anticommons, and (4) flexibility to changing technologies and demands. Each regime is described and analyzed against these four factors. With regard to pure transaction costs, commons may hold a small advantage. For all other factors, the property rights regime holds very substantial advantages relative to the mixed regime. I conclude that the choice comes down to markets vs. regulation as mechanism for allocating resources.

## INTRODUCTION

The use of the electromagnetic spectrum for telecommunications and other functions has traditionally been closely regulated by government agencies in most countries. In the U.S., television and radio broadcasting, microwave transmission, cellular and cordless phones, CB and family radio, amateur (ham) radio, and more recently WiFi and other home networking technologies all operate under frequency assignments, power constraints and location restrictions established and enforced by the Federal Communications Commission (FCC).[1] This system was established by the 1927 Radio Act, initially administered by the Federal Radio Agency and then by the FCC since its inception in 1934. Generally, broadcasters of radio energy must apply for and receive a license,[2] which sets forth restrictions on the frequency, power limit, and perhaps direction and time of day that the licensee is permitted, and also sets forth the specific use permitted by the license, such as FM broadcasting, cellular telephony, taxi dispatch, and so forth. These licenses are generally time-limited, but there is a strong presumption of renewal of the license at its expiration.

The rationale for maintaining this extensive licensing system is *radio interference*. Interference occurs when two or more signals of the same (or similar) frequency and power arrive at a receiver simultaneously, and the receiver cannot distinguish between the wanted signal and the

1. The National Telecommunications and Information Agency of the Department of Commerce manages all federally operated spectrum, such as used by the Department of Defense, Federal Aviation Agency, and so forth. The FCC regulates all other spectrum.

2. As we shall see in detail below, the FCC has also set aside important frequency bands for unlicensed use, such as cordless phones, garage door openers and WiFi.

interfering signal(s). In the early days of radio, conflicting broadcasters in the same geographic area interfered with each others' signals, so that listeners could not enjoy their preferred broadcasts. By assigning broadcasters to specific frequencies in specific localities and limiting their broadcast power, the FCC created an interference-free space in which listeners could hear their preferred broadcaster. Specifically, the FCC allocated broad swaths of frequency to particular uses, such as radio broadcast, taxi dispatch, and police and fire services. Within each swath and in each locality, particular users were licensed to use specific frequencies, such as a radio broadcaster or a police department. Thus, the use of the frequency was also constrained; taxi dispatch services, for example, could not be used by radio broadcasters. This frequency/location/power/use allocation mechanism was a feasible approach for early radio to solve the interference problem, and has remained so up until recently, as new technologies are becoming available.

The purpose of this paper is to review the current state of the property rights vs. commons debate, to parse the question into its constituent parts in order to clarify where the disputants agree and where the disputants disagree, and to focus attention on the four key properties of the overarching legal regime: dispute resolution, transaction costs, tragedies of the commons and anticommons, and flexibility for changes in technology and demands. Part I reviews the history of spectrum management and the evolution of the academic debate surrounding it. Part II examines practical considerations of the FCC concerning property rights, commons, and non-interfering easements. The reader well-versed in this ongoing debate may skim these sections without loss, moving quickly to Part III, which parses the problem into areas in which commons and property rights advocates agree and the one area (the overarching legal regime) in which they do not. Part IV assesses the merits and drawbacks of each regime in terms of transaction costs, dispute resolution, and flexibility to respond to future changes in technology and demands. Part V contrasts the differing regimes in the light of three hypotheticals. I conclude that a property rights regime is substantially superior to a commons regime using these criteria.

## I. THE EVOLUTION OF THE SPECTRUM MANAGEMENT DEBATE

The history of spectrum management since the earliest days has been amply documented elsewhere;[3] I give only the bare outlines of that

3. *See* Ellen P. Goodman, *Spectrum Rights in the Telecosm to Come*, 41 SAN DIEGO L. REV. 269, 282 n.34 (2004) (summarizing several versions of this history). *See also* Yochai Benkler, *Overcoming Agoraphobia: Building the Commons of the Digitally Networked Environment*, 11 HARV. J.L. & TECH. 287, 298 (1998); Gerald Faulhaber & David Farber,

history, relevant to the purposes of this paper.

The command-and-control system of administrative allocation of frequency/location/power/use spectrum licenses was and is the dominant form of spectrum management regime throughout the developed world. As the uses of radio multiplied, the FCC and regulators around the world allocated and assigned spectrum for AM-FM radio, analog (and later digital) television, microwave communications, garage door operators, cordless phones, industrial and scientific purposes, amateur (ham) radio, airport and aircraft radar, CB radio, and a host of other applications. Such licenses were granted on the basis of the licensee operating "in the public interest," a rather elastic standard with widely varying interpretations over time. Conditions were often applied to the granting of such licenses, such as build-out requirements; licenses could be revoked if these conditions were not met. In practice, however, the grant of a license was a grant in perpetuity, and was quite difficult for the FCC to recover should spectrum needs change.[4]

As might be expected, this highly inflexible bureaucratic allocation mechanism has given rise to huge inefficiencies, noted by virtually all scholars and by the FCC itself.[5] The administrative licensing mechanism was initially challenged in a seminal article by Ronald Coase,[6] in which he questioned why licenses should be allocated by administrative fiat and suggested that radio licenses should be bought and sold like any other scarce commodity in our economy. In this

---

*Spectrum Management: Property Rights, Markets, and the Commons*, *in* RETHINKING RIGHTS AND REGULATIONS: INSTITUTIONAL RESPONSES TO NEW COMMUNICATIONS TECHNOLOGIES, (Lorrie Faith Cranor & Steven S. Wildman eds., 2003); 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).

4. *See* JONATHAN E. NEUCHTERLEIN & PHILIP J. WEISER, DIGITAL CROSSROADS 225-60 (2005).

5. For example, in the 1950s, the FCC designed the experiment of UHF television, committing 330 Mhz of frequency space in locations around the country, in the hopes of fostering localism in broadcasting. This experiment failed; however, as there are hundreds of license holders throughout the U.S. that continue to hold onto these licenses, and so the spectrum cannot be used for any other purpose. *See* Faulhaber & Farber, *supra* note 3, at 197. The value of this underutilized spectrum can be inferred from the fact that the entire frequency bandwidth devoted to digital wireless cellular service is no more than 180 Mhz. Opening up the current UHF band to wireless could almost double the capacity of the U.S. wireless industry. Additionally, studies by Agilent Technology of the power spectrum in Santa Rosa, CA show that aside from the fairly narrow digital wireless bands and the WiFi band, virtually all the spectrum between 1.5 Ghz and 3.0 Ghz is almost completely unutilized. And a recent study in Brussels, Belgium finds similar vast underutilization of spectrum in a major European city. *See* Patrick S. Ryan, *Some Tests of Spectrum Usage in Brussels, Belgium*, DROIT & NOUVELLES TECHNOLOGIES (Sept. 28, 2004) (Belg.), *available at* http://ssrn.com/abstract=603581.

6. R. H. Coase, *The Federal Communications Commission*, 2 J.L. & ECON. 1, 25–26, 35–38 (1959).

model, radio licenses would be owned by the licensee, who would have the right to use, exclude use by others, buy, sell, lease, subdivide and aggregate the license. Coase asked the obvious question: why should this valuable commodity be allocated by a regulatory agency, as if the U.S. were a planned economy? Why not treat licenses as we do every other good in our market economy, and let it be bought and sold? In that way, the market would assure that radio licenses would migrate to their highest valued use, rather than migrate to those whose political and bureaucratic power was strongest.

Apparently, this question was not quite so obvious to others at the time. Although Professor Coase was later awarded the Nobel Prize in Economics, his idea of marketable spectrum licenses was considered radical in the extreme at the time, bordering on the crackpot. Indeed, in 1959 the FCC invited Professor Coase to testify about his proposal for market allocation of radio spectrum rights. FCC Commissioner Philip S. Cross asked the first question: "Is this all a big joke?"[7] A University of Chicago colleague called this "an insight more fundamental than we can use."[8] Eventually, Coase's idea took root.

Coase's insight was that substantial inefficiencies would result from government allocation of this valuable commodity, a fact now firmly documented, both in the U.S. and abroad.[9] He accepted that the unit of transaction was the frequency/locality/power/use[10] license (as indeed there were no other options at the time); his remedy was to replace the administrative bureaucratic allocation mechanism with discipline of market allocation.

Coase's ideas did not take root until much later, and only then incompletely: the U.S. Congress permitted the FCC to conduct auctions of spectrum licenses in 1993, and the FCC held its first auction in 1995.[11] Other countries have followed suit. However, these licenses are as constrained in that once won at auction they cannot be bought and sold without FCC review and permission. However, the partial adoption

7. Hazlett, *supra* note 3, at 337.

8. Goodman, *supra* note 3, at 270 (citing Harry Kalven, Jr., *Broadcasting, Public Policy and the First Amendment*, 10 J.L. & ECON. 15, 30 (1967)).

9. *See* Thomas Hazlett, *Liberalizing US Spectrum Allocation*, 27 TELECOMMS. POL'Y, 485-99 (2003), *available at* http://www.manhattan-institute.org/hazlett/TP.TWH.8.03.pdf.

10. Professor Coase seems to have not included "use" in his definition of a marketable spectrum license, relying only on frequency, location, and power. Later advocates of marketable licenses have adopted this approach. A much more complete proposal for defining complete property rights in spectrum licenses is contained in Arthur S. De Vany et al., *A Property System for Market Allocation of the Electromagnetic Spectrum: A Legal-Economic-Engineering Study*, 21 STAN. L. REV. 1499 (1969) (proposing a frequency/location/power paradigm and time as well, assuming time sharing of licenses, with no use restrictions).

11. New Zealand and India preceded the U.S. in employing spectrum auctions.

of Coase's ideas is perhaps best viewed in the broader sweep of policy thinking of the latter half of the 20th century, towards market-based allocation mechanisms and away from administrative and regulatory allocation mechanisms, popularly referred to as deregulation. This mode of economic thinking has become something of the received wisdom in policy circles, both in the U.S. and abroad. The partial acceptance of Coase's ideas concerning market-based allocation of spectrum licenses coincided with the acceptance of market-based approaches over regulation approaches to policy issues.

### *A. Round 1: Market Allocation of Licenses vs. Commons*

During the 1990s, a number of economic scholars published a series of articles elucidating and elaborating the idea of market-based spectrum license allocation, maintaining a gentle pressure on the public policy process to move in this direction.[12]

In sum, economists have sought a regime change: from administrative bureaucratic allocation of licenses to market allocation of licenses. They have done so for the simple Coasian argument put forward in 1959: to vastly increase the economic efficiency of the use of this important resource.

However, a challenge to this reform proposal came from a group of technologists and legal scholars who agreed with the economic critique that regulation had resulted in great inefficiencies, but sharply disagreed with the market-based remedy. They noted that new technologies permitted new forms of interference avoidance that did not rely on the frequency/location/power paradigm. Instead, these new technologies would use processing power and real-time avoidance systems to solve the interference problem without the restrictions of frequency/location/power licenses. Advocates of this approach argue that a commons regime is far more appropriate than a license/property regime for these new technologies, and they predict tremendous spectrum abundance through the use of these new technologies in a commons environment. Technologists and legal scholars (and indeed some economists) also seek regime change: from administrative

12. Thomas W. Hazlett, *Assigning Property Rights to Radio Spectrum Users: Why Did FCC License Auctions Take 67 Years?*, 41 J.L. & ECON. 529, 534 (1998); Evan Kwerel & Alex D. Felker, Using Auctions to Select FCC Licensees (FCC Office of Plans and Policy, Working Paper No. 16, May 1985), *available at* http://www.fcc.gov/Bureaus/OPP/working_papers/oppwp16.pdf; Gregory L. Rosston & Jeffrey S. Steinberg, *Using Market-Based Spectrum Policy to Promote the Public Interest*, 50 FED. COMM. L.J. 87, 93 (1997); Pablo T. Spiller & Carlo Cardilli, *Towards a Property Rights Approach to Communications Spectrum*, 16 YALE J. ON REG. 53 (1999); Lawrence J. White, *"Propertyzing" the Electromagnetic Spectrum: Why It's Important, and How to Begin*, 9 MEDIA L. & POL'Y 19 (2000).

bureaucratic allocation of exclusive licenses to a commons regime, a radical approach that appears to be supported by these new technologies.[13]

Two technologies and one architecture of particular interest are: (i) agile radio (sometimes referred to as cognitive radio, one of a general class called software-defined radio); (ii) ultrawideband; and (iii) mesh networks.[14]

1. Agile Radio

"Agile" radios are devices in which a radio can determine if a specific frequency band is currently in use, emit in that band if not, and switch to another band in microseconds if another user begins to emit in that band. Agility may be hardwired into a device, but it may also occur in the form of software defined radio (SDR), a term that covers a rather broad category of devices and includes any device in which the received radio signal is processed by software.[15] Both transmitter and receiver must be agile for this system to function. For example, in principle an agile radio transmitter could use an empty ham radio band (or government military band) to communicate with an agile radio receiver; should a ham operator (or military user) start using that band, the transmitter would shift to another band within microseconds (the receiver presumably shifting as well, according to a pre-arranged script) and the agile radio communication could continue while the ham operator used the original band. Provided the agile radio switches its emissions to another band, it need not interfere with the ham band.[16] As long as there are sufficient frequency bands so that the agile radio pair can always find an unused band, agile radio achieves a more efficient use of bandwidth without interference with existing licensees.

Agile radio creates this increased efficiency by *dynamic* allocation of spectrum, rather than the current *static* allocation approach, common to both the current licensing regime and a property rights regime.[17] For many purposes, static allocation is the efficient solution; AM-FM and

13. The first writings to call for this regime change are, inter alia, LAWRENCE LESSIG, THE FUTURE OF IDEAS 221–22 (2001); *and* Benkler, *supra* note 3.

14. This technology description is taken from Faulhaber & Farber, *supra* note 3, at 193, 205-07.

15. An excellent non-engineering description of this technology appears in David Marsh, *Software Defined Radio Tunes In*, EDN 52 (Mar. 3, 2005), *available at* http://www.edn.com/contents/images/505082.pdf. My thanks to David Farber for bringing this article to my attention.

16. Current technologies that use "listen before talk" may not completely avoid interference with agile radio. Some form of "get permission before talk" may be necessary.

17. *Within* a licensed frequency band, the licensee may use dynamic allocation; in fact, conventional cellular systems today multiplex many users on a common group of channels dynamically.

TV broadcasting of continuous content to the existing huge base of relatively simple receivers will be a very important spectrum use for years to come, and static allocation works perfectly for this application. But dynamic allocation for certain uses can improve the efficiency of spectrum allocation, perhaps dramatically. In light of the inefficiencies of the current licensing regime, this would appear to be an important improvement. Note, however, this is not without cost; dynamic allocation not only requires substantially more sophisticated transceivers but may also use frequency space for needed signaling purposes.

Agile radio is not without problems. Currently, if a licensee experiences interference, it has only a few neighbors who are likely causing that interference, and can easily check out the source of the interference and take action to suppress it. But since agile radios may be able to transmit anywhere in the spectrum, an interfering agile radio may evade detection and identification, so that victims of its interference have no clue as to the responsible party. Although some have called this "opportunistic" radio, perhaps "hit and run" radio is more deserved. It may be the case that technology will eventually fix this problem, but it appears to be very far from being fixed at this writing.

### 2. Wideband

Wideband radio emissions can be used for a variety of purposes, including ground penetration, through-the-wall imaging, and short-range "radar" for vehicles. It can also be used for two-way communications. The most successful wideband application today is spread spectrum, used in many cordless phones. This technology allows a signal to be "spread" across a range of frequencies, trading off power for bandwidth. Ultra-wideband (UWB) operates similarly but in a more extreme form. The signal to be transmitted is captured in small time intervals (about 1 microsecond) and the signal is converted to a set of very short pulses (about 1 picosecond) and these pulses are broadcasted over a very wide bandwidth (greater than 1 GHz); the broadcaster emits this picosecond pulse in a time slot every microsecond at very low power; the receiver (which must be synchronized) picks up the low power signal over this wide bandwidth, and converts it back to (a very good approximation of) the original signal.

UWB radios essentially trades lots of power for lots of bandwidth. The power per unit of bandwidth of the emission is extremely low;[18] for most purposes, it is part of the background radio noise, and non-UWB receivers that are designed to reject noise would not recognize the signal,

18. With the exception of ground-penetrating radar (GPR), which is quite powerful and would be an interfering use if not pointed into the ground.

so there is no interference with high-powered broadcasters. The useful range of UWB at these power levels is rather short, at most a mile or two. Interference with other UWB emitters is unlikely; emitters more than, say, five miles apart can use the same transmit time slot without interference with each other, and there are many time slots. Additionally, UWB is fault-tolerant, in that the frequency pattern transmitted in the picosecond burst can suffer some degradation and the original signal can still be recovered.

On the other hand, the bandwidth of the UWB signal spans a large fraction of the total frequency available to all, and appears (if undetected) at many frequencies for which licensees hold exclusive use.[19] Some license holders that purchased their licenses at auction have objected that UWB is a violation of their frequency license, regardless of the fact that it cannot be detected or otherwise interfere with their use of the license.[20]

### 3. Mesh Networks

Wireless mesh networking is a wireless architecture that can use different forms of radio transmission, including UWB, agile radio, even cellular. A mesh network of, say, computers[21] in a neighborhood could communicate (possibly at high bandwidth) with a nearby computer similarly equipped that could connect directly into the Internet (or possibly the telephone network).[22] Indeed, the connection may pass through many computers before connecting to the Internet, relaying the connection from one mesh point to the next, and the next. To help establish the mesh, wireless Network Access Points (NAP) could be seeded throughout the mesh region as relay points, in addition to the existing computers. Apart from the few NAPs required to seed the network, there is no infrastructure such as cables or fiber optics needed for mesh networks. The wireless devices themselves form the network,

19. Note that UWB radio could broadcast at much higher power and have a greatly extended range; however, that would lift emissions out of the noise and become an interfering use. Even now, certain existing low power uses such as Global Positioning System (GPS) receivers claim UWB can cause interference with their systems if operated at somewhat higher power levels than recently approved by the FCC.

20. Comments of Sprint Corp., to the *Public Notice* in Spectrum Policy Task Force Seeks Public Comment on Issues Related to Commission's Spectrum Policies, 10–11, ET Docket No. 02-135 (July 8, 2002), *at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513201188.

21. Mesh network architecture can be used not only for computers but also for voice and indeed any radio transmission; it can also be used with a mix of transmission technologies, such as agile, UWB, cellular, CB radio, etc.

22. A current example of a mesh network is Metricom's Ricochet network (now emerging from bankruptcy) which had some thousands of users in multiple cities at its peak. Metricom was based on ideas and patents of Paul Baran (*see* http://www.ricochet.net). Ricochet is NAP-based rather than peer-to-peer based.

much as the Internet currently operates.

Mesh networks use much less power than conventional systems which need every computer to reach a central antenna. A mesh networked computer need only reach the nearest networked computer, and thus needs less power. The architecture takes full advantage of the relay capabilities of the mesh devices to lower power requirements and therefore minimize interference problems. Because of this, mesh networks are claimed to actually increase their capacity as the geographic density of users increases, a claim dependent upon a smooth distribution of devices and an absence of bottlenecks that may not obtain under field conditions. In other networks (such as cellular), increasing density actually decreases available capacity because of interference.

If mesh networks are so wonderful, one might ask why do we not see them in practice? In fact, mesh networks have a number of very practical difficulties that must be overcome before they are field-practical. (i) The density of devices in a geographic area must be relatively high in order for low-power mesh networks to hop from device to device. This is a particular problem for a new service in which device densities are necessarily low. It is also a particular problem for a mobile service in which device density changes minute to minute as devices move around. (ii) Owners of devices must be willing to leave their devices connected and powered in order to act as a relay for others. However, being a relay has no immediate benefit and drains battery life, giving users an incentive to "free ride" and not provide relay functions. (iii) Communications are likely to travel over many links before they reach their destination, resulting in delays. Human conversation is highly sensitive to such delays and mesh networks are unlikely to be useful for voice traffic.[23] These problems may yet be overcome with new technology, but nothing on the immediate horizon suggests solutions to these problems.

### 4. Technology Assessment

The potential for these new technologies to vastly improve the efficiency of spectrum use is very promising. However, there are three points to keep in mind in evaluating the role of these technologies. First, none of these technologies are currently deployed in a commercial setting; they exist in theoretical papers, lab results, and early field tests.[24]

---

23. Delay in transmission is called "latency" in engineering. Certain applications, such as voice telephony, require very low latency to be useful. Other applications, such as e-mail, do not.

24. In fact, each of these technologies as they exist today has technical and operational difficulties that prevent its early deployment. UWB is perhaps closest to deployment, but is a very low power service, and thus only appropriate for services in which transmitters and

Second, while these technologies may enable a commons regime (if they completely supplant existing technology), they are perfectly capable of deployment in the context of a licensing/property regime; they are a necessary but not sufficient condition for a commons regime. Third, there are many applications for which the new technologies are simply an unnecessary expense: TV/radio broadcasting, airport radars and a host of other high-powered dedicated uses are much better served via exclusive licensing. This is not to imply that these technologies will not become increasingly important; they certainly will. But it does mean that (i) this will not happen tomorrow; (ii) they can work their efficiency magic in either a commons regime or a property regime; and (iii) they are very unlikely to supplant exclusive licenses for all or even most uses.

The enthusiasm of the early work on commons and the new technologies suggested that all of wireless communications could be managed as a commons regime, doing away with all exclusive use and permitting users to self-manage their own frequency spaces through voluntary limited commons and protocol agreements among manufacturers. The early papers suggested that there may be some limited role for regulation, to ensure the proper functioning of the commons, but that this regulation was to be "light." The commons was to be largely self-regulating, drawing on ideas of communities managing a resource for mutual gain. There were to be no intermediaries, such as cell phone companies or other service providers. Services would be provided by the users and the devices they used, and interference would be controlled using protocols embedded in hardware.

This vision appears strikingly similar to the pre-1995 Internet of John Perry Barlow, and the early authors certainly come from this tradition. There are several related policy ideas that commons authors share, such as opposition to copyright and other intellectual property mechanisms, and a general concern over the degradation of the intellectual commons in American life.[25] These writings have a strong

receivers are quite close. Agile radios (indeed, software defined radios) are still rather costly to produce, and the protocols needed to behave well in an opportunistic setting are still on the drawing board. (*But see* Marsh, *supra* note 15, for a thorough analysis of SDR's problems and prospects). Mesh networks is actually a rather old idea; the Internet itself can be thought of as a mesh network, albeit not a wireless mesh. In order for a mesh network to provide an acceptable quality of service to its customers, there must be a fairly dense deployment of communicating devices and/or NAPs. This is difficult to guarantee with mobile devices, where density (devices/mi$^2$) can vary dynamically. Additionally, the use of many relay points in the mesh prior to connecting to the Internet or telephone network can introduce delays that are unacceptable to latency-sensitive applications such as voice. Again, this is not to say that these problems cannot be solved; it is to say that they won't be solved tomorrow and these technologies may well yield less than today's theoretical models promise.

25. *See* LESSIG, *supra* note 13, for a powerful statement of this vision, of which spectrum commons is but a small part.

tenor that ownership (of spectrum license, of copyrights, of patents. . .), especially by corporations, leads to exclusion and resource underutilization, while commons ensures full access untrammeled by profit-seeking intermediaries.[26] The commons is asserted to be a superior mechanism for encouraging free speech, although no proof is offered for this highly debatable proposition.[27] Similar arguments are used to illustrate how the Internet, the quintessential commons, is being taken over by corporations.[28]

In "Round 1" of this conflict of ideas, economists approach spectrum management as the next battle of market forces against *dirigiste* regulation. Technologists and some legal scholars approach spectrum as the next battle to save the commons and "public spaces" such as the Internet and public domain writings against rapacious corporations. In both cases, spectrum management is part of a larger intellectual and policy agenda; unfortunately, the topic has become something of a battleground for the larger issues. This paper has a much more modest objective: to focus on the spectrum management issue exclusively, with the normative goal of achieving efficient and effective mechanisms for deploying spectrum resources to the American people. I find much merit in both of the "big ideas," but this paper is about spectrum management only; there is no larger agenda.

### *B. Round 2: Non-Interfering Easements*

In 2001-2003, the spectrum management issues were joined in a series of conferences and moot courts, in which property rights vs. commons conflict was hotly debated. Several papers grew out of this ongoing debate.[29] But the overall picture was accommodation: commons advocates recognized that there was a continuing need for dedicated

26. *See* LAWRENCE LESSIG, FREE CULTURE (2004).

27. Consider, for example, the ability of an individual caller to CNN's "Larry King Live" television show to make her views known to the world and to that evening's high-powered guest, compared to the paltry audience reachable via a cable system's public access channel. The former venue is a private network carried over private cable systems or licensed broadcast TV, to a huge audience. The latter venue is an open access commons, which most viewers avoid like the plague.

28. *See* LAWRENCE LESSIG, CODE AND OTHER LAWS OF CYBERSPACE (1999).

29. On the commons side, *see, e.g.*, Yochai Benkler, *Some Economics of Wireless Communications*, 16 HARV. J. L. & TECH. 25, 82–83 (2002); Stuart Buck, *Replacing Spectrum Auctions with a Spectrum Commons*, 2002 STAN. TECH. L. REV. 2 (2002), *available at* http://stlr.stanford.edu/STLR/Articles/02_STLR_2/article_pdf.pdf; 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, 778–80 (1998). On the property rights side, *see, e.g.*, Stuart Minor Benjamin, *Spectrum Abundance and the Choice Between Private and Public Control*, 78 N.Y.U. L. REV. 2007 (2003); Faulhaber & Farber, *supra* note 3; James B. Speta, *A Vision of Internet Openness by Government Fiat*, 96 NW. U. L. REV. 1553, 1572 (2002) (reviewing LESSIG, *supra* note 13).

spectrum for applications such as radars and AM-FM broadcasting, so that the regime of the future must accommodate both licensed exclusive use spectrum and commons spectrum. Professor Benkler[30] suggested that the FCC oversee a ten-year experiment, managing licensed spectrum and commons spectrum side by side, until it became clear which alternative was superior. Property rights advocates noted that the success of unlicensed spectrum[31] set aside by the FCC suggested that the regime of the future must accommodate unlicensed use. In particular, Faulhaber-Farber proposed a commons-type structure within a property rights regime in the form of a *non-interfering easement* applicable to all (or most) license property, in which the property owner must accept the use of his frequency/location/power license by anyone who does not interfere with his own use (which has absolute priority).[32] For example, low-power UWB would be covered by this easement, to the extent that it operates under the noise floor[33] and creates no interference.[34] Agile radio would also be covered to the extent that agile users leave a frequency band within microseconds of the owner initiating the use of this band, and otherwise cause no interference. Both sides also recognized that there were very substantial uncertainties regarding the future development of both wireless technologies and the uses for wireless, and any regime adopted had to be capable of adaptation as these uncertainties resolved themselves in the coming years. The only feasible regime was one that was flexible enough to adapt to change. Neither commons nor exclusive licenses could be ruled out at this time.

---

30. Benkler, *supra* note 29.

31. I use the term "success" advisedly; a true success would involve a demonstration that the net benefit of unlicensed use exceeds the net benefit of deploying the same spectrum in other licensed uses (such as cellular telephony). While we have some estimates of both market value and social value of licensed spectrum, we have no such estimates for unlicensed spectrum. In this instance, "success" is defined modestly: unlicensed spectrum seems to work for its intended use.

32. Faulhaber & Farber, *supra* note 3, at 208-09. In principle, a market in spectrum rights could achieve the same goal; opportunistic users could bargain in real time with license owners for temporary underlay rights. However, the transaction costs of such a real-time pricing system for opportunistic uses seem excessive; the non-interfering easement would avoid these costs, although the easement is not without costs. A very similar proposal is made in Benkler, *supra* note 29, at 55.

33. Note that the actual level of the noise floor, below which signals are unintelligible, is not a constant of nature; it may depend upon the sensitivity and selectivity of the assumed receivers of the signal.

34. This would appear to be similar to the FCC's Interference Temperature proposal, which proposes using "white space" between the noise floor and the "usable" floor in licensed spectrum for unlicensed use. *See* Establishment of an Interference Temperature Metric to Quantify and Manage Interference and to Expand Available Unlicensed Operation in Certain Fixed, Mobile and Satellite Frequency Bands, *Notice of Inquiry & Notice of Proposed Rulemaking*, 18 FCC Rcd. 25,309 (2003). The proposed non-interfering easement is agnostic regarding the particular noise level, and is neither and endorsement nor a rejection of the interference temperature proposal.

In this Round, several "tragedy" arguments surfaced. Property rights advocates criticized commons advocates for ignoring the "tragedy of the commons," which arises when a free resource is over-used and over-congested. The classic example is open ocean fisheries, such as the Grand Bank off the coast of Newfoundland, traditionally the richest fishery in the world. As the technology of fishing improved, commercial fishermen increased their catch dramatically and eventually depleted the resource almost completely. Since the fishery commons was available to all, no one was responsible for the overall health of the resource; the incentive of each individual fisherman was to take as much as possible from the resource, because if they didn't someone else would. Commons advocates argued that the new technologies freed up so much spectrum that it would be abundant; scarcity would be a thing of the past, and there would be enough for all. The tragedy of the commons would not occur because spectrum would be so abundant. Further, protocols embedded in device hardware would ensure against interference and the tragedy of the commons.

Commons advocates also alluded to the "tragedy of the anticommons," a problem that occurs with private property.[35] Suppose a town or developer wants to put together a large parcel of land for a project, such as a beachfront walkway or a shopping center. This requires the aggregation of land; since the land is usually contiguous parcels, the town/developer must deal with certain buyers, who are likely to hold out for a large payment, recognizing that the project can only happen if they agree. In the context of spectrum, the anticommons problem appears to preclude the aggregation of small parcels of contiguous spectrum into larger swaths that may be required for a government to provide a commons. This is actually a re-badging of the "holdup" problem, well-known in both law and economics, and it suggests that market transactions of private property can be quite difficult in the case of aggregation.

Round 2 thus moved the opposing sides somewhat closer, but neither could claim a conceptual breakthrough. The concept of a non-interfering easement appeared to add something novel to the mix.[36] What is perhaps more important is that both sides recognized the importance of transaction costs and dispute resolution in determining the

35. *See* Michael A. Heller, *The Tragedy of the Anticommons: Property in the Transition from Marx to Markets*, 111 HARV. L. REV. 621 (1998). An economic model of the anticommons is in James M. Buchanan & Yong J. Yoon, *Symmetric Tragedies: Commons and Anticommons*, 43 J. L. & ECON. 1 (2000).

36. While the easement concept was novel to the debate, it is very similar to the well-established concept of secondary allocation, in which a licensed or unlicensed device can use a frequency band provided it caused no interference. There are minor differences between the two concepts, but this approach is neither radical nor untested.

optimal regime for the future of spectrum. This changed the tenor of the debate from philosophical/ideological to practical and results-oriented. At the end of the day, what matters is how effectively either regime gets spectrum into the hands of those who value it most. Commons advocates claimed that a market in licenses would have large transaction costs and dispute resolution would be very costly. Property right advocates noted that commons advocates had yet to address the problem of transaction costs and dispute resolution in a commons system, but simply hoped that a regulator would resolve all such problems, without addressing the costs of regulation. While the "tragedies" of commons and anticommons were raised, there was no resolution. However, this round of writings simply suggested that this was the appropriate research agenda if we wished to make progress on determining the better regime for spectrum management.

### *C. Round 3: Practicality of Property Rights and Commons Regimes*

The current Round 3 of papers, of which this paper is one, attempt to drill down into the detail of how property rights and commons would actually work, considering issues of future flexibility, transaction costs, and dispute resolution.[37] While by no means free of ideology, the papers of Round 3 are more focused on problem solving and less concerned with lofty visions of how the world ought to be. Werbach, for example, proposes his supercommons as a way for exclusive licenses and commons to cohabitate, but with a strong preference for commons.[38] Goodman is more focused on dispute resolution; her most valuable contribution is a very thorough analysis of how nuisance law is an inefficient mechanism for dispute resolution, presumably in a property rights regime.[39] She recommends regulation of a combined licensed and commons spectrum.

## II. THE FCC'S FORAY INTO PROPERTY RIGHTS, COMMONS, AND NON-INTERFERING EASEMENTS

The FCC was not insensitive to this debate; indeed, the Commission had instituted changes in the traditional command-and-control licensing model decades ago. One of the earliest and best known

37. *See, e.g.*, Stuart Minor Benjamin, *Spectrum Abundance and the Choice Between Private and Public Control*, 78 N.Y.U. L. REV. 2007 (2003); Goodman, *supra* note 3; Thomas Hazlett, *Property Rights and Wireless License Values* (AEI-Brookings Joint Center., Working Paper No. 04-08, Mar. 2004), *at* http://ssrn.com/abstract=519602; Kevin Werbach, *Supercommons: Toward a Unified Theory of Wireless Communications*, 82 TEX. L. REV. 863 (2004).

38. *See* Werbach, *supra* note 37.

39. *See* Goodman, *supra* note 3.

was CB radio, a personal wireless communication service that did not require owners of CB equipment to be licensed in order to broadcast and receive. The FCC set aside 40 voice channels in a frequency band that could be shared by anyone with FCC-approved equipment. All conversations were public in that they could be heard by anyone with a CB receiver. Early users of the service, primarily professional drivers, developed social protocols to facilitate effective sharing of the limited channels. The service became wildly popular in the mid-1970s, with sales increasing by a factor of ten, but by the end of the 1970s its popularity had waned. A number of other services were introduced in the 1970s and 1980s in so-called *unlicensed* spectrum, such as cordless telephones, garage door openers, and wireless weather stations (in which an outdoor sensor unit, mounted on the roof or outside wall of a home, communicated wirelessly with an indoor display unit). Most of these services were offered using "Part 15" devices, limited to certain frequency bands. They share a number of properties: (i) no license was necessary for a user to operate the device; (ii) a relatively small number of manufacturers produced the actual radio emitters, each of which was type-certified by the FCC; and (iii) perhaps most important, power levels were quite low. This latter property was crucial to the control of interference; users would not want their cordless phone conversations picked up by their neighbor's cordless phone, nor would they want their garage door opener to open their neighbor's garage door.[40]

In fact, frequencies devoted to Part 15 devices became a focus of innovation. New technologies could be tried out without making a substantial commitment to obtain licensed spectrum first. Perhaps the best-known success in this unlicensed spectrum is WiFi, a high-bandwidth short-range (100-250 ft) wireless technology which has become a standard for wireless home networking. It is also offered in public spaces, such as coffee shops, airports and hotels. Some municipalities have announced plans to deploy WiFi "hotspots" on utility poles and allow residents to access the Internet for free (or at low cost).[41]

The successful deployment of WiFi is a strong argument that a commons approach, in which interference is controlled by hardware, can

40. Apparently, even these low power levels were not sufficient to eliminate all interference. The FCC adopted a novel technology, spread spectrum, for use with 900 MHz cordless phones to secure phone calls (though this technology was strongly contested at the FCC). Garage door opener firms adopted a technique called "rolling codes" to eliminate opening neighbors' garage doors. Both these approaches presaged the technologies mentioned above: ultrawideband and agile radios. And both approaches suggest that there may be private means of resolving interference problems using technology rather than licenses, a key point of the commons advocates.

41. *See* Wireless Philadelphia Executive Committee Briefing, *at* http://www.phila.gov/wireless/briefing.html (last visited Oct. 8, 2005) (describing Philadelphia's well-publicized WiFi initiative).

work. The FCC has indeed been a "light" regulator of the unlicensed spectrum; it specified only frequency and power limits, and let the market decide what devices and what protocols would be deployed. In recent years, the FCC has dedicated new frequency bands for unlicensed use, and has indicated its intent to continue to do so.[42]

On a parallel track, the FCC has also moved strongly in a pro-market direction. Of course, the success of the auctions for PCS cellular services is the best-known market initiative, and the FCC continues to roll out new spectrum at auction. But the initial licenses sold at auction were still of the traditional form: they could not be bought, sold or leased without explicit FCC permission, and their use was tightly restricted: cellular licenses could not be used for TV broadcasting, and vice-versa. The FCC has been moving to relax both these constraints. A recent Report and Order seeks to establish an active secondary market in spectrum licenses by making FCC approval of such transfers virtually automatic (provided these transfers do not involve public safety).[43] The FCC also seeks to establish rules for band managers; firms that would hold the spectrum license and lease part or the entire spectrum to others.[44] Additionally, it has increasingly included "flexible use" in its service definitions, allowing licensees substantial freedom to deploy their licensed spectrum, provided they still abided by the technical (frequency/location/power) limits.

The FCC has also initiated consideration of the non-interfering easement concept suggested by Faulhaber-Farber,[45] at least in the context of ultrawideband. In this proceeding, the FCC is considering whether to authorize opportunistic uses of licensed spectrum when not being used by the licensee.[46]

The FCC also established a Spectrum Policy Task Force to take a broad look at spectrum management and to make recommendations to the Commission. It specifically examined the two options of property rights with markets, commons, as well as the traditional command-and-control regulation.[47] The Report recommends that all three models have a place in the overall FCC regulatory spectrum strategy: (i) continuing to allocate some spectrum at auction while relaxing constraints on use and

42. *See, e.g.,* Additional Spectrum for Unlicensed Devices Below 900 Mhz and in the 3 Ghz Band, *Notice of Proposed Rulemaking*, 19 FCC Rcd. 7545 (2004).

43. Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets, *Report & Order & Further Notice of Proposed Rulemaking*, 18 FCC Rcd. 20,604 (2003).

44. *See id.*

45. *See* Faulhaber & Farber, *supra* note 3.

46. *See* Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems, *First Report & Order*, 17 FCC Rcd. 10,505 (2002).

47. *See* FCC, SPECTRUM POLICY TASK FORCE REPORT, ET Docket No. 02-135 (2002), *at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-228542A1.pdf.

encouraging secondary market (essentially, simulating a true property rights model); (ii) continuing to allocate spectrum bands for common use, especially in the higher frequencies; and (iii) for certain legacy uses, such as TV broadcasting and public safety, continuing command-and-control.[48] Of course, the overarching legal regime would be regulation; both market-based licenses and unlicensed spectrum would still be subject to regulatory oversight and government allocation of spectrum.

This suggests that the traditional regulatory regime, universally despised by virtually all commentators and apparently the FCC itself, is being replaced by a regulatory regime that will contain within it both commons-managed spectrum and property rights/flexibly licensed managed spectrum (along with a legacy command-and-control sector, at least for some time). Should these trends continue, it is likely the end-state of this evolution is *end-state regulation* (as distinct from traditional regulation) which, in brief consists, of a regulator overseeing all spectrum, of which a large fraction is flexibly licensed-managed, a large fraction is unlicensed commons-managed, and a diminishing fraction is traditionally regulated. In the flexibly licensed-managed spectrum, licensees would own the licenses and could buy, sell, lease, subdivide and aggregate licenses, and use their spectrum for a wide range of uses at their discretion. They may also be subject to a non-interfering easement. The commons-managed, unlicensed spectrum would be subject to continued regulation as it is today. As conditions changed, the FCC could adjust the assignment of spectrum to commons vs. property rights, could change the rules under which each commons-managed patch of spectrum was governed, and may even change the property rights of licensees should they deem it necessary. For example, the Spectrum Policy Task Force Report suggests that the FCC may impose a "good neighbor" policy of "group[ing] technically compatible systems and devices in close spectrum proximity"[49] in order to increase efficiency of spectrum use.[50]

48. *See id.*

49. *See id.* at 22.

50. Although a transmitter may have a license to transmit only within a specified frequency band, its transmission may interfere with receivers in adjacent bands, either because the transmitter's power "leaks" into the adjacent band or because the receivers in the adjacent band cannot filter out the power emitted by the transmitter within its own band. Both transmitters and receivers are equipped with band-pass filters, devices that limit the power transmitted outside the required frequencies or limit what is received outside the required frequencies, but such filters are not perfect. For example, a low-powered use in a frequency adjacent to a high-powered use may experience interference, especially with poorly tuned receivers. Thus, interference is a function of both the quality of the receiver and the quality of the transmitter.

## III. PARSING THE PROPERTY RIGHTS VS. COMMONS DEBATE

This debate has been positioned as "property rights vs. commons;" it has also been positioned as new technology (favoring commons) vs. legacy technology (favoring licensing).[51] In this section, there appear to be (at least) four levels of the "property rights vs. commons" debate: *new technology, spectrum use, spectrum management*, and the *overarching legal regime*. Each is discussed in turn:

### *A. New Technology*

Much of the power of the commons advocates' argument is that the latest technology enables, indeed may demand, a commons approach to spectrum. The arguments adduced include agile radio and ultrawideband as requiring a commons, and use of WiFi as a new technology introduced in the unlicensed space as the commons success story. They also suggest that the deployment of mesh networks can lead to increases in bandwidth per user as the number of users increase.

It is noted above that these new technologies have some way to go to demonstrate they are as transformative as their advocates claim, but let us *arguendo* assume the truth of their assertions. Does this imply that new technologies only arise in an unlicensed environment, or that technological innovation is more likely to arise in a commons? Does this imply that these new technologies can only be accommodated by a commons regime? In both cases, the answer is no. Regarding the environment of innovation, there have been extraordinary advances in cellular technology in antenna design and bandwidth utilization, spurred by competition and spectrum scarcity (albeit regulation-induced). There is also very obvious innovation in cellular handsets and data capabilities in this market, suggesting that innovation has many outlets, not merely that of the commons. Regarding the deployment of these new technologies in a licensed regime, Faulhaber-Farber's non-interfering easement concept suggests that a small tweak on an exclusive licensing

51. Another dimension along which battle lines seem to have been drawn is analogy: is spectrum like land, or is it like air? Commons advocates argue the latter is the correct analogy, and conclude that since air is a common resource and is so managed, so must spectrum. They allege that property rights advocates are led to error through the use of the land analogy. In fact, this dimension has more to do with disciplinary differences than with the dispute itself. Legal scholars traditionally argue from analogy, and it is often the case that once the profession settles on the right analogy, the issue is decided. Economists, on the other hand, view analogy essentially as a teaching aid and not a research tool. What spectrum is "like" is largely irrelevant to economists; what matters are its basic underlying physical and economic properties. It is these properties, rather than analogies, which drive the economic logic. The fight over the correct analogy is not a fight that economists understand or care about, and this paper will not engage in this fight.

regime can easily accommodate these technologies.[52] In sum, these new technologies neither require a commons regime for their (as yet to develop) deployment, nor do they demonstrate the superiority of unlicensed spectrum as a source of innovation.

As a general rule, there is a demand side and a supply side to technological innovation. The demand side of innovation is the new products that can be offered with innovation or cost savings realized via the innovation; in either case, the demand side is driven by adding value for customers. The supply side of innovation is the cost of deploying the technology; the supply side is driven by the investment needed for deployment. Generally, we would anticipate that a property rights regime would be less risky for new service introduction as the entrepreneur would not face the risk of congestion, especially by copycat imitators using the same commons frequency band. Indeed, the more successful the new service, the greater is the risk of congestion from copycats in the commons. In addition, we would anticipate that a property rights regime gives strong incentives to adopt innovations that economize on spectrum, as this represents a direct benefit to license holders.

In a commons regime, there is no individual incentive to economize on spectrum; who would pay for an innovation that conserves on spectrum that is free to all? On the other hand, unlicensed spectrum has the advantage that the entry costs (apart from the innovation itself) is virtually free; the innovative entrepreneur need not purchase spectrum in order to offer service. Of course, in a market system, an innovator without ready capital could rent spectrum rather than buy it, thereby reducing entry costs. On balance, then, the demand side of innovation favors a property rights regime while the supply side could be argued to favor a commons regime (although a market system can go far to reducing entry costs).

Generally, we would expect that innovations with great novelty but very uncertain customer value would find unlicensed spectrum a more attractive entry option, while innovations with more promise of customer value would find licensed spectrum a more attractive entry option. A more likely outcome is that new innovators may deploy a trial service in unlicensed spectrum, and upon demonstration that the business model works the entrepreneur could migrate the service to licensed spectrum.

52. High-powered unlicensed agile radios almost surely will require some form of cooperation with licensees in order to avoid interference At the very least, the potential for opportunistic use is likely to require that licensees monitor and record opportunistic users to ensure they operate within parameters. Additionally, there are other technical problems that are difficult to solve without explicit cooperation of licensees, which may require equipment and cost mandates on licensees to accommodate easements for high-powered users.

This has already occurred with the firm Clearwire, which offers wireless broadband Internet access. Originally, Clearwire offered service in the unlicensed 2.4 Ghz (ISM) band. After proving its technical and business plan, Clearwire has moved to licensed spectrum in the 2.5 Ghz (ITFS) band.[53] It currently offers wireless broadband Internet access in four U.S. cities using licensed spectrum.

Although the new technologies have been touted as enabling a commons regime, there are problems with using both high-powered agile/cognitive radios and low-powered mesh networks simultaneously in an open commons. Generally, a commons is open to all users, high-powered and low-powered (up to a certain power limit). Even if the high-powered transmitter (such as an FM broadcaster) used agile/cognitive transceivers to avoid "collisions" with other high-powered transmitters, it is unlikely they could avoid interfering with low-power systems. The high-power agile/cognitive radios using the "listen before talk" protocol may not even detect many of the low-power systems using the commons and therefore not be able to avoid interfering with them. I refer to this as the *power mix* problem.[54] It is easy to solve the power mix problem in a property rights regime, as the license holder decides who and how the frequency band is to be used, within its overall power limit. In a commons regime, the power mix problem appears only solvable by resorting to an intrusive command-and-control regulatory regime. But this is exactly what we already have with current FCC regulation, with well-known and unfortunate results.

53. Marcia Martinek, *Clearwire Picks Raze for First Licensed Trials*, WIRELESS REVIEW, (Sept. 21, 2001), *at* http://wirelessreview.com/ar/wireless_clearwire_picks_raze/. Similarly, Metricom, a company noted by commons advocates to have started a business in unlicensed spectrum, migrated to licensed spectrum as their business matured (to little avail; the firm has failed twice). *See* Hazlett, *supra* note 3.

54. There are potential solutions to this problem. Low power systems could be agile radios themselves, since they can detect both high- and low-power transmissions in the relevant range; of course, this implies extra expense to low power systems simply to avoid high-powered system interference. It is also possible to restrict how many high-powered users are transmitting within a given commons band to ensure that the low-power users have sufficient bandwidth. More drastically, a specific frequency band can be earmarked for low power only, simply by setting a low overall power limit. But again, these options imply an intrusive regulatory solution: who decides the low power protocols for agile radio? Who decides how many high powered transmitters will be allowed in a particular commons band? Who decides which commons should be dedicated to low power only? None of these solutions is particularly good, and all require a regulator to determine the protocols used and possibly to undertake flow control of users and traffic into the commons. Experience has amply demonstrated that regulatory disputations over protocols are both excessively long and excessively costly. Alternatively, if some commons are designated for low power only, the regulatory disputation over how-much-is-low-power-only vs. how-much-is-open-commons would likewise be excessively long and excessively costly.

### *B. Spectrum Use*

The current array of wireless applications is simply dizzying, from cellular phones, broadcast TV and radio, WiFi, public safety radio, scientific and medical equipment to GPS systems. These applications are high power, low power, one-way broadcast, two-way interactive, people-to-people voice and data, machine-to-machine, occasional vs. constant use, and all combinations thereof. Some uses are particularly suited to exclusive use, such as high powered radar in constant use, TV and radio broadcast (again, in constant use). Some uses are particularly suited to commons, such as low powered occasional uses such as garage door openers, cordless phones and home networking. And this is not the end; the uses of wireless are likely to continue their growth, as demands for new services are discovered and developed in the U.S. and abroad. But this expanding set of uses favors neither a commons approach nor a property rights approach. Indeed, it is the realization of this breadth of uses that has led advocates on both sides of this dispute to agree that both a commons and an exclusive use licensing approach somehow need to coexist for the foreseeable future.

At a deeper level, the appropriateness of licensed vs. unlicensed spectrum management depends upon scarcity vs. abundance. Commons advocates are fond of likening spectrum to the ocean, in which passing ships need only simple rules to avoid collisions. There is no need to establish property rights in the ocean to avoid collisions. But is the analogy correct? It depends upon several factors: (i) avoidance using simple rules is easy because the ocean is essentially limitless; (ii) detection is easy with onboard radar; and (iii) ship passings only occur every few days. If we slightly modify the analogy to large ships navigating in rivers and harbors, the situation changes radically: (i) avoidance is much more difficult as rivers and harbors are tightly constrained; (ii) radar in close quarters is rather cluttered and less useful; (iii) ship passings occur every few minutes. Not surprisingly, the rules also change; ship captains are not allowed to navigate within harbors and ship traffic is very tightly controlled by a harbormaster. As the environment becomes more constrained and potential interference becomes greater, a much higher degree of control is required. Applying this lesson to spectrum, the high demand for using spectrum suggests this is a harbor, not an ocean. To make matters even more contentious, we note that in the ocean/harbor analogy, avoiding collisions is in everyone's interest. In spectrum, a rogue user may gain a large (albeit temporary) advantage by breaking the rules. An example would be using excessive transmission power for ensuring the message gets through clearly to very distant receivers, but in doing so, causing excessive interference for other users. The ocean analogy is seductive but very unrealistic.

The current successful implementation of commons spectrum use is Part 15 (unlicensed) frequency bands, such as cordless phones, garage door openers, and WiFi. In this restricted frequency space, the FCC has adopted a rule that essentially makes the spectrum like the ocean: it imposes a strict power limit on transmitters. Each transmitter then creates interference over such a small geographic area (e.g., the inside of a house) that interference is almost defined away. For these uses, power limits in no significant way affect the functionality of the devices, yet the interference problem is solved. For services in which low power destroys functionality (such as airport radars and police radio), a commons approach becomes either impossible or costly, and exclusive use is a more efficient management approach.

It should also be noted that applications currently deployed in unlicensed spectrum could as easily be deployed in licensed spectrum should a market for licenses develop. For example, garage door openers currently operate in Part 15 unlicensed spectrum, a model which is quite successful. However, if licenses were available in regional and national markets, firms that produced garage door openers could purchase small frequency bands (since this is a very narrowband service) throughout the country and design their transmitters for their purchased frequency. Most likely, an industry trade association could purchase the spectrum, which would then be shared among its members (a form of limited commons). Thus, this service (and others like it) can work equally well under either licensed or unlicensed management.

### *C. Spectrum Management*

This term denotes the operating management of specific frequency bands. For example, is the frequency band licensed or unlicensed? Are there rules governing the use of the spectrum (such as use constraints for licensed bands or power limits for unlicensed bands)? Who sets and administers the rules? Are there social norms among the users that control on-air behavior, such as CB radio and ham radio? Is there a payment for use of the band? If so, to whom? If licensed, does the licensee exclude other users? If unlicensed, do user groups exclude others?

Under the current regime, both licensed and unlicensed frequency bands are subject to rules, beyond the frequency/location/power bundle of rights. In the case of unlicensed bands, these rules may be built into the hardware but they are nevertheless real. Some years ago, cordless phones were available that advertised a "50 mile range." While the claim was exaggerated, the actual range was far beyond the usual cordless phone range, for the simple reason that the phones were emitting power far in excess of that mandated by the FCC rules. These were foreign-

made power-boosted phones bootlegged to dealers in the U.S. who could sell them as "superphones;" very valuable to their owners but causing interference with others. Alarmingly, these phones caused some interference to air traffic control radars. The same phenomenon occurred in CB radio during its popularity peak; it was fairly easy to buy a "souped up" CB radio, or indeed to alter an existing radio to illegally boost power. While beneficial to the owner of the altered radio, it greatly increased interference with other CB users.

While early advocates of the commons suggested that commons would be self-managing and require no rules imposed by governments or private parties, there is now general acceptance that some rules for unlicensed bands are required, although commons advocates prefer "light regulation" to accomplish this.[55] There is also the suggestion that for some bands, users may well organize themselves, enforcing self-adopted rules through non-legal mechanisms. In fact, this has occurred in the amateur radio band,[56] in which a group of dedicated users follow historically adopted practices and face group sanctions should they not follow these practices. This closely parallels self-policing in other well-defined groups of commons users, such as cattle ranchers in the western U.S. who use public lands to graze their cattle.[57] Far from being rule-free, such arrangements are usually quite complex and even formal.[58]

The point here is that there will be rules; the only question is who establishes and enforces the rules. Will the rules be set by a private licensee, by a government regulator such as the FCC, or a user/producer group such as ham radio operators or garage door opener manufacturers? While one might speculate that rules set by user groups or manufacturers are more beneficial than rules set by private or regulatory controllers, there is no reason to believe this is the case. User groups and manufacturer groups often have motivations that may not coincide with the well-being of the entire group of users or potential users and may be quite inefficient. For example, manufacturers could adopt rules that

55. *See* Werbach, *supra* note 37; Goodman, *supra* note 3.

56. Amateur radio is in fact a licensed band; in order to receive a license, a user must pass a test on general radio knowledge including demonstrating proficiency in Morse code. Although Morse code is virtually never used in today's ham radio environment, it acts as a barrier to entry for casual users, resulting in a self-defined elite of radio that helps it observe and monitor the group's adopted rules of behavior.

57. *See* ROBERT C. ELLICKSON, ORDER WITHOUT LAW: HOW NEIGHBORS SETTLE DISPUTES 15-64 (1991) (pointing out that in a community in which parties have long-term relationships, norms of cooperation can be enforced by reputation building. If parties are unknown to each other, or otherwise anonymous, then the incentive of each party is to be a selfish short-run profit-maximizer, as reputation sanctions are ineffective).

58. Examples of pure commons in which there are no rules do exist. For example, public domain literature can be published by anyone without payment of royalties or any other restriction. In this case, the use of a book or article in the public domain does no damage to any other party, so untrammeled access is efficient.

constitute entry barriers to new competitors, thus preserving oligopolistic market power. The assertion that there will be rules in any spectrum now seems to be accepted by both sides to the dispute.

Another issue is the price at which spectrum will be made available. Early commons advocates took their cue from current unlicensed spectrum, in which there is no charge for spectrum use.[59] Of course, there is a charge for the devices that use the spectrum, such as the cordless phone and the WiFi access point. Further, there is a cost: since the FCC is the current monitor and enforcer of its own standards, it expends resources to make the rules and to enforce the rules. For example, during the CB radio craze of the mid-1970s, the FCC was receiving about 35,000-50,000 complaints per year, usually from owners of TV sets complaining of broadcast interference.[60]

The costs to establish the rules and then enforce them could be substantial, and there is no reason to expect that taxpayers would continue to bear these costs. Moreover, there are opportunity costs of spectrum use: the Part 15 frequency bands have many alternative uses, such as cellular telephony. Thus, users of unlicensed spectrum are imposing an opportunity cost on the economy, even if there is no actual cash flow. User fees (similar to those charged for many other public services, such as National Parks) may be a more appropriate way to cover these costs. The point here is that the property rights vs. commons debate is not about price. Commons advocates are quick to point out that this is not about "getting free stuff." It appears the "free/not free" is not really part of this debate.

The core of the argument for commons seems to be open access to all. Commons advocates assert that exclusive use licensing will necessarily lead to, well, exclusion. Only licensees will have access to the licensed band, and others will be excluded. In a commons, everyone will have access. Yes, there will be rules, and there may even be a price, but open access to all is the touchstone of the commons argument.

Is it true that commons always implies open access? As a general rule, not all commons are necessarily open to all. For example, cattle grazing on "open" public lands is often quite limited by rules. A non-member will generally not be able to drive up with five head of cattle to let them graze on such lands, as it constitutes a limited commons. But it is certainly the case that Part 15 use of the 2.4 Ghz band for WiFi is indeed open to all, and this is what commons advocates have in mind.

Is it true that exclusive use licenses necessarily lead to a closed

59. This is not quite true; some retail establishments that offer WiFi service on their premises often require a fee for usage.

60. Telephone Interview with George R. Dillon, Assistant Chief, FCC Enforcement Bureau, (Jan. 8, 2004).

system? There are cases in which this is true: an airport operating a radar system will not share its spectrum with anyone else, nor will an FM radio station. However, much spectrum held by licensees is actively marketed by those licensees in order to attract as many users as possible. Consider, for example, cellular telephony. Each wireless carrier offers to provide service to anyone; no one is refused (although billing arrangements may vary). Carriers offer flexibility regarding handsets; a check of Verizon Wireless' website revealed the firm offering twenty different handsets from seven different manufacturers, with a wide variety of features and functions.[61] It is hard to imagine access more open.[62]

But the commons advocates rely on the Internet's "end-to-end" principle,[63] in which anyone may launch any application they wish on the Internet.[64] But this is not observed in radio; any device intended for use in the spectrum must either be controlled by a licensed user or be type-certified by the FCC.[65] This is not simply a meddling regulator; devices which do not meet standards may well cause harm to other users. Approval of devices is the norm in unlicensed bands. In the PCS cellular band, the licensee determines what devices it approves. This is a bit more restrictive (and a great deal more efficient) than type-certification, but it is difficult to build a case for open access in unlicensed as compared to licensed based on this small difference.

In fact, current PCS cellular services are quite close to what the FCC has termed "private commons,"[66] privately licensed spectrum made available to all (under conditions determined by the licensee). The only

61. *See* Verizon Wireless website, *at* http://www.verizonwireless.com/b2c/index.jsp (last visited on June 27, 2005).

62. Note that if "open access" is indeed the same as "anyone can use it", then this is simply common carriage, a principle that has been used in telecommunications and utility regulation for over a century, hardly a revolutionary development.

63. *See* J. H. Saltzer, et al., *End-To-End Arguments in System Design*. 2 ACM TRANSACTIONS ON COMPUTER SYSTEM 277, n.4 (1984).

64. If the application doesn't use the existing protocols of TCP/IP it will not work, and will do no one any harm. If a new wireless application doesn't use the existing rules and protocols, it may work and it is likely to cause others harm, through interference. The Internet is not like wireless in this regard.

In fact, the very openness of the Internet has led to its own "tragedy of the commons." The ability of anyone to develop an application and distribute it over the Internet becomes much less wonderful when that application is a virus or worm that can infect computers worldwide in hours or minutes. The anonymity of the Internet becomes less wonderful when that anonymity (plus low cost distribution) fills users' mailboxes daily with hundreds of spam e-mails. The great promise of the Internet is in danger of being undermined by these activities, but they are a product of its openness; it is a tragedy of the commons.

65. Even experimenters must acquire an experimenter's license in order to transmit and experimental device.

66. *See* Promoting Efficient Use of Spectrum Through Elimination of Barriers to Secondary Markets, *Report & Order & Further Notice of Proposed Rulemaking*, 19 FCC Rcd. 17,503, 17,506 (2004).

difference is that the FCC envisions that the licensee would not provide infrastructure, using instead a low-power mesh network architecture. But the openness and availability of diverse technologies appears the same. The only difference appears to be whether the system's infrastructure is contained within the user device or not.

Hence, both licensed and unlicensed spectrum will be subject to rules. In unlicensed bands, the FCC (and possibly device manufacturers) will set the rules; in licensed bands, the licensee will set the rules. The issue is not whether there will be rules or not; the issue will be who sets the rules. Additionally, it is likely that both licensed and unlicensed frequency bands will carry a price, unless explicitly subsidized by the government. [67] The role of open access, strongly emphasized by commons advocates, may actually be well-served in certain licensed bands such as cellular telephony, for the simple reason that licensees find it most profitable to offer services to everyone on similar terms and conditions, although this latter point may be more controversial.

Are there differences in management between property rights/licensed and commons/unlicensed? In fact, the differences are rather profound. In the licensed arena, both private and public agents may hold licenses. For example, police departments, the military, and Federal Aviation Agency air traffic control may hold licenses, as well as TV and radio broadcasters, cellular telephone firms, and cable TV firms. The licensee may use its license exclusively; for example, cable TV network providers use satellite radio channels to transmit TV shows in real time (or on delay) to their various franchisees. Broadcast networks also use satellite channels to distribute material to affiliates. They use these channels continuously and have no interest in sharing. Likewise, air traffic control is not interested in sharing its frequencies. But licensees could also open their spectrum to everyone, such as occurs in cellular, or to some subset of users, such as aeronautical radio (in which only members can use the spectrum). Government licensees[68] can choose

67. *See* Brett M. Frischmann, *An Economic Theory of Infrastructure and Sustainable Infrastructure Commons* 89 MINN. L. REV. 917, 925-26 (2005) (stating "[t]his does not mean, however, that access is free. We pay tolls to access highways, we buy stamps to send letters, we pay telephone companies to route our calls across their lines, and so on. Users must pay for access to some (though not all) of these resources. Nor does it mean that access to the resource is unregulated. Transportation of hazardous substances by highway or mail, for example, is heavily regulated. The key point is that the resource is openly accessible to all within a community regardless of the identity of the end-user or end-use." But as noted above, this is simply common carriage, not a "commons.").

68. Under the current regime, the government doesn't actually hold a license to Part 15 spectrum. But if a property rights regime were in place, the government (in fact, state and local governments as well as the Federal government) would hold licenses to any spectrum offered under Part 15 rules. In essence, the government would "own" the commons, much as it owns public lands today.

to open their spectrum to all, such as Part 15, or to some, such as ham radio operators. Thus, a property rights regime could accommodate both private and public ownership of licenses and could accommodate exclusive use and various forms of open access spectrum, including government-managed commons.

A commons regime, however, has virtually no other management option than . . . commons. Exclusive use is not possible, nor is private licensing. A commons regime is forevermore government controlled and non-exclusive. As a result, spectrum devoted to property rights/licensed has a rich set of management options available, including government-owned and managed commons.[69] Spectrum devoted to commons has only one management option: commons, subject to regulatory oversight. On the management flexibility dimension, a property rights regime has a decided advantage. This suggests that some form of licensing will be with us for the indefinite future.

### *D. Overarching Legal Regime*

Moving from the micro view to the macro view, I examine the core of the dispute: the overarching legal regime which governs spectrum. The analysis thus far suggests four possible legal regimes: (i) traditional command-and-control regulation; (ii) end-state regulation, as described above;[70] (iii) a property rights regime; and (iv) a commons regime.

Since traditional command-and-control regulation is the regime from which all reformers, both academic and practical, flee, it can be removed from further consideration. Today's regime is far enough away from traditional regulation that a reversion to it is not a serious policy option. The commons regime, while attractive to some, is lacking in flexibility that virtually all disputants agree is necessary. If the overarching legal regime is a commons, then there is no management option for exclusive use, either public or private; since many uses are most efficiently deployed using exclusive use, a commons regime must also be removed from consideration.

The two serious contending regimes are a property rights regime and an end-state regulatory regime. The two regimes are compared on four dimensions: (a) dispute resolution; (b) transaction costs; (c) the

69. To be perfectly clear, under a property rights/licensed regime, a government (at any level, or any other entity) can own a swath of spectrum and permit others to use it, subject to their rules and regulations. For example, New York City land is governed by a property rights regime, and yet there is a large and important commons in the middle of Manhattan: Central Park. The presence of Central Park in no way compromises the property rights regime governing real estate in New York; the City of New York owns the park and chooses to manage it as a commons available to all, under their rules and regulations. It is in this sense that a property rights regime can accommodate commons usage.

70. *See supra* p. 127.

tragedies of the commons and anticommons; and (d) flexibility to adapt to changing technology and changing demands. These comparisons are made using simplifying assumptions: (i) transition issues are ignored; (ii) the regimes are assumed to be in long run equilibrium; and (iii) the technologies discussed above[71] are assumed to be fully mature and available in the market at reasonable cost. This is not to say that transitions, both economic and political, are not important; we applaud the extensive work at the FCC focused on transition.[72] This is also not to say that the technologies described above as yet-to-be-deployed are guaranteed success; but assuming their success makes the case for a commons (and for a non-interfering easement) rather stronger. These caveats are extremely important. It could be that the transition to a preferred regime is very costly or politically impossible; in which case we must settle for second-best. In this paper, I take the view that it is important to understand what the preferred target regime is, and why it is preferred, so that an informed decision regarding transition and its costs can be made.

The actual mechanics of how legal regimes work is messy and uncertain. While property rights advocates assume that the costs of a property rights system (dispute resolution, transaction costs, etc.) are low to nil, this need not be the case; cost must be identified and estimated. Likewise, commons advocates assume that if commons are not totally self-regulating then "light" regulation will solve the problem, all at low cost. Again, this is surely not the case; the costs must be identified and estimated.

## IV. REGIME CHANGE—FINDING THE ANSWER

In order to assess which regime will lead to more efficient use of spectrum, we examine each of the four issues: dispute resolution, transaction costs, tragedies of the commons and anticommons, and flexibility to changing technologies and demands. This requires that the properties of both regulation and markets be made explicit, so that a comparison on these four dimensions is possible. I first make clear precisely what the differences are between a property rights regime and an end-state regulation regime, followed by a brief overview of the regulatory process and its expected outcomes. I then examine how each of the four issues is expressed in the two regimes; I find that the property

71. *See supra* pp. 130-33.

72. *See* EVAN KWEREL & JOHN WILLIAMS, A PROPOSAL FOR RAPID TRANSITION TO MARKET ALLOCATION OF SPECTRUM (Federal Communications Commission Office of Plans and Policy, Working Paper No. 38, November 2002), *at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-228552A1.pdf.

rights regime outperforms the end-state regulation regime in almost every regard.

### *A. Property Rights vs. End-State Regulation: What's the Difference?*

A brief statement of the differences between the two candidate regimes is in order prior to a comparison of their characteristics.

#### 1. Property Rights

Specific rights governing transmission of radio energy and freedom from impinging radiation are defined for each frequency band and geographic area, and licenses are owned by either private individuals or firms, or by public agencies. The licensee has the right to operate radio systems within the constraints imposed by the license; she may buy additional licenses, sell the license, subdivide the license, and rent/lease all or part of the license. A licensee may use the licensed spectrum for its exclusive use; it may also use the spectrum to offer services involving other parties (customers) either with or without charge. Such uses include commons-type open access. If a licensee's spectrum is available to others, such as a cellular phone system or a WiFi-type home networking system, the licensee (public or private) may establish whatever rules, regulations, and obligations on users it deems fit, within the overall constraints of its license. In this regime, behavior *within* the bounds of a license is governed by the licensee, be it private, corporate, or governmental. Behavior *among* licenses is governed by the market, supported by the courts for dispute resolution.

#### 2. End-State Regulation

Specific rights governing transmission of radio energy and freedom from impinging radiation are defined for each frequency band and geographic area, and the regulator (e.g.,, the FCC) specifies which bands and areas are to be licensed and which bands are held in common as unlicensed. Changes in the allocation between licensed and unlicensed would also be under the control of the FCC. Licenses are owned by licensees and can be bought, sold, subdivided, aggregated, and leased by licensees. However, disputes among licensees would continue to be resolved, as today, by the regulator. The FCC would be able (but not likely) to modify the terms of licenses or even revoke them. Frequency bands held in common would be individually managed by the FCC, and may differ in operating characteristics permitted and may be limited in who may use these bands and/or what uses are permitted in the bands. Disputes among users of the commons would be resolved, as today, by

the regulator. Further, selection of protocols and formats to be used to avoid interference would be decided by the FCC, as it does today. The FCC would also control the boundaries among commons uses as well as between commons and licensed uses. The FCC would be able (but not likely) to impose use restrictions for either licensed or unlicensed bands. In this regime, the FCC would have much the same power as today to designate frequency bands as licensed or unlicensed, change these allocations over time, resolve disputes in both licensed and unlicensed, and set the rules and obligations for commons/unlicensed spectrum. The only difference with today's regime is that licensees would have much greater freedom to buy, sell, subdivide, aggregate and lease their licenses. In all other respects, regulatory authority would remain in place.

In brief, the critical difference is the role of regulation. In the property rights regime, regulation is largely replaced by careful construction of property rights to avoid interference, operation of the market, and support of the judiciary for dispute resolution. Today's regulators are relegated to setting rules and regulations only in frequency bands for which they are the licensees, and their power is no more than that of any other licensee. In the end-state regulation regime, the regulator continues its overarching role of allocator of frequencies, arbiter of protocol and technology choices, and adjudicator of disputes, as it does today. The regime does offer licensees much greater freedom to use the market to buy, sell, and lease their licenses, which of course would still be subject to ultimate regulatory control.

### *B. A Short Course in the Theory and Practice of Regulation*

Because regulation is the defining characteristic of the end-state regulation regime, an understanding of regulation[73] is required. Is "light regulation" even possible? I argue that "light regulation" is an oxymoron; it is not an equilibrium outcome of the political forces that drive regulators, especially in commercially important markets.

And regulation is above all political, subject to forces of producers large and small, consumer and user groups, unions, the U.S. Congress, even economists and technologists. If a regulator has jurisdiction over particular markets and technologies, it has the potential to use the coercive power of the government to intervene in markets. This power is highly valued by market participants, and they will lobby the regulator to intervene on their behalf, at the expense of their competitors. Such

73. I use the term "regulation" to denote the presence of a permanent governmental body that has been delegated authority to establish and enforce rules concerning core economic decisions of firms in specific markets or market activities, including price, quality, standards, entry and exit, and other such rules and obligations. In this context, I do not consider the courts to be involved in regulation.

lobbying is not only targeted at the regulators, it is also targeted at legislators (either state or Federal) that control the regulators budgets and can enact laws overturning regulatory rulings. The regulatory process is designed to listen to all sides, consider carefully the merits as well as the power of the lobbying participants and the likelihood of a successful court challenge, and reach a conclusion, often after years of comment, reply comment, deliberation and reconsideration. Participants use the regulatory/political/judicial process strategically to achieve corporate or group objectives.

As an example, consider the ongoing FCC case of Nextel Communications, a cellular (SMR licensed) carrier operating in the 800 Mhz band.[74] This band is adjacent to a police radio band, and police around the nation were claiming interference from cellular traffic in the Nextel band. Nextel proposed that it would move to another band to avoid interference, and the FCC appeared to agree. This rather simple transaction would appear straightforward; however, the proceeding has been ongoing for the last two years, and has attracted 2,445 comments and reply comments from parties far beyond the 800 Mhz band. Most instructive was Verizon Wireless' demand that Nextel should be forced to bid for the spectrum at auction (even though it had already paid for its 800 Mhz spectrum it was now being forced to abandon).[75] Verizon Wireless, a competitor to Nextel, was pursuing the interests of its shareowners in its use of the regulatory process to disadvantage a competitor; it is blameless here. Rather, the problem lies with the regulatory process, which permits parties outside the transaction (which after all is between Nextel and public safety agencies) to have an influence over the outcome. This interpretation of Verizon Wireless' actions is supported by the fact that it reached a business agreement[76] with Nextel to drop all lawsuits if Nextel agreed to let Verizon Wireless use its successful copyrighted "push-to-talk" label for its own services.[77] In sum, it was profit maximal for Verizon Wireless to use its lobbying abilities in a dispute in which it had no direct interest to gain a commercial advantage.

But surely, it might be thought, instructing the FCC (or whatever

74. *See* FCC, ABOUT 800 MHZ BAND RECONFIGURATION, (Jan. 12, 2005), *at* http://wireless.fcc.gov/publicsafety/800MHz/bandreconfiguration/about.html.

75. It might be argued that Nextel could sell its interest in the 800 Mhz band in order to buy other spectrum at auction. In fact, Nextel had paid for its spectrum in every expectation it could use it. In the event, it was the collective ability of the nation's police forces to lobby to shut down Nextel that made this spectrum valueless; should Nextel have tried to sell it, it would have no takers since the spectrum is now unusable for high powered SMR applications.

76. *See* Ken Belson, *Verizon and Nextel Agree to Drop Lawsuits*, N.Y. TIMES, Nov. 3, 2004, at C12.

77. *Id.* After Verizon Wireless dropped its objections, the FCC approved Nextel's re-banding plan.

regulator there is) to regulate "lightly" would eliminate these problems. Unfortunately, this is not the case. Market participants who can successfully lobby the regulator or Congress will do everything they can to force a regulator to intervene in their markets because the participants can then use their power to achieve market outcomes favorable to themselves, generally at lower cost than actually serving customers. It is the participants who will force the regulator to expand from light regulation to the usual pervasive regulation, often by enlisting Congressional support. This is why "light regulation" is an oxymoron; as long as a regulator of a market exists, participants will push the regulator to expand its writ so that participants can enjoy the market advantage that comes from successful lobbying. The conclusion is clear: *light regulation is not a real option.*[78]

There are some frequency bands in which the FCC's hand has been very light; garage door openers and outside home weather stations, for example. But there were very substantial disputes over the introduction of spread spectrum technology in cordless phones, for example; it appears that if the market does not involve a great amount of market value and there are no technological changes involved, then minimal regulation may emerge.

Generally, there is no reason to suspect that regulation under the end-state regulation regime will be much different than it is today, except licenses will be much easier to transact under this regime. But the same forces operating in today's regulated environment will continue to operate in the end-state regulation regime and will be mediated in much the same way. In sum, *as long as there is a regulator to complain to, market participants will complain and the regulator will be forced to respond. The scope and intensity of regulation inevitably expands to meet the demands of market participants.*

Could some form of regulation be used in a property rights regime as a specialized court for dispute resolution? If expertise in wireless issues is needed, perhaps retaining regulation for dispute resolution makes some sense. But as we have just seen, dispute resolution is a function in which regulation performs particularly poorly, and becomes a backdoor by which regulation re-enters, as market participants manipulate their actions to accord with the regulator's interests as expressed in dispute resolution cases. In fact, the need for technical expertise by courts or

78. If light regulation were a feasible option, one would expect that it would exist in some jurisdiction in some industry. The commons advocates have yet to disclose the existence of light regulation in the real world in markets where substantial value is at stake. Perhaps the most telling evidence is that the most successful U.S. deregulations (airlines and motor freight) were very quickly followed by the abolition of the regulating agencies (Civil Aeronautics Board and Interstate Commerce Commission). Had these agencies survived, there is little doubt that market participants would have figured out a way to get them to resume their regulating ways.

regulators to enforce property rights is a signal that the property rights are too complex and too complicated for normal people to understand. The problem is solved, not through specialized courts or regulators, but via simple, clear, measurable conditions on spectrum licenses.

As inefficient as regulation can be, is it necessarily worse than a market system which uses the judiciary for dispute resolution? Clearly, the disastrous consequences of asbestos litigation suggest that there may be worse things than regulation. But a simple comparison of long-run outcomes should frame the issue: spectrum has been allocated by regulation for over seventy years and very large swaths of frequencies are not in use, even though the demand for spectrum is quite high. Land, on the other hand, has been allocated by the market via property rights with dispute resolution by the courts for centuries, and yet we do not see large swaths of real property lying empty and unused in the presence of high demand for it. Likewise, dispute resolution of commercial disputes via commercial law, while costly, have not resulted in large swaths of the economy being paralyzed by allocative inefficiencies. This simple efficiency test suggests that the costs of regulation really are significantly higher than market mechanisms for allocating resources.

### *C. Dispute Resolution*

Disputes take several forms. A classic dispute over a specific interference problem was described above in the case of Nextel in the 800 Mhz spectrum. Another form of dispute could be the introduction of a new technology, such as wideband. A third form of dispute could be over standards and protocols, in which one or more parties wish to change an existing standard or protocol and need a means of ensuring that all parties move to the new standard.[79]

It is easy to assess how an end-state regulatory regime will handle disputes; it will handle them pretty much as it does today. The Nextel 800 Mhz dispute was discussed above; this is a case involving licensed spectrum. Unless the end-state regulatory regime explicitly moves to court-enforced property rights for the spectrum under licensed management, we can expect the FCC to continue to resolve disputes between licensees in much the same was as the Nextel 800 Mhz dispute was resolved.

---

79. Werbach argues that dispute resolution in his "supercommons" will occur via some form of tort which he does not completely specify. Given that a regulator would continue to have overarching authority of all spectrum, both licensed and unlicensed, it is very unlikely that the locus of dispute resolution will change. The FCC will continue to resolve disputes, using rules rather similar to those in place today. Since the regulatory process is very unlikely to change, it is safe to assume that at least in unlicensed bands the FCC will continue to resolve disputes. *See* Werbach, *supra* note 37.

In the case of unlicensed spectrum, the FCC regulatory process has also established a track record relating to new technology introduction. This is particularly important to the commons argument, since the FCC cannot step back from dispute resolution in unlicensed spectrum in the end-state regulatory regime. In her excellent article, Ellen Goodman notes: "For example, it took three years and two rulemakings for the FCC to change its ex ante controls for unlicensed operation to allow new, nonconforming technologies into the unlicensed bands."[80] The footnote that follows explicates this long drawn out affair of regulatory cut and thrust involving the introduction of a new technology into a commons regime.[81] It would appear that even in commons-managed spectrum, the regulatory process is not particularly friendly to new technology introduction. But in the future commons, this scenario will no doubt be the norm; again, "light regulation" is an oxymoron.

Several commons advocates have suggested that social norms can develop within communities to ensure that individuals behave cooperatively (i.e., no pirate transmitting devices) or be subject to group sanctions.[82] The reference is Robert Ellickson's famously colorful study of ranchers in Shasta County, CA, based on the theory of repeated games, which suggested that norms of cooperation (such as the "tit for tat" strategy) can emerge within stable communities.[83] But Ellickson makes clear that this only occurs within stable communities in which actions among neighbors are seen as part of a pattern of repeated play, where sanctions for uncooperative behavior can be imposed on future stages of play.[84] In the wireless context, this applies to cooperation standards among ham radio operators, a fairly homogeneous group who know who is who in the ham community. It does not apply in mass markets such as CB radio in the 1970s, where players are anonymous and cannot be disciplined by other users.

But even when there are user communities that interact over long time periods, Ellickson's view regarding the likelihood of cooperation, based on Axelrod's work in the early 1980s,[85] is overly rosy. Later work in sequential game theory proves Ellickson's allegations about the likelihood of cooperation are incorrect on a couple of counts: (i) "tit for

80. Goodman, *supra* note 3, at 376.

81. *See id.* at n. 348.

82. *See* Benkler, *supra* note 3, at 361; Philip J. Weiser & Dale N. Hatfield, *Policing the Spectrum Commons*, 74 FORDHAM L. REV. (forthcoming 2005), *at* http://ssrn.com/abstract=704741.

83. *See* ELLICKSON, *supra* note 57.

84. *See id.*

85. Much of Axelrod's work is based on articles the author published in 1980-81, very early days in the development of modern game theory. S*ee* ROBERT AXELROD, THE EVOLUTION OF COOPERATION (Basic Books 1984).

tat" is not an equilibrium strategy[86] in the repeated play prisoner's dilemma game; (ii) while cooperative equilibria do exist,[87] they are not unique; non-cooperative equilibria also exist. Evolutionary game theory suggests that if the cooperative equilibria require investments, then it is likely that they will be unstable compared to non-cooperative equilibria.[88] Commons advocates have used Ellickson and the ensuing legal literature on norms[89] to suggest that social norms and mores can act as a substitute for regulation.But the more careful application of game theory by Mahoney and Sanchirico proves this bias toward cooperative norms is misplaced;[90] we rely on it at our peril. Moreover, in a commons regime, the number of "neighbors" is likely to be large and their relationship is unlikely to be long term, so cooperative equilibria are unlikely to exist. Realistically, in commons or markets, court-enforced law or regulation is a necessity whenever cheating could be profitable short-term. Reliance on social norms is romantic but fanciful.

But surely in practice industry groups would find it in their interest to cooperate? Unfortunately, this is not the case. Goodman continues: "Even when industry groups are responsible for agreeing to protocols that the regulator merely approves, standard setting has often proved to be staggeringly slow and acrimonious."[91] The footnote that follows explicates the lengthy proceedings involved in setting standards for digital television.[92]

Unfortunately, the commons presents a special difficulty in dispute resolution. In a property rights regime, each licensee has only a few neighbors, those that would be most affected by a violation of the license terms and conditions. In a commons regime, there could well be thousands of users of a particular commons. If a particular user decides to "cheat," perhaps using an illegal transmitter with much higher power than permitted in the commons, this will interfere with other users.

---

86. The correct equilibrium concept for sequential games is Subgame Perfect Nash Equilibrium. Such equilibria ensure that sanctions are optimal for other players to impose on strategy deviants, thus ensuring strategic discipline that supports the equilibrium. Paul Mahoney and Chris Sanchirico provide a lucid explanation in the legal scholarship literature. *See* Paul Mahoney & Chris Sanchirico, *Norms, Repeated Games and the Role of Law*, 91 CAL. L. REV. 1281 (2003).

87. *Id.*

88. *See* Paul Mahoney & Chris Sanchirico, *Competing Norms and Social Evolution: Is the Fittest Norm Efficient?*, 149 U. PA. L. REV. 2027, 2059 (2001).

89. *See* Eric Posner, *The Regulation of Groups: The Influence of Legal and Nonlegal Sanctions on Collective Action,* 63 U. CHI. L. REV. 133 (1996); Richard H. McAdams, *The Origin, Development, and Regulation of Norms*, 96 MICH. L. REV. 338, 352 (1997).

90. The evolutionary psychology literature suggests a non-game-theoretic mechanism in which cooperation is a possible equilibrium. *See* Amy Wax, *Evolution and the Bounds of Human Nature*, 23 LAW & PHIL. 527 (2004).

91. Goodman, *supra* note 3, at 376-77.

92. *See id.* at 377 n. 349.

However, since the interference impinges on many users, there will be a free rider problem with enforcement. Who will bother to file a formal complaint to the FCC, when everyone expects someone else to undertake the costly complaint process? If commons users are given the right to sue the interferer, the problem becomes even worse.[93] Who will bring a costly suit against the interferer when everyone expects someone else to bring the suit? This is the *enforcement tragedy of the commons*: with lots of commons users affected by the interference, no one user has an incentive to enforce their commons rights.

In a property rights regime, the specification of the property rights becomes critical. Following De Vany,[94] I assume that at a minimum each license has a location, a frequency band, and power levels specified; additionally, a license could also be limited by time of day or direction (relevant for satellite reception, e.g.). It is useful to think of both location and frequency as an allotted space in which the licensee's power across the boundaries of this space are explicitly restricted.[95] For example, power emissions into adjacent frequency bands would be specified,[96] and power emissions across a geographic boundary would also be specified (in watts/$m^2$).[97] In both cases, the power limits may be expressed statistically: emissions across a geographic boundary should be no greater than *x* watts/$m^2$ no more than *y*% of the time.[98] These restrictions on transmitting in one frequency band and location become rights for those in adjacent frequency bands and locations. Goodman argues persuasively that the use of nuisance law to resolve spectrum property disputes would be costly and inefficient.[99] Therefore, I propose that license restrictions would have the force of trespass law; should a licensee violate one of its restrictions, its neighbors could obtain injunctive relief without a showing of damages. Could these restrictions be enforced by neighbors? Should a licensee detect interference, either it

93. As suggested by Werbach. *See* Werbach, *supra* note 37, at 938-39.

94. *See* De Vany, *supra* note 10.

95. *See* KWEREL & WILLIAMS, *supra* note 72, at 42-44 (discussing flexible license rights).

96. This limitation could be specified to "roll off," so that e.g., 80% of out of band emissions would be within 0.5 Khz of the frequency band border, 95% must be within 1.0 Khz of the border, etc.

97. It is more convenient to express power limitations at the transmitter; however, it is actual power impinging across a geographic boundary that is the relevant measure for interference in an adjacent location.

98. This specification may also include the height of the measuring antenna: e.g., ". . .no greater than *x* watts/$m^2$ no more than *y*% of the time measured no higher than *z* m above ground." Clearly, effective enforcement requires the right to be fully specified, cover (almost) all contingencies, and be measurable.

99. Nuisance law cases require a determination of damages as well as a balancing of interests among the parties. This is the basis of Goodman's finding that nuisance law imposes substantial inefficiencies. *See* Goodman, *supra* note 3, at 326-59.

or a third-party measurement service could objectively measure and record violations. In fact, it may make such measurements routinely, without waiting for allegations of interference violations.

The "bright line" trespass rule together with the ease of measuring violations suggests that courts would find dispute resolution straightforward:[100] technical evidence of violation is presented, no damages need to be proved, no balancing of interests is required, and an injunction follows.[101] In fact, in such a trespass law regime, few cases would ever reach the court since the outcome would be foreordained. Only the cases with questionable evidence would move forward. Thus, simple dispute resolution should be a relatively low cost. This avoids Goodman's costly nuisance law issues.

But not all interference cases result from license condition violations. Radio waves can do unexpected things and more sophisticated forms of interference may occur, although this should be unusual. In these cases, in which a licensee experiences interference from another licensee who is operating within his property rights, several alternatives are possible. One option is "neighborly" bargaining. As the commons advocates point out, neighbors often figure out means of resolving disputes without recourse to the courts, especially in the presence of long term relationships ("repeated play" in game theoretic language). But neighborly bargaining works in a property rights regime as well as a commons regime, perhaps even better because there are likely to be fewer (and more familiar) neighbors. Such could be the case here, and in cases where such interference occurs, neighborly bargaining is likely to be the first line of dispute resolution. A second option is more formal dispute resolution, including the courts (in the form of nuisance law) or arbitration. In fact, binding arbitration should be considered an option, should this prove to be the most efficient dispute resolution of these spectrum nuisance cases. Since these cases are likely to require specialized knowledge of radio technology, specialist arbitrators are likely to be knowledgeable and effective as against generalist judges and

100. No doubt a court would be loath to issue an injunction if a licensee emitted out of band power 1% over its permitted limit for 1 second, without a showing of damages. If the property right were written specifically acknowledging the right of injunctive relief without a showing of damages, it is likely the courts would settle on a threshold level of intrusion that would call forth an injunction.

101. The way boundary rights are defined now in flexible licenses requires neither measurements nor the existence of "interference" per se. They are enforced either by equipment type acceptance or by calculations using standard propagation models and technical data that licensees must provide. Also, violations of current boundary limits (like trespass on land) are enforceable now even if there is no harm from interference to a licensee's services. Telephone Interview with John Williams, Spectrum Policy Task Force Member, FCC Office of Plans and Policy (Mar. 10, 2005).

juries.[102]

Failing neighborly bargaining and the courts (or arbitration), an aggrieved licensee has the option of selling his license and moving elsewhere. Now should this be suggested for the settling of land disputes, this would clearly be inappropriate, as landowners may have strong emotional attachments to their homestead or large capital investments that are specific to this property. In spectrum, it is not likely that any licensee will have strong emotional attachments to their spectrum. But what about capital investments? Surely investing in transmitter and receivers (which may actually be owned by your customers) at a certain frequency band makes moving to a different band very costly. However, in the new world of software-defined radio (which we assume to be fully mature) frequency changes in a transmitter can be made quite simply with a flip of a software switch. A frequency change in customer-owned equipment is easily updated over the air in a software-defined radio world. Even today, cellular telephones receive software updates over the air, patching themselves remotely. In this future technological environment, transmitters and receivers will have no long term attachments to particular frequency bands and moving from one to another should be easy.[103] If a licensee has insuperable problems with its neighbor, it can simply move away at low cost to a new set of neighbors.[104] With a rich market in licenses, finding a new place to locate should be no more difficult than finding a new house or apartment. The problem of the anticommons simply does not arise.

If non-interfering easements are granted within the property rights

---

102. Whether or not arbitration is more efficient than litigation or is more or less fair is a matter of dispute within the legal scholarship literature, which is not addressed in this paper. *See* Lisa B. Bingham, *Mandatory Arbitration: Control Over Dispute-System Design and Mandatory Commercial Arbitration*, 67 L. & CONTEMP. PROBS. 221 (2004). Lewis L. Maltby provides a discussion on the fairness of arbitration in employee-employer disputes, in which empirical results are quoted, ". . .compare[ing] the size of the awards in AAA arbitration proceedings to the size of awards in state court employment cases. The median AAA award was $63,120, while the median state court award was an almost identical $68,737." The mean of court awards was considerably higher than the mean of arbitration awards, suggesting that occasional very high jury awards lent a certain lottery aspect to litigation for plaintiffs not present in arbitration. *See* Lewis L. Maltby, *Employment Arbitration and Workplace Justice*, 38 U.S.F. L. REV. 105, 115 (2003).

103. Note that the ability of licensees to swap spectrum using markets is far less demanding than the technology of agile radio, in which spectrum may be swapped every few seconds rather than every few years. A user interested in switching frequency bands will of course be limited in her choices to bands whose license property rights match their needs; not all bands will necessarily do.

104. It is possible that the licensee may incur a loss in selling her current license, if it were the case that her interference troubles with neighbors would carry over to the next owner. For example, if a homeowner acquires a new neighbor that is noisy and obnoxious (but not illegally so), she can move, but it is likely the price of her home will reflect the negative aspects of her current neighbor.

model, the same principle applies. For example, an opportunistic agile radio would have the right to broadcast in a licensed band if the licensee is not using it; the agile radio has the obligation to ascertain if it is being used before broadcasting.[105] The agile radio would also be required to vacate the band within, say, 5 milliseconds of the licensee starting use of the band. Failure of the agile radio to comply would be a trespass violation, and an injunction issued against this particular agile radio using this band again. In this special case of opportunistic use of licensed spectrum, agile radios would be required to broadcast an identifying number to ensure that violators can be identified.[106]

Dispute resolution costs in a property rights model are thus held low by (i) using trespass law to enforce licensee restrictions; (ii) using neighborly bargaining where possible; (iii) using nuisance law in litigation or arbitration as a backup; and (iv) if all else fails, relocate at low cost.

### *D. Transaction Costs*

Commons advocates point out that markets for licenses have costs: buying and selling a license involves costs which would not be incurred in a commons regime. Both Benkler[107] and Werbach[108] note that transaction costs in a property regime are likely to be large and thus suggest the rejection of a market-based property rights regime for that reason (among many others), while neither author offers evidence of large transaction costs nor do they even define "large."

In the recent past, spectrum transactions have been difficult to execute because of regulatory limitations, and so have been more costly than would be the case in a full property rights market. Even so, a great many transactions occurred; Nextel, for example, purchased over 40,000 SMR licenses to put together its national network, apparently not overwhelmed by transaction costs.[109] A number of large wireless firms bought, sold and swapped spectrum around the country in order to build their national networks, again apparently not overwhelmed by transaction costs,[110] in spite of the difficulty of transacting an FCC

105. Quite recently, the FCC issued a ruling permitting "smart" (i.e., agile) radios, taking care to ensure that such radios do not interfere with licensees use of spectrum. *See* Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies, *Report & Order*, 20 FCC Rcd. 5486 (2005).

106. Should such services become popular, then they may acquire "squatters rights;" even though they infringe on licensees, it may be difficult if not impossible to evict them.

107. Benkler, *supra* note 29, at 57.

108. Werbach, *supra* note 37, at 961.

109. *See* Thomas W. Hazlett, *Is Federal Preemption Efficient In Cellular Phone Regulation?*, 56 FED. COMM. L. J. 155, 193 tbl. 8 (2003).

110. Analysts suggested that the broker fee for arranging such sales was approximately

license. The empirical evidence suggests that the transaction costs of spectrum in the late 1990s did not prevent a very active market in spectrum licenses, even though these costs are greater than would be expected in a full property rights market.

There does not appear to be publicly available data on the pecuniary costs of transacting spectrum licenses. However, the costs can be easily bounded from above and below. For example, Internet stock brokerage services are willing to trade at $10-13 per trade brokerage commission.[111] Of course, the stock market has very high volume and very competitive brokerage services, so this commission is likely a lower bound. The market is more likely to be similar to the real estate market in terms of volume and transaction speed. Generally, the real estate market has very high transaction costs, so it is useful as an upper bound on spectrum license costs. Typically, brokerage commissions are 5%-6%. Based on a sample of forty real estate transactions in Maryland and Delaware, I estimate the pure transaction cost at 0.8% in Delaware and 0.62% in Maryland.[112] This upper bound appears to be a rather modest transaction burden, particularly if a full property rights market drives down brokerage costs to under 3%, as seems likely. The pecuniary costs of transacting spectrum licenses does not appear to be a significant hindrance to the market.

Benkler suggests that one important transaction cost comes from the difficulty of predicting the value of a frequency band in markets with uncertainty, which certainly describes spectrum markets. However, this assertion flies in the face of the fact that many markets not only thrive in the presence of uncertainty, they actually *are* markets for uncertainty. Capital markets (stocks, bonds, futures, options, etc.) and commodity markets are obvious examples. In fact, almost every asset market bears elements of risk and uncertainty, yet asset markets generally perform quite well. The assertion that uncertainty about returns would in any way discourage markets runs counter to every piece of evidence concerning the performance of asset markets. The evidence concerning recent transactions of spectrum licenses also runs counter to this assertion.

Werbach also mentions monopoly as a problem with markets,[113] a view shared by many commons advocates. In fact, it would appear that

---

3%.

111. *See* E-Trade Financial, U.S. Commissions and Fees rate sheet *at* https://us.etrade.com/e/t/home/generalgen (last visited Oct. 8, 2005).

112. Based on a sample of 40 real estate transactions; pure transaction costs include all settlement fees and title insurance. They do not include broker fees (uniform at 5% or 6%), financing and mortgage company fees; or state and county transfer taxes (which are unique to real estate).

113. Werbach, *supra* note 37, at 929, 950.

commons advocates believe that the natural state of markets is monopolization. In fact, the empirical evidence supports the opposite. Currently, the spectrum use with greatest market value is cellular telephony, presumably the likeliest candidate for this alleged monopolization. Yet the Department of Justice and the FCC recently concluded that the industry was competitive enough to permit the merger of AT&T Wireless and Cingular, with only minimal requirements for divestitures. If monopoly doesn't exist in wireless today, does it exist in markets that are similar to what a full property rights market in spectrum licenses would be, such as asset markets? National asset markets, such as markets for financial products, are famously competitive. Even localized asset markets, such as real estate markets, are notably free of monopoly.

The assertion that spectrum markets would be monopolized simply cannot be supported by the evidence. In fact, most existing monopolies owe their privileged status to government protection (either current or the recent past). Telephone, electric power distribution and cable TV all gained their strong market power as regulated monopolies. This is not to say that most markets are perfectly competitive in the ideal conceptualization of introductory economics. But rivalrous behavior and aggressive competition, such as in cellular telephony, appears to be the norm in U.S. markets that we all experience daily.

Lessig makes a similar point in noting that a perfectly competitive market must price each use of spectrum at every second at its marginal cost, including opportunity and congestion cost.[114] Since this is clearly impossible (on transaction cost grounds), economic efficiency cannot be achieved and so a commons is preferable. This argument strains credulity. Almost no real world markets fit the ideal conceptualization of perfect competition. In communication markets such as wired and wireless telephony and Internet, pricing is almost never precisely marginal cost. In fact, it is usually flat-rate priced (such as local wired telephone service, Internet service) or priced in "buckets" (such as wireless service). While this doesn't meet the ideal conceptualization, these examples are the result of competitive market forces responding to what customers want. These markets are working just fine and no economist would recommend they be dismantled because they do not meet an ideal conceptualization.

### *E. Tragedies of the Commons and Anticommons*

Commons advocates respond to the problem of the tragedy of the commons by noting that users (or manufacturers of devices) are able to

114. *See* LESSIG, *supra* note 13.

come together to solve their communal problems outside the context of law. Examples include a successful self-imposed code of conduct for amateur radio and the ability of ranchers grazing open range to develop a complex set of rules and protocols for use of the commons grazing land.[115] They also suggest that some "light" regulatory oversight may be needed to enhance these self-organizing systems. It is certainly correct to assert regulatory oversight is required. As previously noted,[116] game theory suggests self-governance is a likely outcome only when a small number of players interact over a long period of time. Otherwise, anonymous and temporary users will have incentives to break the rules for their own advantage, as occurred in CB radio. Continued regulatory oversight and enforcement is necessary to control this; however, FCC enforcement was not sufficient to solve the problems of CB radio in the late 1970s.[117] One response to a tragedy of the commons is for users to request more capacity. As the 2.4 Ghz band becomes more crowded, commons advocates call for more (and better) bandwidth to meet their needs. Of course, if the new technologies are as bandwidth-conserving as commons advocates assert, then there would be little need for new bandwidth; unlicensed users could operate within the allocated bands. In general, in the end-state regulatory regime, congestion in unlicensed bands would call forth regulatory intervention, with its attendant costs, delays and uncertainty.

In a property rights regime, the problem is the tragedy of the anticommons. If bigger blocks of spectrum are needed and cannot be obtained by conserving bandwidth within an existing license, it would appear necessary to negotiate with adjacent licensees in order to obtain needed bandwidth. It would appear adjacent licensees may "holdup" the licensee in need of more spectrum, hoping to extract as much of the rent of the new project from the acquiring licensee.[118] But what is the underlying cause of the anticommons problem? The problem only arises if two properties are satisfied: (i) location-specificity and (ii) contiguity. If I wish to aggregate property around my existing home, then I have no choice about location: it must be where my home is located. I also have no choice about what properties I must acquire: they must be contiguous

115. *See* ELLICKSON, *supra* note 57 (discussing subsequent scholarship).

116. *See supra* p. 142.

117. Enforcement need not be vested in the FCC; VHF marine radio is an unlicensed system in use by almost all boaters and both formal and informal protocols seem to be followed by millions of recreational boaters. The fact that marine police and the US Coast Guard monitor VHF channels no doubt has a disciplining effect.

118. If there is only one other licensee, then the project should go forward, as the only bargaining is over who gets the rents. The anticommons problem arises when there is more than one party on the opposite side, and each party holds out to capture all the rents. In this case, unless the parties on the opposite side can somehow organize themselves, the project will not get done and no one receives rents: hence, the tragedy of the anticommons.

to my current property. A similar problem faces a developer of a shopping mall: there may be only one location that is most suitable for the mall, and the developer must purchase not only that property but all contiguous properties, leading to the holdup problem. A beach town may wish to construct a walkway on its beach, but if the land is owned by private property owners, no other land will do, and it is all contiguous. In this case, the town may choose to solve the holdup problem using eminent domain, a cumbersome and costly process at best.

But in spectrum, neither location-specificity nor contiguity need apply. As previously noted, in the new world of software-defined radio (which we assume to be relatively low cost), frequency changes in a transmitter can be made quite simply with a flip of a software switch.[119] A frequency change in customer-owned equipment is easily updated over the air in a software-defined radio world. Further, spectrum need not be contiguous; receivers need not be listening on just one frequency but be "smart" enough to monitor and receive multiple frequencies. I refer to this as the *anti-anticommons* principle. In this case, commons advocates have been drawn in by the analogy to land; the anticommons is a problem most acute in land. It is not a problem in spectrum, at least with the technologies promised by the commons advocates. Solving the holdup problem in a property rights regime is as simple and low-cost as shopping for new spectrum.

Although contiguity is not crucial for most applications in a world of cheap software defined radio, it is crucial (or at least important) for at least one technology: ultrawideband (UWB). As described above, UWB is now licensed as a very low power service (below the noise floor) which uses a very large swath of spectrum, 1 Ghz or more. While it is not absolutely essential that this swath of spectrum be contiguous, it certainly reduces the cost of UWB if it is. In my previous work with David Farber, I suggested that in a property rights regime a *non-interfering easement* could be granted in *all* licensed spectrum, in which any non-interfering use (such as UWB) could use licensed spectrum without permission provided the licensee was not using the spectrum or would not be interfered with by the use in question.[120] UWB was the anticipated use for such easements (called "underlay" rights in FCC-ese). However, it was anticipated that (high power) agile radio could also use any licensed spectrum that was not in use by the licensee, provided it could vacate the spectrum within milliseconds of the licensee commencing use (called "overlay" rights in FCC-ese). Further analysis suggests that the transaction costs and potential for abuse of agile radio's use of a non-interfering easement may prevent its deployment.

119. *See supra* p. 144.
120. *See* Faulhaber & Farber, *supra* note 3.

Nevertheless, the concept of a non-interfering easement within a property rights regime certainly would accommodate the functionality for which commons advocates champion the commons solution. In other words, the non-interfering easement with a property rights model *is* the commons. It is with some surprise I note that having offered the same functionality of a commons within a property rights regime, the commons advocates continue to argue for a commons regime *instead* of a property rights regime. Commons advocates are apparently unwilling to accept the "win-win" proposition of non-interfering easements within a property rights regime that gives them virtually everything they claim they want.[121]

### *F. Flexibility to Respond to Changes in Technology and Demands*

New technologies meeting new demands occur regularly in wireless without requiring modifications or changes in existing rules. For example, WiFi is a new technology meeting a new demand (for in-home networking) that fits well within the Part 15 rules at 2.4 Ghz, and was introduced seamlessly. Similarly, the extraordinary advances in cellular technology were introduced well within the cellular license rules and were integrated seamlessly. However, some technologies may not fit so easily; commons advocates argue that both UWB and agile radio do not fit into the classic licensing model, although introducing the minor change of non-interfering easements into the property rights model appears to solve that problem. But new technologies, unimaginable today, may also be disruptive of either commons rules or property rights licenses. How robust is either regime to disruptive technology?

There are several ways in which a new technology can impinge on existing arrangements: (i) a new protocol or standard could be introduced into wireless, such as spread spectrum in the 900 Mhz band in the 1980s; (ii) a new technology may require more or less power than existing rules permit; (iii) a new technology may require more or less bandwidth than existing bands permit; (iv) receiver technology may become more or less sensitive to interference; or (v) new technologies may require opportunistic or very low power use of existing licensed or unlicensed bands, such as agile radio or UWB.

---

121. This is not to say that non-interfering easements are obviously easy and costless to implement. Permitting alternative uses of licensed spectrum by random transmitters raised serious and difficult questions regarding methods of ensuring true non-interference, monitoring for non-interference, enforcement and identification issues that cannot be ignored. Should these problems be more costly to solve than the social value of the easement, clearly the easement concept should not be implemented.

1. New Protocols/Standards

The introduction of spread spectrum for cordless telephones under regulation and the adoption of standards for digital TV, discussed by Goodman,[122] are good models for how well the end-state regulatory regime would handle new protocols and standards in both licensed and unlicensed bands. This suggests disruptive protocols or standards are not likely to fare well in the end-state regulatory regime.

By contrast, in the property right regime, licensees are free to adopt new standards and protocols without seeking regulatory approval.[123] Market adoption of new standards is never a smooth process and may result in inefficiencies.[124] However, there is little evidence that regulatory standard setting is an improvement, especially given the opportunities for rent-seeking in the regulatory standard setting process.

2. Flexible Power Limits

If a new technology reduces the power limit required for a particular use, there is little incentive for individual users in an unlicensed band to adopt this new technology. Manufacturers of devices using unlicensed spectrum have some incentive to introduce power-conserving technologies, as it means they may be able to sell more devices. But this incentive is muted in that its introduction means that all manufacturers can sell more devices, leading to a free rider problem. These problems are not present in licensed bands; licensees have the incentive to introduce power-conserving technologies as they are the immediate beneficiaries of it. They may even choose to sell off some capacity should this occur.

If the new technology increases required power, then the end-state regulatory regime faces difficult negotiations in both licensed and unlicensed bands. Neighboring bands might be required to increase the quality of their receivers to tune out additional out of band power and neighboring locations might be required to do the same. In existing unlicensed bands, a changeout of all devices may be required to accommodate the new technology. Alternatively, a new unlicensed band

122. *See* Goodman, *supra* note 3, at 376-77.

123. The theory of regulation discussed above suggests that regulation provides a mechanism by which competitors can seek to disadvantage innovators from adopting new technologies. The openness of the regulatory process ensures that anyone can object to any proposal to introduce technology that requires regulatory approval. Further, the theory also suggests that the scope of regulation will expand to cover new technologies should these innovations be perceived as a threat to other market participants. These institutional mechanisms are simply not present in the property rights model.

124. *See* Stanley M. Bensen & Joseph Farrell, *Choosing How to Compete: Strategy and Tactics in Standardization*, 8 J. ECON. PERSP. 117 (1994).

could be established for the new technology if one were available. At best, these options are likely to be quite difficult, take a very long time, and may not be successful. In a property rights model, a licensee who wished to use the new power-increasing technology could engage in neighborly bargaining with licensees in adjacent frequencies and locations. This bargaining would include possible payments to neighbors to adjust to higher power levels, or the buyout of the neighbors' licenses. Should this fail, the licensees could buy new spectrum licenses covering enough bandwidth and enough locations to enable it to deploy the new technology, as is implied in the anti-anticommons principle. However, the application could be location-specific, in which case options for deployment are more limited.

In sum, technologies that decrease power requirements are more likely to be deployed and exploited in a property rights regime rather than the end-state regulatory regime. Technologies that increase power requirements are in general more difficult to deploy in either regime, but are somewhat more likely to find success in the property rights regime.

3. Flexible Bandwidth

If the new technology enables applications to use less bandwidth than previously, the analysis of the previous section on power also applies. The incentives to deploy the technology in unlicensed bands is somewhat muted. In licensed bands, licensees have incentives to economize on bandwidth, not only to increase the use of their license but also to sell or lease any unneeded bandwidth.

If the technology increases bandwidth needed for applications, then the end-state regulatory regime may observe that existing unlicensed bands become more congested, leading to a tragedy of the commons. The regulator can respond to this by purchasing licensed spectrum and converting it to unlicensed spectrum, or it could impose new rules and limitations on users and manufacturers restricting the use of the new technology. Again, we would expect that regulatory resolution of this conflict would be costly and lengthy, and possibly not successful.

In the property rights regime, licensees who wish to expand their bandwidth to take advantage of the new technology can engage in neighborly bargaining with their neighbors to accept higher levels of out of band power, or they may negotiate the purchase of neighboring bands. Failing this, licensees can choose to sell their current spectrum and move to a new, larger frequency band at relatively low cost, as argued above. In fact, they may purchase several contiguous bands and aggregate them. The same mechanism would apply in the end-state regulatory regime, except that a competitor may petition the regulator to intervene on its behalf to halt this market transaction.

Thus, bandwidth-conserving technologies are more likely to be deployed in a property rights regime than in the end-state regulatory regime, as licensees can internalize the benefits of the innovation whereas users and manufacturers in unlicensed spectrum are handicapped in this regard. Bandwidth-increasing technologies are likely to lead to a tragedy of the commons in unlicensed spectrum, calling for regulatory intervention with its attendant costs, delays and uncertainty. In contrast, deployment of such a technology in a property rights regime calls for license aggregation: buying the licenses of adjacent licensees. Recalling the principle of the anti-anticommons, this should be both simple and low-cost.

Even without the deployment of software-defined radio, the evidence suggests that spectrum can be aggregated. The aggregation occurred during the 1990s, when a number of large wireless firms that owned licenses in some metro areas wished to expand their networks to have national scope. This required them to purchase specific frequency bands in specific locations, generally from other cellular companies, to fill out their networks. More dramatically, Nextel purchased over 40,000 SMR licenses nationwide to obtain nationwide coverage. In both situations, the firms managed to solve the holdup problem and put together nationwide networks. This process took time and money, but it did not stop any of the firms involved.[125]

Lastly, what might occur if the bandwidth devoted to different management options needs to change? For example, it could be that commons-managed spectrum is wildly successful and needs to be expanded at the expense of property rights-managed spectrum. In the end-state regulatory regime, the decision becomes regulatory; the regulator would have to decide how to value commons spectrum (as there would be no market price), how much spectrum to convert to commons, what bands were most appropriate, and then purchase the required licenses at market (and subject to holdup problems). It would then have to decide what commons uses would be permitted to use the newly available spectrum, including power limits and protocols. Each of these decisions could be expected to be costly, delayed and highly uncertain.

In a property rights regime, licensees that held their bands for open

125. The holdup problem is particularly severe in land, where developers must acquire contiguous land at a particular site for a successful project (indeed, almost all examples of the holdup problem used by commons advocates are based on land). Even here, aggregators have come up with interesting and compelling solutions: an aggregator can make a (generous) "all or nothing" offer to landholders, stipulating that individual offers are contingent upon all offers being accepted. In established neighborhoods, for example, such offers can change the social dynamic among neighbors from common resistance and holdups to common acceptance and social sanctions against holdouts. My thanks to Hon. Stephen F. Williams for this observation.

access would find their market value increase and seek to purchase new bandwidth licenses to expand their services. Alternatively, current spectrum licensees could also assess the market value of open access spectrum and choose to convert their current spectrum to open access. Included in this group of potential agents would be government (at any level) that could purchase licenses and convert them from exclusive use to commons use, if there were sufficient political demand for this. On the other hand, it could be that spectrum devoted to open access is less valuable than exclusive use spectrum; we would expect that licensees of commons spectrum would convert their frequency bands from commons to exclusive use, much the way an owner of an apartment building may convert the building from rental units to a condominium. This market-driven process would provide much clearer signals regarding the value of moving spectrum to or from open access/unlicensed to exclusive use.

In sum, the property rights regime is likely to adjust rather easily to technology and demand changes necessitating changes in required bandwidth. The end-state regulatory regime can rely on market mechanisms to be flexible for licensed bands, but is liable to encounter tragedy of the commons problems in unlicensed bands, which can only be resolved by regulatory interventions that are costly, delayed and uncertain. The overall allocation of bandwidth from commons to property rights and back is likely to be difficult in the end-state regulatory regime and relatively automatic in the property rights regime.

## V. SOME ILLUSTRATIVE HYPOTHETICALS

In order to illustrate how each regime would operate in practice, I consider three cases in which an individual, firm or agency would operate within each regime, comparing the costs and benefits of each regime for each of the three cases: a full time exclusive use broadcaster, a two-way communication service (voice or data) and a municipality with public safety needs.

### *A. Case A: Broadcasting*

A firm or individual wishes to operate a high-powered transmitter to broadcast entertainment (such as FM radio or TV) or other full-time exclusive use (such as an airport radar) in an SMSA (or nationally).

#### 1. Property Rights Regime

The firm or individual purchases a spectrum license in the open market for the necessary bandwidth, power and location(s). This is almost identical to the purchase of a radio station (or network of radio stations) in today's market. If the operator wished to use the existing

base of inexpensive receivers, it would be limited to broadcasting in bands the "dumb" receivers could tune in. However, the operator could choose to broadcast at any frequency it chose, provided "smart" receivers were available which could detect the new signal.[126]

If an immediate neighbor (in geographic space or frequency space) claimed that the operator was operating outside the power bounds specified in its license, the operator could hire a third party technical firm to verify that it was in compliance with its license (or not), and appropriate action be taken. Note that the number of neighbors is small.[127] In frequency space, there are only two immediate neighbors, on either side of the licensee's band (although in some cases non-adjacent bands could be affected, the number of "neighbors" remains small). In geographic space, only licensees in the three or four contiguous MSAs are immediate neighbors.[128] This could involve fixing a problem if it exists (requesting a grace period from the neighbor), or notifying the neighbor that the firm is in compliance. In this case, should the immediate neighbor decide to bring suit, the third party firm's data could be used in the firm's defense.

If the firm is in compliance but the neighbor is legitimately suffering interference as a result of the firm's broadcasting, the two neighbors would engage in neighborly bargaining. As neighbors with a fairly long term relationship, we would expect such bargaining would be successful; each neighbor would have an interest in maintaining a cordial relationship with the other to ensure that future problems can be resolved at low cost. Failing successful bargaining, the party suffering interference may attempt to bring suit under nuisance law, in which case the court must balance relative economic harms and costs of remediation. It is likely, however, that a court would find a transmitter operating within its

126. The "smart" radio would have radio stations such as "Power 99" or "Smooth Listening." In each city, this station might be broadcasting on a different frequency, or the frequency in a particular city may change over time. The "smart radio" would receive a download, perhaps once a day or whenever it was turned on, updating the local frequencies of all entertainment broadcasters, much as DNS servers in the Internet download update DNS information from the Internet root servers periodically, so that they may direct traffic appropriately for new servers and discontinued servers.

127. The interference detection problem is made more difficult if a non-interfering easement is present. A licensee may need to monitor its licensed spectrum to ensure that opportunistic users such as agile radios stay within their easement limits. This monitoring could be continuous or only in response to regular interruptions; the firm itself could do the monitoring or it could hire a third party monitor to detect and record out-of-easement power emissions. Under a property rights with non-interfering easement regime, agile radios would likely be required to broadcast an identifier so that infringers could be tracked and prosecuted. *See supra* p. 130.

128. If the licensee significantly violates its licensed limits, it could impinge on more distant bands and locations. But as a general rule, the immediate neighbors suffer the most significant interference and have the greatest incentive to complain and/or bring action.

license parameters not to be creating a nuisance. If the issue is still not resolved, the party suffering interference either mitigates the interference by upgrading receivers or purchases a spectrum license in a different band.

### 2. End-State Regulatory Regime

If the radio and TV bands continue to be allocated by the regulators to exclusive use, then the firm or individual will most likely purchase an existing radio or TV license and would proceed as today. If the firm or individual chooses to purchase other frequencies to which today's "dumb" radios or TVs are not tuned, then the firm would have to rely on customers adopting "smart" radios, as described previously.[129]

Dispute resolution in the exclusive use portion of the spectrum would likely remain with the FCC. There is ample evidence regarding the speed and efficacy of the FCC dispute resolution process, in particular its bias in favor of incumbents and the open nature of proceedings that permits intervention by competitors and other rent-seekers.[130] In essence, today's regulatory regime of dispute resolution is duplicated in the end-state regulatory regime, with all its attendant costs and biases.

It is not at all clear how entertainment broadcasting could work in a commons regime. Broadcasting is typically high-powered; even using agile/cognitive technology (a substantial expense for both broadcasters and users) in an open commons, the power mix problem ensures that low-powered users would suffer interference. Only further intrusive regulation could resolve this problem, and it would still be unattractive to broadcasters.

### 3. Case A Conclusion

A broadcaster could function well in a property rights regime, but would be more likely to encounter competition. Broadcast licenses would no longer command economic rents (unless there was an identification of a particular frequency with a brand name, such as "Power 99" in Philadelphia). In the end-state regulatory regime, broadcasters would function much as they do today in the exclusive use portion of the spectrum, and still be subject to FCC dispute resolution. They are unlikely to be able to function at all in a commons regime. The exclusive use licenses in the end-state regulatory regime promise the transactional flexibility of the property rights regime but continue regulatory dispute resolution, allocation of spectrum between exclusive

129. *See supra* pp. 129-30.
130. Goodman, *supra* note 3, at 376-77.

use and commons, regulatory selection of protocols and standards, and lobbying and other rent-seeking activity, with its attendant excessive delays and excessive costs.

### *B. Case B: Two-way Communication Service (voice/data)*

A firm, individual or government agency wishes to establish a two-way communication system within one or more locations. This case includes a very broad array of systems. One example is systems designed for customers of the firm to use, such as a cell phone system or a wireless computer data system.[131] This would involve a localized wireless network accessing a landline network that connects with other wireless and wireline communication systems. Typically (but not always), such systems are open to all customers, decentralized and often use multiple antennas within an area. A second example is systems designed for a firm/agency's employees to use for internal communications. This would include such examples as police radio, fire radio, taxi dispatch, and firms with locally dispersed employees, such as construction firms or delivery firms. Typically (but not always), such systems are closed to all but the operating firm, have a central focal node, such as a dispatcher, and often use a single antenna within an area.

Both types of systems are similar enough so that their options under a property rights regime are roughly the same and their options under an end-state regulatory regime are roughly the same. In fact, some systems, such as Nextel's cell phone *cum* walkie-talkie system, fit both categories.

#### 1. Property Rights Regime

The firm selling to end-customers would purchase sufficient frequency space in all locations; if the same frequency bands were available in all locations, then the firm could use fairly simple user devices, much like today's cell phones. If not, the firm could buy different frequency bands in different locations and require the use of smart phones by its customers to enable the phones to switch frequency bands in each city. Otherwise, the system would operate as today's cell phone systems work: the firm would attempt to attract as many customers as possible, offering them a wide variety of user devices (phones or PC cards for data services) and a wide variety of payment plans. The firm could choose to deploy a technology using multiple antennas that connect into the national telephone system (or the Internet, if data), or they could deploy a peer-to-peer mesh network, in which the infrastructure is contained within the user devices themselves,

131. Examples of such data systems include GPRS, 1*x*EVDO, WiFi and WiMax.

obviating the need for an antenna infrastructure. Typically, a *service* firm would deploy a system with infrastructure, establishing rules of use and acceptable user devices, while a *device* firm would be more likely to deploy a mesh network, building rules of use and protocols into the individual devices. In either case, the firm would hold the licenses for the frequencies and locations necessary for the system to work.

In the case of a mesh network deployed within a licensed frequency band and location, the user devices could be designed so that they could use up to the maximum permitted power level if the density of users was low and the nearest user device (which would be the relay point) was many miles away. As the density of users increased, the power levels could be reduced, since the nearest user device may only be several feet away. This ability to vary power depending on the density of the network enables a mesh network to be economically viable at low device densities. As the density increases, power can be reduced, leading to what David Reed has called *cooperation gain*.[132] However, this cooperation gain can only be achieved at fairly high device densities, and its benefit is severely limited if the required multiple "hops" to complete a message results in unacceptable delays (latency). Within a property rights regime, a mesh network may trade off cooperation gain by using higher powered devices to reduce latency problems (fewer hops) and handle lower device densities.

Interference problems among users within a frequency band can be managed by the licensee, perhaps by updating software within the permitted devices and controlling the number of devices sold in a particular location if necessary. Whether the licensee is operating a mesh network or a more traditional communications network with an antenna infrastructure, it is the licensee that is responsible for policing its own spectrum to ensure that interference does not occur, and has the legal authority to take action if necessary. Further, it is in the interest of the licensee to offer an acceptable level of interference (generally low but not necessarily zero) to attract and retain customers in the context of a competitive market.

If the immediate neighbors complain of interference due to out-of-license power emissions from the licensee's customers, both the licensee and his neighbors have the same options available as in Case A; each can hire a third-party monitor to detect, measure and record the presence or absence of out-of-license emissions. If a suit is brought, the records of the third-party monitors should be decisive in reaching a swift decision,

132. Comments of David P. Reed, to the *Public Notice* in Spectrum Policy Task Force Seeks Public Comment on Issues Related to Commission's Spectrum Policies, ET Docket 02-135 (July 8, 2002), *at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513202407.

suggesting it is unlikely that most cases would actually be tried. If the neighbor suffered legitimate interference from the licensee operating within his license constraints, then the neighbor and the licensee could engage in neighborly bargaining; since they have an ongoing relationship as neighbors, it is likely such bargaining would be successful. Otherwise, the neighbor could bring suit under nuisance law, in which the court would decide on the basis of relative harms. If this does not resolve the issue, the neighbor can take mitigating action (such as buying new receivers) or move to other spectrum. Of course, this would involve changing the frequencies of both transmitters and receivers; but this could be realized using over-the-air system updates for smart phones.[133]

### 2. End-State Regulatory Regime

Deployment of a two-way voice or data communications system in the end-state regime offers both opportunities and problems. A *service* firm could provide a system with infrastructure within the exclusive use portion of the spectrum simply by purchasing the spectrum. Such an operation would be almost identical to offering cellular phone service today, except that service providers would have greater freedom to purchase spectrum in an open market with few of today's constraints. This would also entail continued FCC oversight and dispute resolution. One recent example of how convoluted and costly is this oversight and dispute resolution is the current Nextel band relocation case, discussed earlier.[134]

Could a service firm deploy a system with infrastructure in a commons spectrum? This would seem unlikely; as such systems usually depend upon high power (as do cellular systems today). If the system were deployed in an open commons, it would certainly require agile radios in order to avoid interference with other high-powered users. But it would also be subject to the power mix problem, and would likely interfere with low-powered users, which it would be unable to detect. Only if the low powered users deployed agile technology would they manage to avoid interference from high-powered users such as a cellular-type system. This would, of course, impose a cost on low powered users

133. Even with today's not-very-smart cell phones, information can be downloaded over the air to each phone, updating roaming information.

134. *See supra* pp. 138-40. Another example of a dispute before the FCC whose resolution was very costly and long-delayed is the NextWave case, involving disputed payments for auctioned licenses for spectrum to be used for wireless telephony. After two trips to the Second Circuit and one trip to the DC Circuit the case was eventually decided by the Supreme Court after five years; during this period, the disputed spectrum was not used in any way to benefit the public. *See* FCC v. NextWave Pers. Commc'ns Inc., 537 U.S. 293 (2003), *available at* http://caselaw.lp.findlaw.com/scripts/getcase.pl?court=US&vol=000&invol=01-653 (briefly discussing history of the case).

they would not have to bear if only low powered users were permitted. This suggests that a regulator may have to segregate commons for high-powered users from commons for low powered users, which again involves regulatory decisions which are likely to be disputatious, lengthy and costly. Additionally, operating a cellular-type system in an open commons, even using agile radios, subjects the system operator to the risk of congestion in the band; since it does not own the band and it is open to all, it cannot guarantee to customers a particular service level (dropped calls, failure to connect, etc.), and therefore cannot guarantee to investors that its business model will be viable in the future if and when congestion may occur.

A *device* firm would be more likely to deploy its system as a mesh network in a commons or in exclusive use spectrum. In the case of the commons, however, low power constraints on transmitters imply that only a high device density can support the service (since transceivers must be close together to act as relays for each other at low power). It is unclear how such a system could get started; obviously a new system will have a rather low device density, and thus be unworkable. It is also likely that latency problems could occur in such low power networks if many hops are required to transmit information. The deployment of mesh networks in a low powered commons environment is problematic. On the other hand, the device firm could certainly deploy its system in the exclusive use portion of the spectrum simply through direct purchase.

In the end-state regulatory regime, the communications service would still be subject to FCC dispute resolution, should interference occur. If cheating (such as using a pirate radio) is beneficial to the cheater even if costly to other commons users, there is a potential enforcement tragedy of the commons. This need not be the case of all such commons. For example, many Part 15 devices today work together quite well; there is no benefit to users of garage door openers or to users of inside/outside weather stations to increase their power. But CB radio during the late 1970s offers an example in which pirate devices caused substantial interference for the simple reason that it was in the interest of the pirate to increase power and the likelihood of enforcement was quite low.

### 3. Case B Conclusion

Two-way communications services from a service firm with antenna infrastructure are unlikely to be offered in a commons environment; the power mix problem may work against this high-powered use. The property rights regime appears to be their natural métier, as evidenced by today's highly successful cellular service. Device firms offering mesh networks are likely to find the variable-powered property rights regime

preferable to the low-powered commons regime, in that the former allows them to solve the device density problem. As above, the exclusive use licenses in the end-state regime promise the transactional flexibility of the property rights regime but continue regulatory dispute resolution, allocation of spectrum between exclusive use and commons, regulatory selection of protocols and standards, and lobbying and other rent-seeking activity, with its attendant excessive delays and excessive costs.

### *C. Case C: Public Safety*

A municipality wishes to establish (more likely, to continue) police, fire and emergency radio services for its public safety agencies. The demands of public safety agencies for radio spectrum are rather unique: at most times, the need is for administrative and isolated emergency traffic among mobile units and headquarters, using relatively little bandwidth. However, at times of civil disturbance or catastrophe, the needs change dramatically; many units are simultaneously deployed and must coordinate activities within and sometimes between agencies. The bandwidth requirements for public safety may increase dramatically at these times, and the ability of public safety agencies to protect and serve the public depends critically on having sufficient bandwidth, free of interference, to communicate instantly. Negotiations are not possible and compromise is not an option; clear communications requiring multiples of the normal bandwidth requirements are essential.

#### 1. Property Rights Regime

Municipalities have already been allocated spectrum in today's regime and would be most likely to keep it under the new property rights regime. The amount of bandwidth allocated for public safety tends to be the maximum bandwidth needed for public emergencies; as a result, much of the bandwidth allocated for public safety lies fallow. Municipalities could adopt two strategies to improve their spectrum efficiency without compromising their mission goals. Under the first strategy, municipalities could adopt new digital technologies for transmission and reception which could reduce their bandwidth needs. They could then sell off the unneeded spectrum to others, covering the cost of the new equipment while helping the municipal finances. Ownership of the license ensures that municipalities have the incentive to engage in this mutually beneficial trade. Under the current regulatory regime, they do not.

Under the second strategy, in order to use their normally spare capacity, municipalities could also sell rights to others to use their spectrum during non-emergency periods using special cognitive radios.

During an emergency, a signal would be broadcast that would shut down all non-emergency spectrum use,[135] so that all available bandwidth would be used for emergency traffic only. [136] Examples of potential customers for these overlay rights would be construction firms and delivery companies. Municipalities would benefit by receiving revenues for the spectrum they control when they do not need it, and users willing to tolerate interruptions get access to spectrum at lower cost. Ownership of the license ensures that municipalities have the incentive to engage in this mutually beneficial trade. Under the current regulatory regime, they do not.

Should the licensees create interference by violating the license terms, or receive interference from a neighboring licensee violating its license terms, recourse to the courts would be direct, and third-party monitors could generate evidence regarding adherence by the parties to license terms. Because of the life-or-death nature of public safety services, neighbors violating their license terms may be subject to criminal as well as civil penalties. Interference caused by neighbors operating within their license terms could be handled by neighborly bargaining or by bringing suit under nuisance law, should that fail. Alternatively, either party can sell their spectrum and move to a different band.

Users of underlay spectrum could also violate the conditions of use, perhaps using an unauthorized device that did not turn off on command (just as a motorist today may refuse to yield the right-of-way to an emergency vehicle); they would then be subject to civil and perhaps criminal penalties (as is the unyielding motorist today) for such violations.

If the municipality wishes to move to a newer system, it may need less bandwidth or more. If it needs less, it can move to the newer system and sell off the unneeded bandwidth to help offset the cost of the new system. If it needs more bandwidth, it can bargain with its neighbors to buy a license for a contiguous band or it can buy a license for a non-contiguous band and use software defined radios to manage the use of multiple bands within a single device.

---

135. The municipality could require that only certain devices be used in this underlay spectrum, which devices would have hardware embedded that would turn them off upon receipt of the "off" signal broadcast by public safety officials.

136. If a non-interfering easement is adopted for all spectrum including public safety, then the overlay right discussed here would be senior to the "free" overlay right of the non-interfering easement. Specifically, the owner of the overlay right discussed could broadcast as long as there was no emergency, and it would have an absolute right to transmit over anyone using the non-interfering easement. Only if the public safety agency *and* the owner of the underlay right were not transmitting could an agile radio use the non-interfering easement in this band.

### 2. End-State Regulatory Regime

Public safety agencies would likely prefer to use exclusive use spectrum in this regime, taking advantage of the transactional capabilities outlined above. The only difference would be the continued oversight of the FCC and that dispute resolution would remain a regulatory function. The current proceedings regarding the interference issues in the 800 Mhz band involving Nextel and public safety agencies is a clear case study demonstrating the excessively long and excessively costly regulatory dispute resolution.

Using the commons for public safety seems highly undesirable. Public safety radio is generally high-powered, and thus could cause the power mix problem if used in an open commons. If public safety radios are used in a high power commons only, then they would have to be agile, and yet still be subject to possible congestion or tragedy of the commons. A public emergency when life and limb are in danger is no time for a police radio to be blocked by a teenager using an agile phone to download pictures from Penthouse Magazine during a traffic burst. While commons advocates may claim this is unlikely, whose life are we willing to bet on this?

### 3. Case C Conclusion

A property rights regime is quite friendly to public safety use, even permitting costs to decline, and additional revenues to be realized, for municipalities. In the end-state regime, using a commons for public safety radio is undesirable; in a public emergency, first responders must be able to access the bandwidth they need without competing with other users of the commons. As above, the exclusive use licenses in the end-state regime promise the transactional flexibility of the property rights regime but continue regulatory dispute resolution, allocation of spectrum between exclusive use and commons, regulatory selection of protocols and standards, and lobbying and other rent-seeking activity, with its attendant excessive delays and excessive costs.

## CONCLUSION

This paper lays out in some detail what we can expect from regulation based on evidence, and also lays out a legal framework for a property rights regime. It analyzes each regime on the basis of the four factors. For one of those factors, the end-state regulatory regime has the advantage, at least in commons-managed spectrum: there are no transaction costs associated with buying, selling or leasing spectrum. In the case of the property rights regime, the evidence suggests that these transaction costs are likely to be rather small, and therefore not a decisive

issue. For all other factors, the property rights regime appears to dominate the end-state regulatory regime.

The new technologies have been a driving force in this debate, and without exception these technologies hold much promise. However, these technologies do not favor one regime over the other. These technologies enable the commons, in the sense that they help solve the tragedy of the commons (interference) problem, but they support property rights, in the sense that they help solve the holdup (tragedy of the anticommons) problem. The technologies cannot tell us the regime to choose, but they do make it easier to implement either regime.

It is important to recall that the focus of this paper is the evaluation of two "end-state" regimes, while ignoring costs associated with transitioning from today's regime to the preferred end-state regulatory regime. The economic and political costs of transition may differ greatly between the property rights regime and the end-state regulation regime, and these transition costs are important in making a good regime choice. But it is beyond the scope of this paper to undertake the task of analyzing these costs.

Ultimately, the choice of an overarching legal regime comes down to a choice between regulation and markets. There is much evidence about the economic performance of regulation, not the least from FCC regulation over the past 70 years. Markets in spectrum licenses are small and very imperfect; yet the existing spotty evidence suggests they work moderately well. The fears of commons advocates of monopoly, holdup problems and huge transaction costs simply don't withstand careful analysis. The conclusion is clear and inescapable.

# MAKING SPECTRUM REFORM "THINKABLE"

JAMES B. SPETA*



## INTRODUCTION

In 1997, then FCC Chairman Reed Hundt delivered a speech to the Brookings Institution entitled, "Thinking About Why Some Communications Mergers are Unthinkable."[1] The Chairman's specific target was an AT&T/RBOC merger, and he declared that any "combination of AT&T and an RBOC is unthinkable."[2] Hundt's speech was a response to a trial balloon that had been floated by AT&T's CEO, which was then in widely-rumored negotiations with SBC over a

* Associate Professor, Northwestern University School of Law. My thanks go to Gerald Faulhaber, Ellen Goodman, Robert Pepper, and Philip Weiser for early comments. Comments are welcomed to j-speta@northwestern.edu.

1. Reed E. Hundt, *Thinking About Why Some Communications Mergers Are Unthinkable*, (Jun. 19, 1997), *at* http://www.fcc.gov/Speeches/Hundt/spreh735.html.

2. *Id.* Chairman Hundt was not the only one to try to describe the merger in such terms, with the Washington Post reporting: "It just takes my breath away, the chutzpah of it,' Alfred Kahn, the father of airline deregulation, said of the possible AT&T-SBC hookup. 'This is one where you'd want to blow the whistle.'" Steven Pearlstein & Mike Mills, *Telecommunications Deals Set Off Antitrust Alarms; Some Say AT&T, News Corp. Plans Go Too Far*, WASH. POST, May 29, 1997, at E1.

possible merger.[3] Although any AT&T/SBC merger at that time likely would have resulted in the separation or spin-off of a wholesale-only loop company – a structure that grew directly out of the antitrust theory of the AT&T Consent Decree[4] and a structure that enjoyed some academic support[5] – "the deal's chances of going through were vaporized overnight"[6] by the speech. Hundt's premise was that the merger was fundamentally inconsistent with the premises of the 1996 Act, and, in fact, ten days after the speech, the deal was dead.[7]

Today, eight short years later (in early 2005), much has changed. AT&T and SBC are merging, with little resistance expected. More importantly, there seems to be growing traction for a comprehensive re-writing of the laws governing communications markets. Academic calls for a new regulatory structure are not new. Ithiel de Sola Pool, whose ground-breaking book anticipated genuine technological convergence by about 20 years, also anticipated the regulatory problem: "If the boundaries between publishing, broadcasting, cable television, and the telephone network are indeed broken in the coming decades, then communications policies in all advanced countries must address the issue of which of the three models will dominate public policy regarding them."[8] In recent years, as this conference and previous conferences here in Boulder confirm, genuine glimpses of convergence have multiplied these academic calls.

What is new is that key politicians and regulators are also calling for re-writing the Act. Senator John McCain, recalling his "long held belief

3. Disclosure: at the time, I was an associate attorney at Sidley & Austin and did do work for AT&T.

4. United States v. AT&T, 552 F. Supp. 131 (D.D.C. 1982), *aff'd sub nom.*, Maryland v. United States, 460 U.S. 1001 (1983). The theory of the Decree, of course, was that the owner of a natural monopoly segment of the telecommunications network (then the local exchange) would have the "incentive and ability" to leverage that monopoly into long distance markets. *See generally* Joseph D. Kearney, *From the Fall of the Bell System to the Telecommunications Act: Regulation of Telecommunications under Judge Greene*, 50 HASTINGS L.J. 1395 (1999); Glen O. Robinson, *The Titanic Remembered: AT&T and the Changing World of Telecommunications*, 5 YALE J. ON REG. 517 (1988) (reviewing GERALD R. FAULHABER, TELECOMMUNICATIONS IN TURMOIL: TECHNOLOGY AND PUBLIC POLICY (1987)).

5. *See generally* T. Randolph Beard, et al., *Why ADCo? Why Now? An Economic Exploration into the Future of Industry Structure for the "Last Mile" in Local Telecommunications Markets*, 54 FED. COMM. L.J. 421 (2002). *But see* Robert W. Crandall & J. Gregory Sidak, *Is Structural Separation of Incumbent Local Exchange Carriers Necessary for Competition?*, 19 YALE J. ON REG. 335 (2002) (criticizing idea of structural separation).

6. Allan Sloan, *Remember How the Mighty AT&T Stumbled as SBC Acquisition of Ameritech Unfolds*, WASH. POST, May 19, 1998, at C3.

7. *See, e.g.*, Paul Farhi, *AT&T, SBC Halt Talks on Merger*, WASH. POST, June 28, 1997, at D1.

8. ITHIEL DE SOLA POOL, TECHNOLOGIES OF FREEDOM: ON FREE SPEECH IN AN ELECTRONIC AGE 8 (1984).

that the 1996 Act is a fundamentally flawed piece of legislation," stated in 2004 that "some of my colleagues have joined me in expressing the need for Congress to take a serious look at reforming the Act."[9] Former FCC Chairman Powell has similarly said to the Senate Commerce Committee that "it is my responsibility as your expert agency to tell you, I think the days are numbered on the way we're doing this under the current statute. I do believe there is going to have to be a statute that recognizes these dramatic technical changes and gets us out of the buckets of the '96 Act."[10] As the 109th Congress approached (and began), similar calls were heard from a number of important legislators.[11]

This paper focuses on the possibility of significant spectrum reform as an element of any communications legislation – to the extent that a rewrite of the Act is "thinkable," whether spectrum reform too is "thinkable." In particular, this paper asks whether spectrum reform is likely to be included in the legislative agenda and also asks whether there are concrete steps that can be pursued to increase the likelihood of Congressional attention to spectrum reform. The purpose is not, principally, to argue spectrum reform on the merits. A substantial literature, from the FCC and from academics, has arisen in the past several years making the case for spectrum reform[12] – and the current work has its roots in serious criticism of government spectrum allocation and use rules going back at least as far as Ronald Coase's famous 1959

9. *Voice Over Internet Protocol (VOIP) Hearing Before the Senate Commerce, Sci., & Transp. Comm.*, 108th Cong. (2004) (statement of John McCain).

10. *Voice Over Internet Protocol (VOIP) Hearing Before the Senate Commerce, Sci., & Transp. Comm.*, 108th Cong. (2004) (statement of Michael K. Powell).

11. *See infra* notes 58-61 and accompanying text.

12. As discussed *infra* notes 106-14 and accompanying text, the FCC has made spectrum reform one of its strategic goals, and its Spectrum Policy Task Force Report provides in important summary of current regulation, the need for reform, and possible alternatives. *See* FCC, Spectrum Policy Task Force Report, ET Dkt. No. 02-135 (2002), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-228542A1.pdf. A report by two FCC economists presents a persuasive case for largely privatizing the spectrum, through a so-called "big bang" auction. *See* EVAN KWEREL & JOHN WILLIAMS, A PROPOSAL FOR A RAPID TRANSITION TO MARKET ALLOCATION OF SPECTRUM (FCC Office of Plans and Policy, Working Paper No. 38, Nov. 2002), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-228552A1.pdf.

The academic literature is extensive, and, given that I am not here arguing the merits, I will not attempt to cite all of it. Several central articles, which themselves provide entry into most of the other literature, are: Stuart N. Benjamin, *Spectrum Abundance and the Choice Between Private and Public Control*, 78 N.Y.U. L. REV. 2007 (2003); 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); Yochai Benkler, *Some Economics of Wireless Communications*, 16 HARV. J.L. & TECH. 25 (2002); GERALD R. FAULHABER & DAVID J. FARBER, RETHINKING RIGHTS AND REGULATIONS 193 (Lorrie Faith Cranor & Steven S. Wildman eds., 2003); Ellen P. Goodman, *Spectrum Rights in the Telecosm to Come*, 41 SAN DIEGO L. REV. 269 (2004).

article.[13] The literature, of course, is not unanimous on prescriptions for spectrum reform, with a significant divide between those who call for a largely property-based solution and those who call for a largely unlicensed solution, but almost no one has risen to a defense of the status quo.[14]

Spectrum reform is only one part of a comprehensive communications law reform, but focusing on its political possibilities makes sense for several reasons. First, the fundamental premise of spectrum law – government ownership of the spectrum and licensing of uses – has changed little since the Federal Radio Act of 1927. The 1996 Act rewrote much of traditional wireline regulation, explicitly preferencing competition to monopoly in all markets[15] and providing an explicit mechanism for eliminating tariffing, rate regulation, and other industry supervision.[16] But, as Thomas Hazlett has noted: "Despite ambitious rhetoric regarding the scope of liberalization in telecommunications markets, the omnibus 1996 Telecommunications Act did shockingly little to disturb age-old regulatory arrangements in radio and television broadcasting."[17] The spectrum reform component of earlier bills was broken off into a separate proposal, and Congress never returned to it.[18] Second, the principal reason for the lack of reform has been political intractability – not the lack of need for spectrum reform. As Hazlett and others have shown, the original structure of the Radio Act[19] in large part protected incumbent broadcaster interests. And incumbent interests can largely explain both changes made (such as extending license terms, eliminating renewal hearings, granting digital television (DTV) licenses) and changes refused (such as low power radio, and certain spectrum relocations) including the absence of spectrum

13. Ronald H. Coase, *The Federal Communications Commission*, 2 J.L. & ECON. 1 (1959). Leo Herzel is generally credited with "deposit[ing] the idea into the literature" in 1951, in a student commentary in the University of Chicago Law Review. Thomas W. Hazlett, *The Law and Economics of Property Rights to Radio Spectrum: Introduction*, 41 J.L. & ECON. 521, 522 (1998); *see* Leo Herzel, *"Public Interest" and the Market in Color Television Regulation*, 18 U. CHI. L. REV. 802 (1951).

14. My own call for spectrum reform, largely in a property rights direction, is James B. Speta, *Deregulating Telecommunications in Internet Time*, 61 WASH. & LEE L. REV. 1063, 1111-25 (2004).

15. *See generally* Thomas G. Krattenmaker, *The Telecommunications Act of 1996*, 29 CONN. L. REV. 123 (1996).

16. *See* 47 U.S.C. § 160 (2000).

17. Thomas W. Hazlett, *Physical Scarcity, Rent Seeking, and the First Amendment*, 97 COLUM. L. REV. 905, 905-06 (1997); *see also* Thomas G. Krattenmaker, *The Telecommunications Act of 1996*, 29 CONN. L. REV. 123, 157 (1996) ("The new Act does very little to reform broadcasting law and policy in helpful ways.").

18. *See infra* notes 76-78 and accompanying text.

19. Thomas W. Hazlett, *The Rationality of U.S. Regulation of the Broadcast Spectrum*, 33 J. L. & ECON. 133 (1990).

reform in the 1996 Act.[20] Third, the potential benefits of spectrum reform are large, allowing services currently in great demand to grow, increasing the possibility of permitting intermodal competition with wireline carriers, and creating necessary space for innovative technologies to develop.

Although the benefits of spectrum reform appear substantial, the political economy for wholesale spectrum reform does not look promising. The FCC has been moving in the right direction, offering studies discussing the benefits of reform and liberalizing spectrum as much as it dares. And, the academic literature is burgeoning. But there is little suggestion that a reform that fundamentally reduces government control of spectrum uses is on the political agenda, or that a window of opportunity is opening in which to pass truly significant spectrum legislation. If anything, recent events, such as Congress's override of the FCC's attempt to make low power radio licenses available, have confirmed the power of politics over the policy community (if such confirmation were necessary).[21] Wholesale reform would require a significant legislative commitment, but evidence that it is on the agenda is slim.

So, should policy-minded academics fold up the spectrum reform tent and move on to other issues? Of course not. First, it is important that the policy community resolve, so far as is possible, the arguments concerning spectrum reform and detail its implementation. When political opportunities arise, solutions must be ready to go or the process will move on to other topics, where action can yield results without intense efforts to research, generate, and analyze competing alternatives. Every now and again, legislation does get passed, as with the end-of-year approval of the Commercial Spectrum Enhancement Act.[22] This Act, while limited in scope, does embody some of the programs advanced by the FCC and the policy community, namely the allocation of (some) federal government spectrum to commercial service and the use of auction proceeds to fund federal-user relocation. Second, ideas do matter, not only to generate consensus in the policy community, but also to persuade policymakers. Finally, to the extent that there is some window for reform of the Communications Act generally (a contestable

20. *See* Hazlett, *supra* note 17, at 906.

21. The FCC proposed to license low power FM stations and, after long study, concluded that interference risks were so minimal that licensing should proceed. Following intense lobbying by incumbent broadcasters, Congress passed a statute expressly forbidding such licenses. *See generally* Stuart M. Benjamin, *The Logic of Scarcity: Idle Spectrum as a First Amendment Violation*, 52 DUKE L. J. 1 (2002).

22. Commercial Spectrum Enhancement Act, Pub. L. No. 108-494 (2004) (amending 47 U.S.C. § 923(g)).

proposition[23]), action on spectrum reform might be possible by better relating spectrum reform to the general agenda of communications reform. Indeed, in some regards, progress to date on spectrum reform has much in common with the preludes to earlier deregulatory success, such as transportation and long-distance.

In Part I, I explore the spectrum reform idea, and note its growth in the policy community. This advance has not been matched, however, by a similar prominence on the legislative agenda, and Part I also looks to hearings held and bills introduced in recent Congresses to demonstrate this. In Part II, I review the calls in the political community for reform of the Communications Act and note that, from this perspective, spectrum reform does not appear to be a prominent part of the agenda. Apart from the FCC, which in this regard is more a part of the policy community than part of the political process, government actors discuss only small modifications of the spectrum laws, not the wholesale reforms being floated by academics and advocacy groups. Part III brings these two parts together. I look at current events around spectrum reform and compare them to the events leading up to transportation deregulation and the opening of long-distance markets. Despite the similarities, and especially the leading work of the FCC to introduce the fundamentals of spectrum reform in a number of contexts, the current environment around spectrum reform does not show a fully-worked out policy consensus, nor is there an obvious aligning of interest groups. Until a policy entrepreneur comes onto the political scene to seize the issue, incremental reforms will likely continue to be the order of the day – although these, taken together, may themselves change the landscape sufficiently to allow more fundamental action.

## I. THE SPECTRUM REFORM IDEA – HAS ITS TIME COME?

Over the past several years, spectrum reform has occupied a prominent position on the FCC's agenda[24] and on the agenda of the policy community more broadly. By "spectrum reform," I mean the significant replacement of the so-called "command and control" spectrum allocation system currently embodied in the Communications Act and in FCC practice. To be sure, some of the most significant features of that system have already been dismantled (more on this later). Licenses are no longer assigned through comparative hearings, but rather through

23. *See infra* notes 58-61 and accompanying text.

24. It is not a new item on the FCC's agenda. For some time, economists and others at the Commission have strongly suggested more market-based approaches to spectrum allocation. *See, e.g.*, EVAN KWEREL & ALEX D. FELKER, USING AUCTIONS TO SELECT FCC LICENSEES (FCC Office of Plans and Policy, Working Paper No. 16, May 1985).

auctions.[25] Similarly, renewals and transfers of licenses are now presumptively allowed.[26] These amendments and administrative action to increase use and exclusion rights all add up to make current spectrum licenses resemble property rights.[27] What remains to be done – and what is the focus of current writing – is, at a minimum, the dismantling of the band plan's restriction on types of services that can be provided by licensees, or, more maximally, dismantling of the governmental licensing process entirely.

The FCC has been focused on these issues for much of the past five years. The most prominent piece is the Spectrum Policy Task Force Report, which garnered substantial attention for its comprehensive examination of the problem and its discussion of proposals to substantially reduce spectrum licensing.[28] But the FCC and its Commissioners and Bureau Chiefs have also given speeches and written policy papers that raise the possibility of getting the FCC out of the licensing business.[29] More importantly, the FCC has taken a number of concrete steps that reduce government control over spectrum uses. For example, the FCC has authorized a few secondary spectrum markets,[30] and has also authorized the use of some ultrawideband devices even in licensed spectrum.[31] Similarly, the FCC has significantly expanded the amount of unlicensed spectrum and proposed additional increments.[32]

In the broader policy community, which includes academics, consultants, and advocacy groups,[33] this sort of fundamental spectrum reform has been increasingly on the agenda, as it is again at this conference. As one rough measure[34] of its increasing currency in

25. *See* 47 U.S.C. § 309(j) (2000); Thomas W. Hazlett, *Assigning Property Rights to Radio Spectrum Users: Why Did FCC License Auctions Take 67 Years?*, 41 J.L. & ECON. 529 (1998) (discussing 1993 legislation requiring auctions in most circumstances).

26. *See* 47 U.S.C. § 309(d), (k)(4) (2000).

27. *See* Howard A. Shelanski & Peter W. Huber, *Administrative Creation of Property Rights to Radio Spectrum*, 41 J.L. & ECON. 581 (1998); Douglas W. Webbink, *Radio Licenses and Frequency Spectrum Use Property Rights*, 9 COMM. & L. 3 (1987).

28. *See* Spectrum Policy Task Force Report, *supra* note 12.

29. *See, e.g.*, KWEREL & WILLIAMS, *supra* note 12.

30. *See, e.g.*, Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets, *Report & Order & Further Notice of Proposed Rulemaking*, 18 FCC Rcd. 20,604 (2003).

31. Wideband Unlicensed Devices and Ultra-Wideband Technology, *Second Report and Order*, ET Dkt. 98-153 (Dec. 15, 2004).

32. *See* Spectrum Policy Task Force Report, *supra* note 12.

33. *See generally* JOHN W. KINGDON, AGENDAS, ALTERNATIVES AND PUBLIC POLICIES 53 (2d ed. 2002) (placing academics, researchers, and consultants, together with interest groups, in a policy community outside of government, but interacting with it).

34. The numbers that follow, of articles and of hearings, are my own work, but, because I am intending only to convey a rough sense of the growth of the idea – which seems incontestable in any event – I did not employ procedures, such as multiple raters and tests for inter-rater reliability, that would be necessary for a firm representation. Nevertheless, I will

academic circles, I looked at articles published in law reviews and in economics journals.[35] In 1981-1985, only 5 articles even mentioned the possibility of wholesale spectrum reform, and only two discussed it as a central thesis.[36] In 1986-1990, the topic received only 7 mentions, and was the central thesis of three articles. The issue began to take off in the five years between 1991 and 1996, in part leading up to and then following legislation that required auctions for the assignment of (most) licenses. In that five-year period, 22 articles mentioned and three articles substantially advocated the possibility of spectrum without government entry controls. But it was only following 1996 that substantial numbers of academic articles began to propose a wholesale elimination of the government role in spectrum allocation. Between 1996 and 2000, 73 articles mentioned and 34 articles advocated fundamentally different spectrum allocation. Fourteen of those articles were in a 1998 special issue of the Journal of Law and Economics devoted to property rights in spectrum,[37] but there was still significant growth. Finally, from 2001 to the present (December 2004, or only 4 years), there were 70 total articles with 28 taking a substantial position in favor of eliminating governmental controls. This rough measure is confirmed by the fact that Coase's 1959 article received very little notice until the 1990s, with citations picking up significantly only in the second half of the decade.[38] The Social Science Citation Index reports a total of 170 cites since 1959. No year prior to 1990 has more than 5 citations, but the average in 1995 and after is 11/year.[39] Think tanks and advocacy groups have also been active in spectrum reform, with a significant number of policy papers issued in the past several years.[40]

---

retain, for a modest time, the work product from which I gathered these numbers, should anyone wish to duplicate or disprove the numbers.

35. I did a number of searches in the LexisNexis law review database and the Econ/Lit database, as well as a review of the Index to Legal Periodicals.

36. The line between a mention and a use of the argument as a central thesis was somewhat subjective. A "mention" was more than a simple cite; in general, the article was addressed to a different or more limited subject of communications reform (or, occasionally property reform), but the article noted or briefly discussed the possibility of spectrum being outside government control.

37. Symposium, *The Law and Economics of Property Rights to Radio Spectrum*, 41 J.L. & ECON. 521 (1998). Despite the title of the symposium, one article advocated the commons approach. *See* 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).

38. The SSCI on-line edition permits an analysis of citations by year.

39. The SSCI does not index all law reviews.

40. *See, e.g.*, THOMAS W. HAZLETT & ROBERTO E. MUÑOZ, A WELFARE ANALYSIS OF SPECTRUM ALLOCATION POLICIES (AEI/Brookings Working Paper No. 04-18, Aug. 2004); GERALD R. FAULHABER, PRESENTATION: THE SPECTRUM DEBATE (AEI/Brookings Event Proceeding No. 04-16, May 2004); KEVIN WERBACH, OPEN SPECTRUM: THE NEW WIRELESS PARADIGM (New America Foundation, Oct. 2002).

This activity in the broader policy community has not been matched by significantly greater attention in the government policy community, although some attention has been and is being paid. Below, I discuss some specific instances of spectrum legislation. But, in the past five years, the ideas of fundamental privatization or of wide spectrum commons have received only little traction. Of 1331 hearings held in the House and Senate Commerce and Judiciary Committees, the four committees with jurisdiction over spectrum policy, only a dozen included any testimony making a mention of reforming government out of the spectrum process and only six were addressed in any significant part to such fundamental issues of spectrum policy.[41] Communications matters were often on the agenda, representing somewhat more than 12.5% of all hearings (and approximately 16% of the commerce committees' agenda).[42] The issues, however, were generally much more specific, and were often prompted by current events, such as multiple hearings on broadcast indecency following the Super Bowl halftime show of 2004.[43] Some hearings did touch on spectrum issues, including hearings on the

41. Lists of all hearings were compiled from the LexisNexis CIS database and from the committees' own websites. It is necessary to use the committees' websites because hearings do not reach the CIS indexes until printed by the GPO, and the GPO does not print hearings until they are released by the committee. According to the GPO, "most" hearing transcripts are released, but only two months to two years after the hearing occurs. Promising titles were reviewed. Additional backstop research was done through subject matter searches on the LexisNexis congressional hearing database. This last database is selective, but its provider states that it includes significant hearings. The six hearings that included an important focus on spectrum matters were: (1) Telecommunications Policy: A Look Ahead Before the Senate Commerce, Sci., & Transp. Comm., 108th Cong. (2004); (2) Future of Spectrum Policy Before the Senate Commerce, Sci., & Transp. Comm., 108th Cong. (2003); (3) Hearing on "Spectrum Management: Improving the Management of Government and Commercial Spectrum Domestically and Internationally" Before the Senate Commerce, Sci., & Transp. Comm., 107th Cong. (2002); (4) Hearing on Spectrum Management and Third Generation Wireless Service Before the Senate Commerce, Sci., & Transp. Comm., 107th Cong. (2001); (5) The FCC's UWB Proceeding: An Examination of the Government's Spectrum Management Process Before the Subcomm. on Telecommunications and the Internet of the House Comm. on Energy & Commerce, 107th Cong. (2002); and (6) A Review Of The FCC's Spectrum Policies For The 21St Century And H.R. 4758, The Spectrum Resource Assurance Act Before the Subcomm. On Telecommunications, Trade, and Consumer Protection of the House Comm. on Energy & Commerce, 106th Cong. (2000).

42. Here, I defined communications matters somewhat broadly, to include matters of Internet policy and to include intellectual property matters that are significantly related to communications networks, such as peer-to-peer filesharing. Of the total 1331 hearings, 169 qualified as communications related; of the 757 hearings held by the House and Senate Commerce Committees, 121 were communications related.

43. *H.R. 3717 Broadcast Decency Enforcement Act of 2004 Before the Subcomm. on Telecommunications and the Internet of the House Comm. on Energy & Commerce*, 108th Cong. (2004); *Can You Say that on TV: An Examination of the FCC's Enforcement with Respect to Broadcast Indecency Before the Subcomm. on Telecommunications and the Internet of the House Comm. on Energy & Commerce* , 108th Cong. (2004).

potential recovery of Nextwave's spectrum,[44] spectrum needs for public safety and first responders,[45] and implementation of enhanced 911 service for cellular systems.[46]

Auctions and commons have been the focus of several bills, although the proposals were modest by comparison to the academic and FCC proposals. Congress and the executive have been successful in making some additional federal spectrum available, such as the so-called Commercial Spectrum Enhancement Act (CSEA) passed late last year.[47] (But Congress has also slowed certain spectrum auctions, as it did with the 700 MHz spectrum allocated to certain television channels.[48]) Similarly, some proposed legislation has sought additional allocations of unlicensed spectrum – one even using the term "spectrum commons" in its title.[49] These bills died in committee,[50] and, under the CSEA, much of the spectrum that these proposals would have committed to

44. *Hearing on the Settlement between the U.S. Government and Nextwave, Inc. To Resolve Disputed Licenses Before the Subcomm. on Commercial and Admin. Law and the Subcomm. On Courts, the Internet and Intellectual Property of the House Judiciary Comm.* 107th Cong. (2001); *The Settlement between the U.S. Government and Nextwave, Inc. To Resolve Disputed Spectrum Licenses Before the Subcomm. on Telecommunications and the Internet of the House Comm. on Energy & Commerce,* 107th Cong. (2001).

45. *Spectrum for Public Safety Users Before the Commerce, Sci., & Transp. Comm.,* 108th Cong. (2004); *The Spectrum Needs of Our Nation's First Responders Before the Subcomm. on Telecommunications and the Internet of the House Comm. on Energy & Commerce,* 108th Cong. (2003); *Electronic Communications Networks in the Wake of September 11th Before the House Energy and Commerce Comm.*, 107th Cong. (2001); *Protecting Homeland Security: A Status Report on the Interoperability Between Public Safety Communications Systems Before the Subcomm. on Telecommunications and the Internet of the House Comm. on Energy & Commerce,* 108th Cong. (2004).

46. *H.R. 2898, A Bill to Improve Homeland Security, Public Safety, and Citizen Activated Emergency Response Capabilities Through the Use of Enhanced 911 Wireless Services Before the Subcomm. on Telecommunications and the Internet of the House Comm.* on *Energy & Commerce,* 108th Cong. (2003); *Wireless E-911 Implementation: Progress and Remaining Hurdles Before the Subcomm. on Telecommunications and the Internet of the House Comm.* on *Energy & Commerce*, 108th Cong. (2003); *Ensuring Compatibility with Enhance 911 Emergency Calling Systems: A Progress Report Before the Subcomm. on Telecommunications and the Internet of the House Comm. on Energy & Commerce,* 107th Cong. (2001).

47. Commercial Spectrum Enhancement Act, Pub. L. No. 108-494 (2004) (amending 47 U.S.C. § 923).

48. *See* Auction Reform Act of 2002, Pub. L. No. 107-195, 116 Stat. 715 (2002) (amending 47 U.S.C. § 309(j)). The Act was something of a mixed bag, in that it eliminated prior mandatory deadlines for auction of the 700 MHz spectrum, confirmed the FCC's authority to set the spectrum for auction in the future, and yet halted certain scheduled auctions in their tracks.

49. *See* Spectrum Commons and Digital Dividends Act of 2003, H.R. 1396, 108th Cong. (2003). A bill with very similar provisions, the Wireless Technology Investment and Digital Dividends Act of 2002, H.R. 4641, was also introduced in the 107th Congress. And the Jumpstart Broadband Act, introduced as H.R. 340, H.R. 363, and S. 159 in the 108th Congress also specifically called for a 255 MHz band for unlicensed devices.

50. *See* bill summary and tracking on Thomas, Library of Congress.

unlicensed uses will instead be auctioned to pay for the relocation costs of incumbent federal users.[51]

These issues also have not seemed to penetrate the media. This confirms their relative absence from the true political agenda, for, although public opinion doubtlessly has an effect on the development of a legislative agenda, "[t]he media report what is going on in government, by and large, rather than having an independent effect *on* government agendas."[52] In the past two years, media coverage of spectrum issues has focused on "current event" issues, such as the disposition of the Nextwave spectrum and the transition to digital television, and media ownership.[53] Apart from two articles noting the administration's undertaking a spectrum policy study (the NTIA study) in 2003,[54] spectrum policy more broadly drew only a paltry seven mentions, three on the Op-Ed pages.[55] And not all of the coverage was favorable: one of the most prominent pieces was an Op Ed in the Washington Post declaring that the FCC was contemplating a spectrum privatization that would "result in the biggest special interest windfall at the expense of American taxpayers in history."[56]

## II. THE CURRENT AGENDA FOR TELECOMMUNICATIONS REFORM

Although fundamental spectrum reform does not appear to be high on the legislative agenda, many legislators have called for an inquiry into the Telecommunications Act, with some calling for a re-writing of the Act. To be sure, some legislators have favored broad legislative action for some time, with Senator McCain's criticisms of the 1996 Act in particular of long standing.[57] And the notion of re-writing the Act is

51. Commercial Spectrum Enhancement Act, Pub. L. No. 108-494 § 203 (2004).

52. KINGDON, *supra* note 33, at 59.

53. I looked at coverage of spectrum issues, through Lexis searches, from January 1, 2003, in the Washington Post, Los Angeles Times, New York Times, and Wall Street Journal.

54. *See* Mark Wingfield, *Federal Panel Will Explore Wireless Spectrum Use*, WALL ST. J., June 6, 2003, at B6; Jube Shiver Jr., *U.S. To Review Airwave Allocation*, L.A. TIMES, June 6, 2003, at BUSINESS 3.

55. *See* David Wessel, *Radio Daze: Technology and the Airwaves*, WALL ST. J., June 24, 2004, at A2; Peter Huber, *Attack of the 'Cuisinart' Regulators*, WALL ST. J., Feb. 26, 2004, at A10 (Op Ed); *Review and Outlook: Err Waves*, WALL ST. J., May 30, 2003, at A6 (Op Ed); Jube Shiver Jr., *Plan for Spectrum Is Making Waves*, L.A. TIMES, May 7, 2004, at C1; Norman Ornstein & Michael Calabrese, *A Private Windfall for Public Property*, WASH. POST, Aug. 12, 2003, at A13 (Op Ed); Stephen Labaton, *U.S. Moves to Allow Trading of Radio Spectrum Licenses*, N.Y. TIMES, May 16, 2003, at A1 (reporting on FCC action to permit subleasing); Yuki Noguchi, *FCC To Let Companies Sublease Airwaves*, WASH. POST, May 16, 2003, at E05 (same).

56. Norman Ornstein & Michael Calabrese, *A Private Windfall for Public Property*, WASH. POST, Aug. 12, 2003, at A13 (Op-Ed).

57. *See Voice Over Internet Protocol (VOIP) Hearing, supra* note 9 and accompanying text.

becoming something of a standard, which some legislators put forward even if nothing in particular is on the legislative agenda. For example, prior to a May 2004 hearing in which the House Commerce Committee essentially convened to see "the latest gizmos from technology and communications companies,"[58] then-Committee Chairman Fred Upton included in his statement the familiar academic criticism that "stovepipe regulation perpetuated by the Telecommunications Act of 1996 needs to be revisited given the evolution in technology and the marketplace that was virtually unforeseen at the . . . Act's creation."[59] Other legislators have made similar statements.[60]

Despite the partial development of this theme, many of the legislative calls for a "re-write" of the telecommunications laws have come in response to or in the context of a particular issue, and privatizing spectrum (or turning it over to commons) is not often mentioned as part of the agenda. For example, Senator John Sununu, who in December 2004 said, "'I believe we will write a telecom bill in 2005,'" also "said the legislation will cover a number of areas, including a realignment of the universal service fund that is intended to support phone and Internet service in rural and high-cost areas; federal rules for broadband voice providers; and possibly a deadline for the return of analog spectrum occupied by broadcasters."[61]

Similarly, voice over Internet Protocol telephony has prompted many of the calls for a new Act.[62] Representatives Rick Boucher and Cliff Stearns, who last year introduced legislation to clarify regulatory treatment of VoIP and some other IP-based services, said that the bill was intended to "'frame the debate for next year,' when a major legislative battle to rewrite the 1996 Telecommunications Act is likely to begin."[63] Senator Stevens has discussed VoIP as a motivator for broader reform as

58. Drew Clark, *Tech Convergence Demands Rethinking of Rules*, NAT'L JOURNAL'S TECH. DAILY, May 19, 2004 (PM Edition).

59. *Id.*

60. *See, e.g.*, 150 CONG. REC. S11671 (2004) (statement of Sen. Allen) ("Unfortunately, the regulatory treatment of a given broadband provider depends on the particular platform that provider uses to offer their service. DSL providers are regulated entirely differently from wireless broadband providers or cable modem service providers."); *House Panel Pushes for Overhaul of 1996 Telecom Act*, NAT'L JOURNAL'S TECH. DAILY, Feb. 5, 2004 (AM Edition) ("Rep. Cliff Stearns, R-Fla., said that while consumers have benefited under the law, regulatory uncertainty has been an 'obstacle' to long-term investment in telecom technologies. He said emerging Internet telephone services, for example, do not fit the current regulatory framework.").

61. Amol Sharma, *Sen. Sununu Sees Senate Action on Telecom Overhaul in 2005*, CONG.QUARTERLY, Dec. 16, 2004, at 5.

62. The statements from Senator McCain and Chairman Powell were made in the context of a hearing on VoIP. *Supra* notes 9, 10 and accompanying text.

63. Drew Clark, *Industry Group Backs Draft Legislation on Internet Telephony*, NAT'L JOURNAL'S TECH. DAILY, July 6, 2004 (PM Edition).

well.[64] And the statement in the introduction made by Senator McCain was at a hearing on VoIP, where other senators called for significant reform. Representative Boucher has also echoed incumbent local telephone company complaints that a rewrite of the statute is necessary to create regulatory parity between Internet-based services offered by cable companies and those offered by telephone companies.[65]

Determining an appropriate structure for regulation of VoIP could, in fact, be a good vehicle for a new Communications Act, but getting beyond the rhetoric and looking at the proposed legislation reveals a much less ambitious agenda. Internet telephony is a prototypical case of a traditional telecommunications service, previously associated with a particular type of network technology, now becoming platform independent.[66] It is not the first instance of cross-platform competition, of course, and cable television, cellular telephony, and DBS were each accommodated into the Act without a rewrite of its basic provisions.[67] But VoIP's platform independence is much more extreme, as with any IP-enabled service, and it does require an assessment of the relationships among the layers of communications networks that a traditional service-based approach to regulation simply cannot accommodate. Nevertheless, the two leading VoIP bills in the 108th Congress avoided the issue by creating a new regulatory category. Companion bills proposed by Senator Sununu and Representative Charles Pickering created federal jurisdiction over, but limited regulation of, "the use of software, hardware, or network equipment for real-time 2-way multidirectional voice communications over the public Internet or a private network utilizing Internet protocol, or any successor protocol, in whole or in part . . . ."[68] A second House bill, sponsored by Representatives Stearns and Boucher, went somewhat further, essentially deregulating all

64. Drew Clark, *Senate Panel Votes To Limit State Rules on Net Phones*, NAT'L JOURNAL'S TECH. DAILY, July 22, 2004 (PM Edition).

65. Clark, *supra* note 63 ("The discrepancy between the treatment of cable and DSL is one reason why the telecom industry is pushing for a rewrite of the act while cable industry executives take a wait-and-see approach. Boucher said such disparate treatment is intolerable. 'We have a provision that there may not be discriminatory treatment for the service, depending on the platform' upon which it is delivered, be it cable, copper or any other means.").

66. *See generally* Elizabeth M. Donahue, *Directly Competing Policies: The Growth of Internet Telephony and the Future of the Universal Service Fund*, 9 COMM LAW CONSPECTUS 225 (2001) (discussing manner in which VoIP can be provided over multiple technologies).

67. I do not defend the nature of these statutory amendments, of course, and there is much to criticize in each of them. But it remains the case that the statute was amended and the regulatory structure did not collapse of its own weight. *See* 47 U.S.C. § 541 (2002) (providing the cable television provisions); *id.* at § 332 (defining the regulation of commercial mobile radio services).

68. VOIP Regulatory Freedom Act of 2004, S. 2281, 108th Cong. § 10(a)(6)(A); VOIP Regulatory Freedom Act of 2004, H.R. 4129, 108th Cong. § 10(a)(6)(A).

"advanced Internet communications services," which were defined to include "any IP network and the associated capabilities and functionalities, services, and application provided over an Internet protocol platform or for which an Internet protocol capability is an integral component . . . ."[69] At bottom, these bills responded to VoIP by creating a category of IP services (more limited in the case of the Sununu and Pickering bills) and specifying the regulation that should obtain in that category. The bills are largely deregulatory, but they are not a conceptual break with past accretions to the Act. Needless to say, neither of these bills mentioned spectrum regulation at all.

In fact, even a rewrite of the service categories of the Communications Act would not necessarily have to address spectrum allocation. The European Union's integrated Directives on electronic communications, which otherwise bring within a single definition all communications networks and services, do not mention spectrum reform, except in the most general and hortatory manner.[70] Government allocation of spectrum licenses to the parties deemed most likely to serve the "public interest" (so-called beauty contests), which are long gone from the U.S. scene, are still explicitly permitted. Parity of service regulation does not necessarily require that government allocation end. Government allocation does frustrate the efficiency and competition goals that animate many arguments for a new statute, which are largely the same efficiency and competition goals behind spectrum reform proposals, but the two are not inevitably required to be dealt with together. (Of course, they should be, more on this later.)

A few statements can be found mentioning global spectrum reform, but in the 108th Congress no such proposal was included even in

69. Advanced Internet Communications Services Act of 2004, H.R. 4757, 108th Cong. § 4(1). This bill would have essentially deregulated all Internet access services as well, including eliminating unbundling regulation as applied to DSL, for the bill defined an "IP network" to include "the facilities used to transmit and to encode, digitize, packetize, or route advanced Internet communications services in an Internet Protocol format, including routers, softswitches, gateways, packet switches, and transmission facilities." *Id.* § 4(4). *See also* Clark, *supra* note 63 (quoting Rep. Boucher that the bill would effectively deregulate Internet services no matter what the platform).

70. The EU did issue a Radio Spectrum Decision contemporaneously with its new regulatory framework, *see* Decision No 676/2002/EC of the European Parliament and of the Council of 7 March 2002 on a regulatory framework for radio spectrum policy in the European Community, 2002 O.J. (L 108) 1, but the document largely respects national choices, to the extent that two commentators have written that "one cannot consider that there exists, as of the present time, any real common policy in the field of spectrum." PAUL NIHOUL & PETER RODFORD, EU ELECTRONIC COMMUNICATIONS LAW: COMPETITION AND REGULATION IN THE EUROPEAN TELECOMMUNICATIONS MARKET § 7.86, at 720 (2004). *See also generally* James B. Speta, *Rewriting the Communications Act with an Eye on Europe*, in CONNECTING SOCIETIES AND MARKETS (Jürgen Müller & Brigitte Preissl, eds., forthcoming 2005) (discussing absence of spectrum reform from EU Directives).

proposed legislation. Prior to the "gizmos" hearing,[71] Representative Christopher Cox reportedly "took the argument [of Chairman Upton] further, noting that new technologies undermine the original 'scarcity' rationale for regulation. 'Perhaps we should declare victory' and hold a hearing instead to close the FCC . . . ."[72] Similarly, in hearings in 2003 that led to the CSEA, Representative Stearns said that "we may not have to operate under the scarcity arguments much longer. New technologies can transfer data with less bandwidth and are not far from our reach."[73] More significantly, in a 2003 hearing on the FCC's task force report, Senator Burns stated that he "intend[ed] to work on [his] colleagues on a comprehensive spectrum reform bill" and that "[s]ome form of market driven allocation of spectrum is desirable."[74] Nevertheless, Senator Burns did not in fact introduce any such bill in the remainder of 2003 or in 2004.[75] As mentioned above, only a few bills have been introduced concerning spectrum policy, and, although a few have intended significant set-asides for unlicensed devices or have made new spectrum available for commercial auction (and the CSEA managed to pass), the proposed legislation has not developed a general program to privatize or render open spectrum as the default rule.

## III. MAXIMIZING THE POLITICAL ECONOMY

Although spectrum reform may not be as high on the current political agenda as it is on the policy agenda, legislative attention is by no means foreclosed. Predecessor bills of the 1996 Act had spectrum reform included, and, although the issue was peeled off from that legislation, just after the 1996 Act's passage Senator Pressler introduced for legislative consideration a spectrum reform package that would have both privatized spectrum through auction and eliminated use restrictions.[76] "The key reform contained in this discussion draft is freedom in spectrum use. While important, auctions are not the most important reform contained in this legislation. Much more important is replacing the current Government mandated industrial policy with a market-based

71. *See supra* p. 191.

72. Clark, *supra* note 58.

73. *The Commercial Spectrum Enhancement Act: Hearing Before the Subcomm. on Telecomms. & the Internet of the House Comm. on Energy and Commerce*, 108th Cong. 4 (2003), *available at* http://energycommerce.house.gov/108/action/108-12.pdf.

74. *The Future of Spectrum Policy: Hearing Before the Senate Commerce, Science, and Transp. Comm.*, 108th Cong. (March 6, 2003) (transcript available on LEXIS, Federal News Service database).

75. Review of bills sponsored or co-sponsored by Senator Burns. Library of Congress, Thomas Legislative Information, *at* http://thomas.loc.gov/ (last visited June 19, 2004).

76. *See* 142 CONG. REC. S4928, S4929-30 (1996) (statement of Sen. Pressler).

approach."[77] Unfortunately, although Senator Pressler circulated draft legislation,[78] no bill was introduced in the 104th Congress nor was one introduced in the succeeding Congress (to which Senator Pressler did not return). Still, hope survives.

An issue can move from the policy agenda to the political agenda for a variety of reasons, including those idiosyncratic to individual legislators or people or groups close to the legislators, and the process can be highly unpredictable. It is probably overdue in this paper to echo Jim Chen that "[p]rophecies in telecommunications are as treacherous as they are foolish"[79] and that " 'the body of law' regulating telecommunications, 'at any time or place, is an unstable mass in precarious equilibrium.'"[80] Chen was pointing to "economic analysis and market predictions" – not the more variable field of politics. [81]

Nevertheless, past legislation and a reasonably careful look at present circumstances can provide some clues as to how spectrum reform might move closer to legislative action. "The debate about network deregulation, and other future deregulation debates, will be more enlightened if the positions of the parties and their arguments are not viewed in isolation, but are instead seen as part of a long history of regulatory policy, broadly defined."[82] In this vein, spectrum reform is prompted by some of the same factors that preceded other deregulatory episodes – in part by technological change, in part by activity in the academy, and in part by an active regulatory agency. The more global cause of telecommunications might receive some prodding from the courts, as long-distance did from the D.C. Circuit's decisions requiring the FCC to justify a long-distance monopoly. On the other hand, spectrum reform does not currently have a favorable alignment of interest groups in its favor (though the situation is better than preceded airline and trucking deregulation). Nor does spectrum reform have an identifiable window of political opportunity or an identifiable advocate in the political sphere. Nevertheless, some positioning of the spectrum policy debate could enhance its prospects, if the political stars otherwise align.

---

77. *Id.* at S4929.

78. *Id.* at S4932-36.

79. Jim Chen, *The Legal Process and Political Economy of Telecommunications Reform*, 97 COLUM. L. REV. 835, 873 (1997).

80. *Id.* (quoting GRANT GILMORE, THE AGES OF AMERICAN LAW 110 (1977)). Of course, Chen's point here is that recognition of certain patterns and processes, even though not in equilibrium, can be "the beginning of wisdom" concerning policy. *Id.*

81. I discuss the public choice issues *infra* notes 126-27 and accompanying text.

82. ROGER G. NOLL & BRUCE M. OWEN, THE POLITICAL ECONOMY OF DEREGULATION 5 (1983).

### *A. The Beginning of a Reform*

Regulation has tended to breed its own constituencies, resulting in overall stability, whether or not the original justifications for the regulatory scheme continues.[83] But deregulatory movements do happen and do sometimes happen despite the interests that support the extant structure. Case studies have revealed a number of possibilities – including technological change, prodding by the courts, and agency initiative – as events that can shake up a regulatory system. Some of these are obviously present in the spectrum policy mix.

#### 1. Technological Change

Just as microwave technology and electronic switching put pressure on the monopoly regulation of long-distance,[84] technological advance in wireless has clearly been an impetus for spectrum reform. Here, technological advance has two dimensions. Associated developments in computer technology have increased the general demand for wireless services.[85] By itself, an increase in demand for some or all services does not call into doubt the basis of government regulation; it could even reinforce an argument for government control over the distribution of spectrum uses. And, demand can be met by administrative action to make more spectrum available or to move existing users. Both of these strategies have, of course, been used, and their success ironically takes some of the pressure off the system for more fundamental reform.

More importantly, however, "[g]rowth in the use of digital spectrum-based technologies not only increases the potential throughput of information, it also has potentially significant ramifications for interference management."[86] Increasingly sophisticated transmitters and receivers mean that government-engineered anti-interference rules, formed ex ante to operation, are less necessary.[87]

To some extent, these technological advances trade off, as new protocols allow increased demand to be served with the same amount of spectrum (as cell phone service has shown). To be sure, increasing demand and innovation can best be served if carriers (or users) have the

---

83. *E.g.*, *id.* at 155 ("because regulation tends to create new special interests whose survival depends on its continuation, deregulation and other regulatory reforms appear least likely to succeed in the very areas where policy has departed most from serving a more general public purpose").

84. *See, e.g.*, Joseph D. Kearney & Thomas W. Merrill, *The Great Transformation of Regulated Industries Law*, 98 COLUM. L. REV. 1323, 1389 (1998).

85. Spectrum Policy Task Force Report, *supra* note 12, at 11-13 (discussing increase in demand for spectrum services).

86. *Id.* at 13.

87. *Id.*; *see also* Benkler, *supra* note 12 (discussing these technological developments and their interaction with the interference regime); Noam, *supra* note 37.

right to introduce new technologies and uses without permission ex ante. But technological advance can both increase *and* decrease the pressure on the status quo.

Moreover, government delimits spectrum uses for a variety of reasons other than interference management, including assuring the current provision of services deemed in the public interest or, as is sometimes asserted, planning for the future.[88] Technological advances in interference management may make competition more feasible, but they do not address the pursuit of other goals that may be incompatible with competition. As Joseph Kearney and Thomas Merrill have pointed out, the technological change must yield efficiency gains great enough to justify the transactions costs of a switch in regulatory regimes.[89] The inability of the new technology to better address non-efficiency goals means its effectiveness as a catalyst is limited.

Spectrum reform could be segmented, as was the case with the 1993 legislation requiring spectrum rights to be auctioned, by carving out broadcasting rights from its scope.[90] But this is some of the most commercially valuable spectrum, and taking broadcast spectrum out of the mix severely limits the benefits of any reform. Viewed from this perspective, the technological development that should make spectrum reform possible is the advance of cable and satellite television to the point where nearly ninety percent of Americans do not watch broadcast television.[91] But this is not a new development, and it is a cause that the FCC has declined to make part of its spectrum reform proposals. Although the agency works to further the transition to digital television, which will free up much of the currently allocated spectrum, its Chairman has also pointedly defended the interests of those who receive over-the-air television.[92]

---

88. For example, in 1952 the FCC assigned substantial numbers of television licenses to cities that were then too small to support service on the explicit justification that the license should be reserved for the time that those cities grew. *See* Amendment of Section 3.606 of the Comm'n's Rules & Regulations, *Sixth Report & Order*, 41 FCC Rcd. 148, 152 (1952).

89. Kearney & Merrill, *supra* note 84, at 1385 ("It is occasionally suggested that the mere existence of efficiency gains in moving from monopoly or oligopoly to competition is sufficient to explain the great transformation. This is not correct. The magnitude of the efficiency gains must be weighed against the transitional costs of moving from a regime of regulation to one of competition, as well as the transaction costs of operating under a regime of competition after the transition . . . .").

90. *See generally* Thomas W. Hazlett, *Assigning Property Rights to Radio Spectrum Users: Why Did FCC License Auctions Take 67 Years?*, 41 J.L. & ECON. 529 (1998) (discussing the 1993 auctions legislation and carve outs).

91. *See* Speta, *supra* note 14, at 1116-17; Hazlett, *supra* note 17, at 935-40.

92. Review of the Commission's Rules and Policies Affecting the Conversion to Digital Television, *Second Report & Order & Second Memorandum Opinion & Order*, FCC 02-230, MM Dkt. No. 00-39 (Aug. 8, 2002) (Separate Statement of Chairman Michael K. Powell), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-02-230A1.pdf.

In sum, technological development is important in the spectrum debate; it does directly limit one of the principal justifications for government control, the control of interference. And it does make the transition to a private system (of either kind) less costly. On the other hand, these same technological developments decrease the pressure for reform, and the technological obsolescence of broadcast television has not resulted in its regulatory demise. On the whole, it does not appear that technological advance standing alone will get spectrum reform on the legislative agenda.

2. Response to Judicial Action

Courts sometimes prompt the reconsideration of a regulatory regime. In the famous *Execunet* decisions, the D.C. Circuit forced the FCC to justify its restrictions on MCI's provision of basic long-distance services, which led, in due course, to the opening of those markets.[93] Judicial action, in the form of the AT&T antitrust case, was the final step in this reform.[94] Similarly, the D.C. Circuit prodded the Civil Aeronautics Board by openly questioning whether it was "unduly oriented towards the interests of the industry it is designed to regulate, rather than the public interest it is designed to protect."[95] More recently, court of appeals decisions holding that cross ownership restrictions on telephone company entry into video markets violated the First Amendment gave a boost to elimination of those restrictions in the 1996 Act.[96]

Section 301 of the Communications Act, however, clearly dictates government ownership and control of spectrum licenses.[97] As a result, the prospects for courts' prodding the agency to achieve fundamental

93. MCI Telecomms. Corp. v. FCC, 561 F.2d 365 (D.C. Cir. 1977); MCI Telecomms. Corp. v. FCC, 580 F.2d 590 (D.C. Cir. 1978). For more background on the *Execunet* decisions, *see generally* Kearney & Merrill, *supra* note 84 at 1367; MARTHA DERTHICK & PAUL J. QUIRK, THE POLITICS OF DEREGULATION 68, 193 (1985); Robinson, *supra* note 4, at 523-27.

94. *See* United States v. AT&T, 552 F. Supp. 131 (D.D.C. 1982) (consent decree breaking up the Bell System), *aff'd sub nom.*, Maryland v. United States, 460 U.S. 1001 (1983).

95. Moss v. Civil Aeronautics Bd., 430 F.2d 891, 893 (D.C. Cir. 1970); *see generally* ROBERT BRITT HOROWITZ, THE IRONY OF REGULATORY REFORM: THE DEREGULATION OF AMERICAN TELECOMMUNICATIONS 216-20 (1989) (discussing role of court decisions in prodding deregulation of airlines).

96. *See* Chesapeake & Potomac Tel. Co. v. United States, 42 F.3d 181, 190-204 (4th Cir. 1994), *vacated by* 516 U.S. 415 (1996) (remanding on the question of mootness).

97. 47 U.S.C. § 301 (2002) ("It is the purpose of this Act, among other things, to maintain the control of the United States over all the channels of radio transmission; and to provide for the use of such channels, but not the ownership thereof, by persons for limited periods of time, under licenses granted by Federal authority, and no such license shall be construed to create any right, beyond the terms, conditions and periods of the license.").

spectrum reform are essentially three. First, the courts could find that use restrictions on spectrum licenses, or other fundamentals of spectrum policy, violate the First Amendment. Stuart Benjamin has made a version of this argument quite forcefully,[98] but its adoption seems unlikely. The Supreme Court has had opportunity in recent years to repudiate the scarcity doctrine and to adopt full First Amendment rights for spectrum users (which result would, even if achieved, only go part of the way towards Benjamin's result). But despite court of appeals opinions and academic work strongly arguing for this result, the Court has continued to maintain a wide ambit for government regulation of broadcasters.[99]

Second, the courts might hold that use restrictions fail the minimum rationality required for FCC action. This seems somewhat more likely, especially in non-broadcast services, and, so long as the license is limited in term, would be consistent with section 301 (or so the court could say).[100] In recent years, the D.C. Circuit has used standard administrative law doctrines to force the FCC to reconsider many of its long-standing market-structure rules for broadcast markets.[101] And, in this regard, administrative law is very supple. In any particular case, the court has some range in which it can choose between those precedents that require it to defer to the agency's "predictive judgment" and those that permit it to reverse an agency that it perceives acts without "substantial evidence" or based on an "irrational economic theory."[102] Even if courts should, at the end of the day, defer to a determined administrative agency, their decisions and rhetoric can give agency reformers the opportunity to push their agenda, can give the agency cover to move in a new direction, and can even cause others in the political

98. *See* Benjamin, *supra* note 21.

99. Just in the past two years, the Court affirmed regulations that required broadcasters to submit certain information concerning candidate appearances, and the Court stated flatly: "We note, too, that the FCC's regulatory authority is broad. Red Lion Broad. Co., Inc. v. FCC, 89 S.Ct. 1794 (1969) ('broad' mandate to assure broadcasters operate in public interest); National Broadcasting Co. v. United States, 319 U.S. 190, 219, 87 L.Ed. 1344, 63 S.Ct. 997, (1943) (same)." McConnell v. FEC, 540 U.S. 93, 237 (2003).

100. Shelanski & Huber, *supra* note 27, at 581-82 ("Section 301 . . . forbids private ownership . . . [, but] permits a range of possible rights for licensees.").

101. *E.g.*, Fox Television Stations, Inc. v. FCC, 280 F.3d 1027 (D.C. Cir. 2002) (striking down media concentration rules).

102. Although surely beyond the scope of this paper, my view is that the courts of appeals have too vigorously reviewed the FCC's principal rulemakings implementing the 1996 Act. *See* Speta, *supra* note 14, at 1096. In particular, it has seemed to me that the FCC's choice on the level of "granularity" that the rules should include, which is a matter of balancing the possibility of type I and type II errors as well as the costs and benefits of administrative proceedings, should have been a matter that received the highest deference from the courts. *Cf.* SEC v. Chenery Corp., 332 U.S. 194, 202-03 (1947) (holding that agency has virtually unfettered discretion to choose whether to act by rulemaking or through adjudication).

process to notice the potential for an agenda item.

Third, court decisions on telecommunications policy more generally might help move spectrum policy to the political agenda, by making more comprehensive reform of the law necessary. As noted above, despite sometimes ambitious rhetoric, many of the pending bills on VoIP and other issues actually propose fairly limited reforms to the Act. A judicial decision could force Congress to move more comprehensively. To date, the FCC has muddled through the statutory structure in part by defining new services (and especially services that it thinks it should not be subject to common carrier regulation) as "information services." This strategy dates back thirty years, to the *Computer II* decision.[103] But Internet services have made it increasingly central. If the courts were to make this strategy impossible, several forces might accelerate reform of the Act. Cable companies, which are currently sitting on the sidelines of the "re-write" movement, might join the telephone companies' advocacy for a new Act,[104] and might be able to raise the prospect that the government is "regulating the Internet." This theme is occasionally taken up by the public, and it might help the window for a rewrite open.

As noted above, of course, rewriting the Act need not include spectrum reform: the 1996 Act did not. But I will return to this idea in the conclusion.

### 3. An Activist Agency

The Civil Aeronautics Board and even the Interstate Commerce Commission took initial deregulatory steps that provided some of the groundwork for later legislative action. The FCC has, of course, been very active in spectrum reform. As Howard Shelanski and Peter Huber have detailed, the FCC in the 1980s and early 1990s took a number of steps that significantly increased the property-like attributes of spectrum licenses.[105] More recently, the FCC's Spectrum Policy Task Force and the agency's actions permitting secondary markets and UWB devices, as well as its advocacy for the making available of additional spectrum both

---

103. *See generally* Robert Cannon, *The Legacy of the Federal Communications Commission's Computer Inquiries*, 55 FED. COMM. L.J. 167, 181-99 (2003) (explaining the history and reasoning of these decisions).

104. *See* Drew Clark, *Congressional Changes May Not Affect Telecom; Rewrite*, NAT'L JOURNAL'S TECH. DAILY, Oct. 26, 2004 (PM Edition) ("Now, the impetus for re-opening the Telecom Act comes from the Bells chafing under their regulatory treatment as compared with cable operators. Cable companies' television service is taxed and lightly regulated at the local level, but the FCC has declared cable high-speed modems to be an 'information service' free from regulation and taxation. Cable companies are largely satisfied with the status quo. But that could change if the Supreme Court refuses to review or does not overturn an appeals court decision, Brand X . . . .").

105. *See* Shelanski & Huber, *supra* note 27.

for unlicensed use and for auction, have substantially advanced the cause of spectrum reform.[106]

Because of section 301, the FCC does not have the authority to privatize the spectrum, but the FCC could continue to liberalize license terms.[107] The agency has done so in some significant regards. The 1993 PCS licenses permit a variety of uses,[108] but the FCC has also modified the MDS and ITFS licenses to permit interactive services, in a partial attempt to encourage the offering of fixed wireless data services, such as high-speed Internet access.[109] In airline and trucking deregulation, the legislation was greatly assisted by having examples of better-functioning, but deregulated submarkets. The intrastate air carriers in California and Texas demonstrated that competition was sustainable and that reduced regulation brought lower prices.[110] Examples from Canada and from the transport of agricultural commodities showed that deregulated trucking was superior.[111]

It can be hoped that some of the FCC's efforts to permit secondary uses and to liberalize licensing terms can generate substantial evidence for taking use control away from the government. In this regard, proponents of the commons option have a partial record already built, through the success of WiFi.[112] The commons architecture is more than just WiFi, to be sure, but the example of equipment-driven entry to provide new services in unlicensed bands provides a powerful example.

---

106. *See supra* notes 24-28 and accompanying text. The NTIA has been somewhat active as well, for example, in working to move federal spectrum into the FCC's auction process. *See Commercial Spectrum Enhancement Act Hearing*, *supra* note 73, at 10-16 (statement of Assistant Secretary Nancy Victory).

107. Section 310(d), which provides that only the Commission may approve the transfer of a station license, may also provide some constraint. *See* 47 U.S.C. § 310(d) (2002). Indeed, Commissioner Copps expressed concern that the FCC's actions to permit secondary spectrum markets were inconsistent with section 310(d), as that section has been interpreted over time. *See* Promoting the Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets, *Report & Order & Further Notice of Proposed Rulemaking*, 18 FCC Rcd. 20,604, at 20,797 (2003).

108. *See e.g.*, Amendment of the Comm'n's Rules to Establish New Personal Communications Serv., *Memorandum Opinion & Order*, 9 FCC Rcd. 4957 (1994).

109. Amendment of Parts 1, 24, & 71 to Allow Instructional Fixed Television Serv. & Multipoint Distribution Serv. Licensees to Engage in Two-Way Communications, *Report & Order on Further Reconsideration & Further Notice of Proposed Rulemaking*, 15 FCC Rcd. 14,566 (2000).

110. *See generally* Speta, *supra* note 14, at 1073 (collecting principal authorities).

111. *See generally id.* at 1075.

112. *See, e.g.*, Kevin Werbach, *Supercommons: Toward a Unified Theory of Wireless Communications*, 82 TEX. L. REV. 863, 879 (2004) ("There are several reasons for the rapid legitimation of the commons argument, beyond the rhetorical persuasiveness of its proponents: lingering fears about the consequences and irreversibility of spectrum propertization, excitement about unlicensed wireless data networks due to the business success of WiFi, and desire for fresh approaches given the collapse of the telecom sector and the problems with some spectrum auctions in the United States and Europe.").

The FCC's actions have met with resistance from some quarters, as with the now frequently heard argument that spectrum privatization will result in an unjustified windfall.[113] One difficulty is that the FCC's Spectrum Policy Task Force Report, while it states general principles of spectrum reform that should be adopted (and that the agency itself has in many regards been implementing), does not itself provide a concrete framework for legislative action. The Report concludes that more spectrum should be made available, and that command and control regulation should be reduced, but it also concludes that future spectrum allocation should include all three models – of public interest regulation, of unlicensed spectrum, and of property rights. "No single regulatory model should be applied to all spectrum."[114] As a general matter this is probably right, and I do not mean to fault the Report for not undertaking to draft specific legislative proposals (which may itself have increased resistance to the Report).[115] Nevertheless, and I will return to this briefly below, the lack of a fully worked-out consensus position on the shape of spectrum reform will prove to be a significant hurdle if the matter does rise on the political agenda.[116]

4. Other Catalytic Events

Legislative action, as a more general matter, is often responsive to particular, high-profile problems. In the deregulation arena, the Penn Central bankruptcy is often credited with focusing the Congress on railroad deregulation, for it wanted to avoid traffic disruptions and to avoid the need for further government bailouts.[117] Similarly, the inflation crisis of the mid-1970s played a role in the advocacy for other deregulatory moves of that era.[118]

In spectrum reform, a recent example is the communications

113. *See supra* note 60 and accompanying text.

114. Spectrum Policy Task Force Report, *supra* note 12, at 3.

115. *See id.* at 49-51 (stating generally that all three models should play a role and that "[t]he Commission must consider a number of factors when deciding which transition mechanisms to implement.").

116. *See infra* notes 165-67 and accompanying text.

117. *E.g.*, DERTHICK & QUIRK, *supra* note 93, at 38 ("Events could serve this dramatic function, and in 1970 the bankruptcy of the Penn Central, the nation's biggest railroad, did so to some extent. The collapse of the Penn Central drove federal transportation officials to a greater activism and discredited the regulatory practices of the ICC, which was condemned for forcing the Penn Central and other railroads to continue unprofitable operations.").

118. *E.g.,* ROBERT BRITT HORWITZ, THE IRONY OF REGULATORY REFORM: THE DEREGULATION OF AMERICAN TELECOMMUNICATIONS 208 (1989) ("Inflation was very high, and regulation seemed to play a significant role in it. Moreover, the economic critique of regulation had some validity. Clearly, as we have seen, regulation often functioned as a mode of industry protection. Indeed, by the mid- to late 1970s, the combination of inflation and business counterattack on regulation succeeded in altering the political discourse on regulation.").

difficulties that arose in the rescue efforts following the attack on the World Trade Center on September 11, 2001. The needs of first responders and of public safety and homeland security agencies to have reliable wireless services have drawn legislative attention.[119] Private property rights and unlicensed commons are probably not the solution to these issues. But even the tragedy of September 11 could not provide enough impetus for Congress to accelerate the transition to digital television (thus reclaiming very valuable and useful spectrum), as Senator McCain proposed.[120] More generally, it is hard to imagine a "crisis" that would put property rights solutions (or commons solutions) high on the regulatory agenda.

Short of a crisis, changes in important economic measures can focus legislative attention.[121] In this regard, part of the impetus for the CSEA was the need for the United States to "catch up" to world-wide deployment of 3G wireless technologies.[122] It is arguable how great the demand actually will be for the multimedia services on mobile devices, but the perception that the United States was not leading the world in wireless penetration, devices, or services helped the relevant actors find additional spectrum and move to make it available.

Similarly, the idea that the United States is behind the rest of the world in broadband deployment has been a motivation for government policy. In his 2004 presidential campaign, President Bush specifically said that the U.S.'s ranking (10th) in broadband deployment was not acceptable.[123] Linked up with spectrum policy, this could provide an opening to the political agenda.

### *B. Matching the Trigger with Policy*

An event that creates the possibility of a political reform will not necessarily lead to that reform: more is needed. What that "more" is

---

119. *See supra* note 45.

120. The SAVE LIVES Act, S. 2820, 108th Cong. § 2 (2004).

121. *See* KINGDON, *supra* note 33, at 92-95.

122. *E.g.*, *Commercial Spectrum Enhancement Act: Hearing Before the Subcomm. on Telecoms. & Internet of the House Comm. on Energy & Commerce,* 108th Cong. 4 (2003) (statement of Rep. Stearns, Member, House Comm. on Energy & Commerce) ("Spectrum, or rather the efficient use and management of spectrum, enables our industry, our economy to continue to benefit from technological advances and delivery of services that consumers demand. I might add that other nations are working incredibly hard to challenge the U.S. in just those areas."); *id.* at 6 (Statement of Rep. Towns, Member, House Comm. on Energy & Commerce) ("[W]e need to ensure that . . . our wireless carriers [can] compete in the global marketplace by rolling out advanced services. . . .").

123. *See* Press Release, Office of the Press Secretary, President Unveils Initiatives for Technology, Health Care, Internet, (Apr. 26, 2004), *at* http://www.whitehouse.gov/news/releases/2004/04/20040426-6.html (on file with the author) ("[B]y the way, we rank 10th amongst the industrialized world in broadband technology and its availability. That's not good enough for America. Tenth is 10 spots too low as far as I'm concerned.").

varies in particular cases, but can include a favorable alignment of interest groups, consensus in the policy community, and good luck.[124]

1. Interest Groups

Some have described nearly the entire history of spectrum policy as the product of bargains among interest groups, and particularly the furthering and protection of incumbent interests. They claim "regulations have consistently produced predictable outcomes – those favoring the interests of powerful incumbents, primarily commercial broadcast television licensees."[125] As a general matter, of course, public choice theories have established that legislators and regulators often respond to interest group interests.

Despite the importance of interest groups, legislation remains possible even in the absence of interest group alignment. Legislators may side with a more powerful set of interests over others, or a political deal among interest groups, giving each some of what they want, may be achieved. This is the main account of the 1996 Act, in which Bell company efforts finally lined up support for long-distance entry, but legislators gave long-distance companies their second choice option with provisions for unbundling local networks.[126] Even in the absence of any natural constituency, matters can proceed. At the outset of legislative efforts, airlines and trucking interests were opposed to deregulation, and only United Airlines ever came around to support deregulation.[127]

Although some elements of spectrum reform have natural constituencies, support for full privatization of spectrum rights or for wholesale adoption of the commons model is less clear. Cellular and other wireless access companies certainly desire additional spectrum for private license. And electronics manufacturers are a natural constituency for the creation of additional unlicensed spectrum bands. Both groups have been active in efforts to date. But the cellular companies also resist wholesale use flexibility, with the CTIA's comments to the Task Force Report making clear that incumbent licensees should not receive flexible

124. Kingdon identifies the availability of an entrepreneur, a person with access to the political process that links the problem with the policy and the politics, as an essential element in a policy's adoption. Because the level of speculation (already high in this paper) would become intolerable if I were to try to identify individuals who could fulfill this role, I will set it to one side. *See generally* KINGDON, *supra* note 33, at 179-84.

125. Thomas W. Hazlett, *All Broadcast Regulation Politics Are Local: A Response to Christopher Yoo's Model of Broadcast Regulation*, 53 EMORY L.J. 233, 237 (2004).

126. Hazlett, *supra* note 17, at 223-25.

127. *See* DERTHICK & QUIRK, *supra* note 93, at 157. At the time, United was the largest carrier, and it came to believe that it would fare better under deregulation than under the CAB's system of trying to protect and stabilize all carriers. *Id.*

use rights except through a case-by-case process at the Commission.[128] And the CTIA's comments caution strongly against underlay uses[129] and the commons model.[130]

Potential incumbent opposition to widespread flexible use rules is vividly highlighted by the CTIA's statement that "the application of unconstrained flexible use policies" can "undermine the value of other licensees' spectrum assets."[131] That, of course, is the point of spectrum reform, with Gerald Faulhaber and David Farber offering the view that extensive auction of private spectrum rights would cause the price of spectrum to fall significantly.[132] Similarly, Tom Hazlett has recently studied spectrum auction licenses, and he concludes that "licenses issued by countries awarding substantially more extensive property rights are less valuable than licenses issued under more restrictive rules."[133] Under the current auction system, in which the FCC defines a limited block of spectrum for a particular use and that use does not face entry from users in other blocks, the auction prices may reflect not only the value of the right of use but also the market structure that inheres in the band plan's limitations.

For their part, the broadcasters' public comments on the Task Force Report were tempered, but they also made clear their position that "any introduction of additional non-conforming uses or other major spectrum

128. Comments of the Cellular Telecomm & Internet Ass'n, Commission Seeks Comment on *Spectrum Policy Task Force Report*, ET Dkt 02-135, at 6 (Jan. 27, 2003), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513405035. ("CTIA suggests that the threshold question when presented with a flexible use proposal should be to consider whether the scope of the request suggests that the spectrum is being underutilized. In such cases, the band may be a candidate for reallocation. The FCC should not . . . resort to the 'easy fix' of giving inefficient or commercially non-viable incumbents flexibility to provide any service under the guise of increasing innovation.").

129. *Id.* at 15 ("Given that the potential for interference from unlicensed systems is significant, CTIA believes that 'underlay' operations should not be authorized in licensed spectrum unless they are: (1) below an interference threshold which can be conclusively demonstrated, based on actual tests, to protect licensed operations from interference; and (2) required to cease – and be practically capable of ceasing – operation immediately if they cause interference to licensed users.") (citations omitted).

130. *Id.* at 16 ("CTIA does not oppose additional unlicensed spectrum use where there is a demonstrated need . . . . [but] the Commission must prioritize the search for licensed spectrum first and foremost").

131. *Id.* at 5.

132. *See* FAULHABER & FARBER, *supra* note 12, at 214 ("Current inefficient uses such as UHF TV will come to market quickly once a market regime is in place, with more than enough bandwidth to satisfy immediate demands. Based on this presumption, we conclude that *in the short run*, excess demand will likely turn into excess supply, except in certain especially useful frequency bands. In this situation, *the price of spectrum at the margin is likely to be zero* (or very close to it).").

133. THOMAS W. HAZLETT, PROPERTY RIGHTS AND WIRELESS LICENSE VALUES 3 (AEI-Brookings Joint Ctr for Regulatory Studies, Working Paper 04-08, Mar. 2004), *available at* http://www.aei-brookings.org/admin/authorpdfs/page.php?id=771.

policy changes should be directed to other [non-television] bands."[134] The broadcasters' interests are, to say the least, complicated, as the networks and most individual broadcasters do not rely on actual over-the-air transmission (i.e., the spectrum they are licensed to use) to reach most viewers. As noted, the FCC reported that, as of June 2004, 85.1% of television households had multi-channel cable or satellite service.[135] The networks also do not rely on their status as broadcasters to force carriage of their content,[136] although some smaller broadcasters probably do. As a result, spectrum flexibility would likely increase the value of many current broadcast licenses for two reasons. First, because of the relatively small market for over-the-air video services,[137] new broadcasters are unlikely, and so increased spectrum flexibility for other licensees is unlikely to increase competition in broadcasting *qua* broadcasting. Second, the FCC has already begun making spectrum available for fixed wireless, high-speed Internet access systems, and telephone companies are touting plans to deploy enough fiber in their networks to enable IP-TV. Thus, video competition will be increasing. On the whole, traditional broadcast licensees would seem to benefit from flexibility generally, for the increase to the value of their licenses due to the ability to move from broadcasting to other services would seem to outweigh the possibility that other spectrum owners (with their own flexible licenses) would move into competing broadcast services. This is conjecture, to be sure, but it seems reasonable. (It also re-raises the "windfall" issue, on which more in the conclusion.)

Some deregulatory movements have benefited from the organized support of new entrants and user groups, particularly large commercial users in a position especially to benefit from lower prices and more flexible services.[138] Consumer electronics manufacturers have made clear

134. Joint Comments of the Ass'n for Maximum Serv. Television, Inc. & the Nat'l Ass'n of Broadcasters, Commission Seeks Comment on *Spectrum Policy Task Force Report*, ET Dkt 02-135, at ii (Jan. 27, 2003), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513405009.

135. Annual Assessment of the Status of Competition in the Mkt. for the Delivery of Video Programming, *Tenth Annual Report*, 19 FCC Rcd. 1606, 1609 (Jan. 2004).

136. *See* HAZLETT, *supra* note 12.

137. Chairman Powell has argued that 40 million Americans exclusively receive over-the-air broadcasting. Press Statement of Michael K. Powell, Nov. 4, 2003, 2003 WL 22494670. But this is still under 15% of all television households.

138. Kearney and Merrill state that "the great transformation would not have happened – at least in most industries – unless there were concentrated groups that stood to gain disproportionately from the change and that therefore had an interest in continually pressing for change in a variety of forums (including not just agencies and Congress but also the courts)." Kearney & Merrill, *supra* note 84, at 1396-97. On the other hand, they admit that the work of Martha Derthick and Paul Quirk, who conclude that airline and trucking deregulation occurred without any interest group actively pushing for that reform, "remain[s] unrefuted." *Id.* at 1397; *see* DERTHICK & QUIRK, *supra* note 93. Whether significant

their interest in additional spectrum being made available, especially for unlicensed uses,[139] and their influence in the regulatory and political process in recent years. They played an important role in the FCC's proceedings to establish copy protection rules for digital cable and broadcast systems.[140] Many have credited the electronics industry with blocking the passage of the INDUCE Act, which would have addressed (and, in general, expanded) application and hardware makers' secondary liability under the Copyright Act.[141]

Finally, consumer groups and general public opinion can play some role in setting the legislative agenda. "Governmental participants' sense of the national mood serves to promote some items on their policy agendas and to restrain others from rising to prominence."[142] As is usual, much consumer interest in spectrum reform is indirectly represented by the various interest groups, although in the case of incumbents benefited by a restrictive market structure the consumer interest in lower prices is not fully represented. Of the traditional public interest groups in communications policy circles, their principal *objections* to spectrum reform are the possible elimination of "public interest" broadcasting, with its assumed advantage in producing diverse, local, and informational programming, and the windfall that incumbents could receive if property rights were granted to existing licensees.[143]

All told, interest groups are neither uniformly in favor of spectrum reform nor opposed to it. Those incumbents currently benefiting from the limited availability of spectrum for certain services have the greatest incentive to resist full privatization (or commons, if the technology develops such that commons can provide competing services). Granting them full property rights without payment – a "windfall" – is intended to eliminate their incentive to resist change, or at least to mute it.[144] In fact, allocating the initial property rights in a new market regime to those companies who have incumbent advantage under the command and

---

deregulatory action is impossible without interest group support is an interesting question, beyond the scope of this paper, but it is doubtless the case that such reforms can more easily penetrate the political agenda if there is interest group support.

139. *See* Comments of Consumer Electronics Association, Commission Seeks Comment on *Spectrum Policy Task Force Report*, ET Dkt 02-135, at 6 (Jan. 27, 2003), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513405027.

140. *See generally* Susan P. Crawford, *The Biology of the Broadcast Flag*, 25 HASTINGS COMM. & ENT. L.J. 603 (2003) (discussing vigorous advocacy of consumer electronics groups in opposition to tighter DRM proposals of content industries).

141. *See* Drew Clark, *Lobbying Fierce over Induce Act*, NAT'L JOURNAL'S TECH. DAILY, Sept. 12, 2004 (PM Edition).

142. KINGDON, *supra* note 33, at 147.

143. *See, e.g.,* Ornstein & Calabrese, *supra* note 56; Harold Feld, Media Access Project, Statement at NSF Hearing, March 12, 2004.

144. *Compare* KWEREL & WILLIAMS, *supra* note 12.

control regime has been done in environmental and other contexts to overcome incumbent resistance.[145] Alternatively, to the extent that the FCC is able to make more flexible use spectrum available (directly, or indirectly through secondary markets), incumbent incentive to resist change will fall as competition increases and the relative benefit to the incumbents of securing their own flexibility increases.

2. Consensus in the Policy Community.

Consensus in the policy community is widely credited with promoting the deregulation of the transportation industries. As one wag put it, "by the mid-1970's it was probably fair to say that no impartial academic observer of any standing doubted that the airline business, if unregulated, would reach something that more or less resembled a competitive equilibrium."[146] Derthick and Quirk argue that "[i]f economics had not made the case for procompetitive deregulation, it would not have occurred – at least not on the scale the nation has witnessed."[147] Academic advice, however, is not always heeded, and, for years, economists and policy analysts despaired of having their views adopted.

The key is the matching of the political window of opportunity with a consensus prescription that is well worked out in the policy community. "[N]ormally, before a subject can attain a solid position on a decision agenda, a viable alternative is available for decision makers to consider. It is not enough that there is a problem, even quite a pressing problem. There also is generally a solution ready to go, already softened up, already worked out."[148] And, the absence of a well-worked out solution, or resistance to the solution, decreases the likelihood (all else equal) of its adoption.[149]

---

145. *See generally* Thomas W. Merrill, *Golden Rules for Transboundary Pollution*, 46 DUKE L. J. 931, 982 (1997) ("For nearly two decades, the midwestern states consistently blocked any meaningful regulation of acid rain . . . . The impasse was finally broken by an agreement to create a system of tradeable emissions allowances to achieve these reductions. The key feature of the system, in terms of overcoming the objections of the source states, was an agreement to give the bulk of the allowances in the initial round of the program to midwestern utilities.").

146. Michael E. Levine, *Airline Competition in Deregulated Markets: Theory, Firm Strategy, & Public Policy*, 4 YALE J. ON REG. 393, 394 (1987).

147. DERTHICK & QUIRK, *supra* note 93, at 246.

148. KINGDON, *supra* note 33, at 142; *see also id.* at 142-43 ("the chances for a problem to rise on the *governmental* agenda increase if a solution is attached to the problem. The chances for a problem to rise on the *decision* agenda are *dramatically* increased if a solution is attached.").

149. *E.g.*, *id.* at 170 ("the window [of political opportunity] closes because there is no available alternative"); *id.* at 176 ("What happens when such an unmanageable multitude of problems and alternatives get dumped into the deliberations? On possibility, indeed not uncommon, is that the entire complex of issues falls of its own weight. Most participants

In the policy community's discussion of spectrum reform, there are a number of worked out solutions to spectrum problems, but privatization and unlicensed commons are incompatible with one another. Although many commentators suggest some use of both, commentators generally place principal emphasis on either one or the other. For its part, the Task Force Report comes down strongly on the side of using property rights in most spectrum below 5 GHz,[150] but this is far from a consensus position.

Similarly, in order for policy recommendations to be adopted in the political cycle, evidentiary support is important. "Without belief in its technical feasibility, the proposal is not likely to survive to the point of serious consideration."[151] This, of course, relates to the need for evidence of the success of deregulated (or less regulated) spectrum markets, as noted above was the case prior to transportation deregulation.[152] Some evidence is being developed in comparative case studies of countries with liberalized spectrum policies,[153] and, again, the case of WiFi provides strong support for commons advocates. More rigorous work here – the creation by economists of a few more bullets for the lawyers to fire at one another[154] – might help matters significantly.

## CONCLUSIONS – POSITIONING THE IDEA

As all of the foregoing suggests, firm predictions about the possibility of fundamental spectrum reform are folly. But enough can be shown of the policy and political processes to know that, at the time that a window of opportunity opens and an influential person makes spectrum reform his or her decision issue, an array of factors can assist its passage. Central among these are the continuing efforts of the FCC and of the rest of the policy community to develop consensus proposals for reform. Additionally, FCC action to lift restrictions on current licenses – to the extent of the FCC's current powers – can help both to decrease the objection of any incumbent favored by limited rights in the status quo and to build the evidentiary record for reform. Ideas need lead time – the political process needs "softening up"[155] in advance of the legislative window of opportunity.

One of the most important ideas that needs "softening up" is the

---

conclude that the subject is too complex, the problems too numerous, and the array of alternatives too overwhelming. Their attention drifts away to other, more manageable subjects.").

150. Spectrum Policy Task Force Report, *supra* note 12, at 45.

151. KINGDON, *supra* note 33, at 132.

152. *See supra* notes 108-109 and accompanying text.

153. *See generally* HAZLETT, *supra* note 133.

154. *Cf.* DERTHICK & QUIRK, *supra* note 93, at 3.

155. KINGDON, *supra* note 33, at 132.

response to the claim that spectrum licensees that receive flexibility or that receive the rights to sell their spectrum are getting a "windfall." Here, there are two points to be made. The first is, as noted above, one of political reality. Broadcasters are politically powerful, and the current regime gives them some valuable rights (both license rights and must carry rights). Some compensation is probably necessary to cause them to support a new, more efficient regime. The second is more a rebuttal to the "windfall" argument on the merits. Although current broadcasters have not paid the government for their licenses, many have purchased the licenses on the secondary market, and they therefore have paid something for the asset.

Apart from these spectrum-specific ideas, it seems to me that the cause for spectrum reform might be advanced by more consistently making explicit the linkages between it and the cause of telecommunications policy and reform more generally. Despite the doubts expressed in Part II, telecommunications policy could move onto the political agenda. The resignation of Chairman Powell, and the need to appoint and confirm a successor, will require that at least some attention be paid to telecommunications policy. More significantly, new Senate Commerce Committee Chairman Ted Stevens has abolished the telecommunications subcommittee, and he has stated that the reason for the move is to make sure that the full committee has before it the important items of telecommunications reform.[156] Although other motivations have been mentioned,[157] this could signal an increase in telecommunications' place on the political agenda. (Of course, public choice also might suggest that, although the issue is potentially higher on the agenda, the move by a committee chairman to place the issue under his personal jurisdiction is simply a move to garner interest group attention. And this might be true *even if* the lack of legislative action is the most likely outcome.[158]) Last, as the President's adverting to the issue during the campaign shows,[159] the U.S.'s trailing the rest of the world in broadband deployment could cause the broadband issue to remain on the political agenda.[160]

---

156. *See, e.g.*, Cong. Quarterly, Midday Update, Feb. 1, 2005.

157. Cong. Daily, January 28, 2005 (suggesting, over Sen. Stevens' denials, that the move was to deny Sen. McCain a subcommittee chairmanship in retaliation for McCain's criticisms of Stevens' permission of pork on Appropriations).

158. *E.g.*, FRED S. MCCHESNEY, MONEY FOR NOTHING: POLITICIANS, RENT EXTRACTION, AND POLITICAL EXTORTION (1997) (arguing that politicians not only receive political contributions in exchange for the passage of legislation, but that politicians can use the threat of potential legislation to receive contributions in exchange for maintaining the status quo).

159. *See supra* note 123 and accompanying text.

160. *Cf.* KINGDON, *supra* note 33, at 92-93 ("Policy makers consider a change in an indicator to be a change in the state of a system; this they define as a problem. The actual

As telecommunications issues (whatever they are) rise on the legislative agenda, linkages to spectrum policy should be exploited. The experience of transportation deregulation showed how "[o]nce a precedent is established in one area, it can be used to further a similar change in an area that is like the first in some way."[161] But "[s]uch argumentation requires appropriate category construction."[162] Thus, the program for privatizing spectrum must be made of a piece with the continued elimination of entry barriers into telecommunications markets,[163] with the unleashing of technology generally, and especially with the prospect of increased deployment of and competition in broadband. These themes, of course, resonate not only with the direction of telecom policy generally (since the 1996 Act, especially), but also with some themes pushed in the current political environment such as privatization, personal ownership, and deregulation.

Indeed, wireless seems to be a likely prospect for additional platform competition in broadband markets. I have elsewhere argued for a telecommunications policy that focuses relentlessly on the regulatory conditions that might increase platform competition, and wireless policy could certainly play a leading role.[164] The precedents are certainly favorable. Wireless provided the first platform competition in long distance (microwave) and in multichannel video (DBS); and wireless, especially among the young, is increasingly a competitor on voice. Speeds on WiMax/EVDO systems are increasing. In Chicago, Verizon's high-speed wireless data service is between 300 and 500 kbps – not cable modem or DSL speeds, but not too shabby either. I am not suggesting that these themes are absent from the current discussion in the policy community. They are not; the FCC's decisions on ITFS and MMDS frequencies are designed in part to promote fixed broadband deployments,[165] and the movement on wireless ISPs is especially favorable. But much of the spectrum reform discussion focuses on the demand for cell phone service or for other uniquely wireless services instead of explicitly placing it in a broader telecommunications agenda.

Positioning spectrum reform as a central component of *any* significant telecommunications reform increases the likelihood that it will make its way onto the political agenda. It may increase some risks as well, for such reform (especially comprehensive reform) will face some

change in the indicator, however, gets exaggerated in the body politic, as people believe the change is symbolic of something larger and find that the new figures do not conform to their previous experience. Thus indicator change can have exaggerated effects on policy agendas.").

161. *Id.* at 192.

162. *Id.* at 193.

163. *See* 47 U.S.C. § 253 (2005).

164. *See generally* Speta, *supra* note 14.

165. *See supra* note 109.

significant hurdles. The elimination of the public interest model will raise the spectre of increased indecency in the media, which public opinion seems to consider unacceptable. And, comprehensive reform raises the problem of universal service. The policy community has proposals to address these issues as well, of course. But if spectrum reform turns on the prospects for total telecommunications reform (and, given the evidence above, I think it does), these are problems that must be worked to the same consensus as well.

All in all, the most likely, effective path forward is to continue on the path currently charted by the FCC: free up as much spectrum as possible, auction most of it, provide for flexible uses, and permit secondary markets to flourish. All of these steps will change the landscape significantly, diminish any continuing incumbent resistance, and, as Alfred Kahn put it in the airline context, "scramble the eggs" of the old regime so much that it cannot be put back together. In this regard, then, spectrum policy advocates, instead of proceeding broadly, should perhaps focus all energies on one single cause: accelerating the release of the analog television licenses. This is a well-recognized problem, and there are some solutions in the mix, such as an FCC staff proposal to set a hard shut-off date[166] and a bill introduced by Senator McCain both to set a hard date and to subsidize the purchase of digital tuners.[167] Succeeding here, however, would free up enough spectrum that even FCC action alone would have a substantial effect.

166. *See, e.g.*, Ted Hearn, *Ferree Plan No Picnic for Cable, Either*, MULTICHANNEL NEWS, Apr. 26, 2004, at 79 (discussing plan for 2009 shut off).

167. A bill to ensure the availability of certain spectrum for public safety entities by amending the Communications Act of 1934 to establish January 1, 2009, as the date by which the transition to digital television shall be completed, and for other purposes. *See* the SAVE LIVES Act, *supra* note 120.

# SPECTRUM EQUITY

ELLEN P. GOODMAN*



## INTRODUCTION

A decade after the 1996 overhaul of the Communications Act, work is underway on another rewrite of communications law for the Internet age.[1] Among the Act's many deficiencies is its use of grand principles

* Associate Professor, Rutgers University School of Law – Camden. My thanks go to Gerald Faulhaber, Jay Feinman, Robert Pepper, James Speta, and Judge Stephen Williams for their terrific suggestions, and especially to Phil Weiser who continues to teach and inspire me.

1. Telecommunications law reform is on the agenda of the 109th Congress. *See e.g.,* Bill McConnell, *New Threat to Broadcasters; Overhaul of Telecom Act Will Legislate Station Fare*, BROADCASTING & CABLE, May 3, 2004, at 21 (reporting on then-Senate Commerce Committee Chairman McCain's intention to re-open the Communications Act this year); COMM. DAILY, Aug. 31, 2004 (reporting on the same intention of House Commerce Committee Chairman Barton). *See generally* James B. Speta, *Making Spectrum Reform "Thinkable"*, 4 J. TELECOM. AND HIGH TECH. L. 159 (2005). Commentators have called for a Communications Act re-write as well. *See e.g.,* James B. Speta, *Deregulating Telecommunications in Internet Time,* 61 WASH. & LEE L. REV. 1063, 1065-66 (2004) (providing examples).

that are appealing, but vague, making them maddening for regulators to implement and for regulated entities to obey. The most notorious of such principles is that the Federal Communications Commission (FCC) must regulate in the "public interest."[2] A more obscure, but equally illusive, principle can be found in the Act's "spectrum equity" provisions.

These provisions require the FCC to auction rights to use the electromagnetic spectrum in ways that "recover[] for the public .. a portion of the value of the public spectrum resource . . ." and avoid the "unjust enrichment" of licensees.[3] The venerable common law doctrine of "unjust enrichment" appears nowhere else in the United States Code as a substantive command.[4] Its inclusion in the alien medium of communications law raises intriguing questions about how spectrum access should be valued and how fairness in the distribution of access rights can be achieved.

This essay probes the Act's spectrum equity provisions and notions of spectrum equity in general, highlighting problems of definition and scope. Fairness as a goal in the distribution of spectrum access rights is controversial. From a Chicago School economic perspective, equitable considerations have no place in the formation of policies properly aimed at maximizing the efficient provision of wireless services.[5] By contrast, equity is central to a broader "public resource" perspective of spectrum. According to this perspective, spectrum users – generally meaning the entities licensed to provide spectrum-based services – should be required

---

2. For a discussion of the uncertain meaning of the "public interest" in the context of spectrum management, *see* Ellen P. Goodman, *Spectrum Rights in the Telecosm to Come*, 41 SAN DIEGO L. REV. 269, 303-11 (2004).

3. 47 U.S.C. § 309(j)(3)(C) (2005).

4. Unjust enrichment appears elsewhere in federal law only as a carve-out for common law actions not preempted by the federal statute. *See* 15 U.S.C.A. § 80a-46(b)(3) (2005) (securities law).

5. *See e.g.,* EVAN KWEREL & JOHN WILLIAMS, A PROPOSAL FOR A RAPID TRANSITION TO MARKET ALLOCATION OF SPECTRUM (FCC Office of Plans and Policy, Working Paper No. 38, Nov. 2002), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-228552A1.pdf. (proposing a two-sided auction in which incumbents would have the chance to convert licenses to property rights, even though this would bestow windfall value on such licensees); ROBERT M. ENTMAN, CHALLENGING THE THEOLOGY OF SPECTRUM: POLICY REFORMATION AHEAD 21 (2004) (quoting Robert Pepper of the FCC, saying "Get over it; we need to benefit the consumers even if there's a windfall"); Gregory L. Rossten & Thomas W. Hazlett, Comments of 37 Concerned Economists, in WT Dkt. No. 00-230 (FCC filed Feb. 7, 2001) at 6 ("Efforts to extract gains from licensees . . . should not be permitted unduly to hinder or delay realization of the public benefits from promoting greater competitiveness through spectrum liberalization."). *See also* Thomas W. Hazlett, *Property Rights and Wireless License Values* 32-32 (AEI-Brookings Joint Center, Working Paper No. 04-08, 2004), *available at* http://ssrn.com/abstract=519602 (arguing that the grant of flexible usage rights to incumbents does not constitute a windfall, but actually reduces windfall benefits since a regulatory structure that "restrict[s] flexibility of operators effectively award[s] windfalls to incumbent licensees via reduced competitive entry.").

to provide a fair return on access to public spectrum and "giveaways" should be avoided.[6] Echoing some of these arguments are wireless users themselves, who deploy fairness arguments strategically to keep their competitors from obtaining regulatory advantages.[7]

Were we to jettison considerations of fairness, Telecommunications Act reform with respect to spectrum equity would be easy: Congress need simply remove references to unjust enrichment and permit, even mandate, the distribution of spectrum access rights without regard to distributional effects. Such an approach is both politically unrealistic and, as I argue below in Part I, undesirable. Substantive fairness and efficiency in spectrum management are not inconsistent and fairness is a value that should influence access to the critical communications resource of spectrum.

If we are willing to engage in questions of fairness, we must grapple with the value of spectrum rights and the selection of equitable goals. A wireless user can only be unjustly enriched by spectrum access if we know how much spectrum access he is due. The measure of unjust enrichment will thus depend on baseline entitlements in spectrum. Under current law, these entitlements are poorly defined. Licensees purchase, or are granted for free, the rights to transmit signals within a particular band in a particular area. But the scope of these rights depends on the degree to which these users are expected not to cause interference to others and to bear interference caused by others. These interference entitlements are grossly under-determined.[8]

Even if it were possible to quantify the unearned benefits a spectrum user has received, the appropriate remedy for unjust enrichment in spectrum depends on whether the regulator is concerned primarily with public restitution or competitive parity. What it takes to remedy the public's loss of value in the exclusive use of spectrum might be quite different from what it takes to put similarly situated users on equal footing. Part II explores these complexities in the context of the

6. *See e.g.,* Michael Calabrese & Norman Ornstein, Editorial, *A Private Windfall for Public Property*, THE WASH. POST, Aug. 12, 2003, at A13 (arguing against policy proposals that would confer "a massive and undeserved financial windfall – up to $500 billion – on a few lucky industries" and proposing spectrum use fees instead); *Future of Spectrum Policy: Before the Senate Comm. On Commerce Science and Technology*, 109th Cong. (2003) (statement of Michael Calabrese, Director, New America Foundation) (arguing that allowing incumbent licensees greater flexibility to use spectrum, or allowing them to convert licenses to property rights, would constitute a windfall). *See also* Michael H. Rothkopf & Coleman Bazelon, *Interlicense Competition: Spectrum Deregulation Without Confiscation or Giveaways* (New America Foundation Spectrum Policy Program, Spectrum Series Working Paper No. 8, 2003), *available at* http://www.newamerica.net/download_docs/pdfs/pub_file_1329_1.pdf. (arguing on efficiency as well as fairness grounds that licensees should have to compete in an auction in order to get expanded spectrum usage rights).

7. *See infra* notes 27, 51, and 66.

8. *See infra* notes 56-57 and accompanying text.

FCC's innovative steps to solve the interference problems between Nextel Communications, Inc. and public safety users of shared spectrum.

Equitable considerations are likely to become both more complex and widespread as spectrum use intensifies. In particular, as Part III shows, fairness issues may come to be implicated in unlicensed spectrum use. There is a growing literature on the legal mechanisms required to prevent and resolve interference disputes as unlicensed applications like WiFi grow more dense and complex.[9] In developing these proposals, scholars have considered spectrum conflicts in the context of an interference dispute. Spectrum equity implicates a different conflict. It is the conflict between the spectrum user and the public or between competing spectrum users, whether or not they are antagonists in an interference dispute. Claims of spectrum fairness cannot be answered in either the licensed or unlicensed arenas without a clearer articulation of the goals and measures of equity, as well as the underlying set of entitlements that spectrum users can justly claim.

## I. EQUITY IN SPECTRUM ACCESS

Terms like "windfall", "unjust enrichment", "parity," and the "public interest" form a regulatory jurisprudence of equity in the allocation of spectrum access rights. This Section identifies the contexts in which fairness concerns have typically arisen in the past, defends fairness as an important principle in spectrum management, and highlights both the normative and logistical difficulties of implementing such a principle.

### *A. Contexts for Fairness*

A fair distribution of spectrum access rights means a distribution that treats like-situated spectrum users alike and fairly compensates the public for exclusive uses of the spectrum. Analogizing the right to use spectrum to the right to graze cattle on federal lands, we can easily identify two distinct issues of equity. One is whether the rancher has paid fair market value for the grazing rights, or otherwise compensated the public for access to the public resource. The other is whether one rancher has been given special privileges unavailable to others. The Communications Act's spectrum equity provisions, which address only initial licenses, actually cover very few of the circumstances in which these fairness issues arise. The law is as important for supplying the

9. *See* Philip J. Weiser & Dale N. Hatfield, *Policing the Spectrum Commons,* 74 FORDHAM L. REV 101 (forthcoming 2005), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=704741*;* Kevin Werbach, *Supercommons: Toward a Unified Theory of Wireless Communication*, 82 TEX. L. REV. 863, 936-49 (2004); Gerald Faulhaber*, The Question of Spectrum: Technology, Management, and Regime Change* (December 2004, draft on file with author) at 22-26; Goodman, *supra* note 2 at 384-402.

vocabulary of unjust enrichment as for its technical force. As discussed below, this vocabulary, and the underlying norm of fair spectrum access, exerts force even when the statutory provisions do not apply.

### 1. Initial Licenses

Congress legislated against unjust enrichment in the award of initial spectrum licenses in 1993 when it gave the FCC the authority to auction spectrum.[10] Prior to that, the FCC had made spectrum available either on a shared basis to all or to the winners of lotteries or administrative hearings.[11] Four years after Congress first authorized spectrum auctions, it made them obligatory for most commercial services.[12] As the law stands today, the FCC *must* auction spectrum when (a) there are mutually exclusive applications for (b) any initial license to be used primarily for (c) commercial services, (d) unless the spectrum use is one of several enumerated exceptions.[13]

Both efficiency and fairness goals played a part in the move to auctions. There was consensus that auctions are efficient because they put spectrum use rights into the hands of those who value them most highly.[14] But other methods of assigning spectrum rights had done this

10. Omnibus Budget Reconciliation Act of 1993, Pub. L. No. 103-66, § 6002, 107 Stat. 312, 388 (1993) ("If mutually exclusive applications are accepted for filing for any initial license or construction permit which will involve a use of the electromagnetic spectrum. . . then the Commission shall have the authority . . . to grant such license or permit to a qualified applications through the use of a system of competitive bidding that meets the requirements of this subsection").

11. *See* STUART MINOR BENJAMIN ET AL., TELECOMMUNICATIONS LAW AND POLICY 144-46 (2001).

12. *See* Balanced Budget Act of 1997, Pub. L. No. 105-33, § 3002, 111 Stat. 251, 258 (1997) (codified at 47 U.S.C. § 309(j)) ("If . . . mutually exclusive applications are accepted for any initial license or construction permit, then, except as provided [herein], the Commission shall grant the license or permit to a qualified applicant through a system of competitive bidding that meets the requirements of this subsection"). *See also* H.R. REP. NO. 109, at 557 (1997) (confirming that the amendments "require[d] all radio-based licenses for which mutually exclusive applications are filed with the FCC to be assigned by means of competitive bidding"); *id.* at 567 ("The subsection requires the FCC to employ a system of competitive bidding if presented with mutually exclusive applications for use of the spectrum."). Congress had previously, though less clearly, attempted to convert spectrum auctions from permissive to mandatory in the Telecommunications Act of 1996. *See* H.R. REP. NO. 612, § 421(4), (5) (1996) (assuming that "services would be auctioned where the [FCC] has not yet conducted auctions for such services . . . [and that] the Commission should act expeditiously and without further delay to conduct auctions of licenses in a manner that maximizes revenue, increases efficiency, and enhances competition.").

13. 47 U.S.C. § 309(j)(1)-(2). The FCC is not permitted to auction licenses for public safety radio services, for noncommercial educational or public broadcast stations, or for digital television service provided by incumbent television broadcast licensees. 47 U.S.C. § 309(j)(2). The FCC is also prohibited from auctioning licenses for satellite orbital slots or to provide international or global satellite communications services. *Id.* § 765(f).

14. *See* Implementation of Section 309(j) of the Communications Act, Competitive Bidding for Commercial Broadcast and Instructional Television Fixed Services Licensees,

too, albeit more expensively. Ronald Coase taught us that the ultimate distribution of entitlements will be efficient so long as parties can negotiate around initial entitlements, free from material transaction costs.[15] Spectrum licensees have always been able to transfer their licenses, whether they won them at auction or in a lottery. In the pre-auction environment, the most valuable licenses did indeed come to be possessed by the most efficient user.[16]

Certainly a great advantage of well-designed auctions was that they reduced the transaction costs associated with this migration of licenses, and therefore improved allocative efficiency. But auctions promised something more. What galled members of Congress was that lottery winners were reaping windfall profits when they transferred their licenses in what amounted to private auctions.[17] Auctions shifted these profits from the private to the public sector, making the distribution of spectrum rights fairer and more efficient.[18]

The spectrum equity provisions, adopted alongside the FCC's auction authority, grew out of these fairness concerns. Congress required the FCC to design auctions to "avoid[] unjust enrichment through the methods employed to award uses" of spectrum.[19] The FCC must control the disposition of spectrum rights after they are in the hands of licensees, "as may be necessary to prevent [the] unjust enrichment" of licensees that receive special advantages in the auction process and then seek to flip the

---

*First Report and Order*, 13 FCC Rcd. 15,920, 15,928 (1998) (auctions assign spectrum "to those who value it most highly."); Mobile Communications Corp. of America v. FCC, 77 F.3d 1399, 1405 (D.C. Cir. 1996) (auctions ensure that "the license will end up in the hands of the firm best able to develop its potential."). This economically efficient use of spectrum is often, and was by Congress, conflated with the technically efficient use of spectrum. *See e.g.,* H.R. REP. NO. 111, 253 (1993) (auctions "promote efficient and intensive use of the electromagnetic spectrum"). *See also* Goodman, *supra* note 2 at 305-09 (identifying various notions of efficiency embedded in FCC policy).

15. R. H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1, 15 (1960) ("if. . .market transactions are costless, . . . a rearrangement of rights will always take place if it would lead to an increase in the value of production."). *See also,* Stewart Schwab, *Coase Defends Coase: Why Lawyers Listen and Economists Do Not*, 87 MICH. L. REV. 1171, 1195 (1989) (discussing the distributional implications of Coase's transaction cost theory).

16. *See* Congressional Budget Office, Where Do We Go From Here? The FCC Auctions and the Future of Radio Spectrum Management 5 (1997) (reporting that more than 75% of all cellular licenses distributed by lottery were transferred at least once in the first years of the service).

17. *Id.* at 5.

18. *See* H.R. REP. 111, 248-49 (1993) (cataloging the ways in which distribution of licenses by lottery resulted in the distribution of licenses to unqualified persons and firms).

19. 47 U.S.C. § 309(j)(3)(C). Also, as part of the auction process, the FCC was required to "prevent unjust enrichment" in according preferential treatment to entities that make pioneering technical contributions "by ensuring that the value of any such contribution justifies any reduction in the amounts paid for comparable licenses" at auction. 47 U.S.C. § 309(j)(13)(D)(ii). This "pioneer's preference" policy is no longer in effect.

licenses to entities that would not have qualified for these advantages.[20] The FCC has recently interpreted this provision to require "unjust enrichment payments" in the case of spectrum leases as well as the transfer of licenses.[21]

Congress also instructed the FCC to ensure public restitution for spectrum use. In designing auctions, the FCC would have to allow "recovery for the public of a portion of the value of the public spectrum resource made available for commercial use."[22] In other words, the FCC is required to contract for the sale of spectrum rights so as to fairly compensate the public.[23]

### 2. License Modifications

Equitable concerns arise outside of the auction process and the reach of the spectrum equity provisions. Claims of unfairness tend to surface when it appears that a spectrum user has obtained a windfall through regulatory largesse having nothing to do with the award of initial licenses. In particular, such claims arise when the FCC distributes exclusive spectrum use rights without auction or expands the rights of an incumbent licensee without imposing additional payment or other obligations.[24]

Fairness concerns manifested most publicly when the FCC gave incumbent broadcasters the exclusive rights to use spectrum for digital television, without resorting to the auction process. This decision, endorsed by Congress, was lambasted by critics who called it a "giant

---

20. 47 U.S.C. § 309(j)(4)(E); 47 C.F.R. §§ 1.2111, 24.714(c) (2004) (rules requiring unjust enrichment payments when certain licenses are transferred). *See also* Implementation of Section 309(j) of the Communications Act – Competitive Bidding, *Second Report and Order*, 9 FCC Rcd. 2348, 2385 (1994) (Congress wanted "to prevent auction winners from acquiring licenses for less than true market value at auction and then transferring them for a large profit prior to providing service."); *id.* at 2,394 (adopting unjust enrichment provisions to "prevent designated entities" that received credits in spectrum auctions "from profiting by the rapid sale of licenses acquired through the benefit of preference policies.").

21. *See* Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets, *Report and Order and Further Notice of Proposed Rulemaking*, 18 FCC Rcd. 20,604 (2003) (establishing rules to require unjust enrichment payments by licensees that leased spectrum to entities unqualified for preferential payment plans licensees obtained). *But see id.* at 20,676 (not requiring unjust enrichment payments for short-term leases).

22. 47 U.S.C. § 309(j)(3)(C).

23. *See* H.R. REP. NO. 111, 253 (1993) ("[A] carefully designed system to obtain competitive bids from competing qualified applicants can . . . produce revenues to compensate the public for the use of the public airwaves."); 139 CONG. REC. S2348 (1993) (statement of Sen. Inouye) (auctions will "allow the Government to receive significant revenues from the use of this public asset."); *id.* at S2353 (statement of Sen. Stevens) (auctions will "fairly compensate Federal Taxpayers for use of a scarce public resource.").

24. These gains are not technically windfalls, since they are usually foreseen and may be the result of productive activities that society wants to reward. *See* Eric Kades, *Windfalls*, 108 YALE L.J. 1489, 1491-92 (1999) (distinguishing windfalls from other benefits or advantages).

corporate welfare program" and a "rip off on a scale vaster than dreamed of by yesteryear's robber barons."[25]

Similar, if less vociferous, complaints arise when the FCC modifies incumbent users' licenses to expand their rights. These modifications tend to be efficient because they allow licensees to use spectrum more intensively.[26] At the same time, the modifications can confer windfall benefits on licensees who have not bargained for them.[27] The FCC has been especially receptive to these fairness claims when it can be done without sacrificing efficiency. For example, the FCC has refused to allow licensees to benefit from policy changes that would effectively reinstate expired licenses[28] or give some licensees a competitive advantage over others.[29]

### *B. Norm of Fairness*

Fairness advocates face skepticism about why equity should figure in the distribution of spectrum access rights, particularly when spectrum users deploy fairness arguments strategically simply to impose costs on their competitors. This skepticism tends to start from the premises that fairness is at odds with efficiency and too indeterminate to address profitably. While each premise has some merit, neither is entirely accurate. Moreover, the anti-fairness argument runs headlong into the powerful counterforce that is the norm of equity. There are at least three

---

25. Paul Taylor, *Superhighway Robbery*, NEW REPUBLIC, May 5, 1997, at 20 (quoting Senator Robert Dole and columnist William Safire respectively). *See also* Thomas W. Hazlett, *Physical Scarcity, Rent Seeking, and the First Amendment,* 97 COLUM L. REV. 905, 938-43 (1997) (criticizing the auction-free assignment of spectrum to broadcasters).

26. *See e.g.,* Revision of Part 22 and Part 90 of the Commission's Rules to Facilitate Future Development of Paging Systems, *Memorandum Opinion and Order on Reconsideration and Third Report and Order*, 14 FCC Rcd. 10,030, 10,101 (1999) (allowing licensees increased operational flexibility even though this threatens "the value that other licensees place on their competitively won licenses" because the benefit of flexibility "outweighs any possible disadvantage of allowing . . . licensees to receive a financial windfall" through flexibility). *See also* Hazlett, *supra* note 5 (advocating flexibility despite distributional implications).

27. *See e.g.,* Kathleen Q. Abernathy, *Government Doesn't Always Know Best: Harnessing Self-Interest to Advance the Public Interest*, 11 COMM. L. CON. 5, 17 (2003) (citing comments of Verizon Wireless, Motorola, Inc. and Cingular Wireless LLC in proceeding that gave broadband wireless incumbents in 2.5 GHz band additional operational flexibility).

28. *See e.g.,* Amendment of Section 2.106 of the Commission's Rules to Allocation Spectrum at 2GHz for Use by the Mobile Satellite Service, *Third Report and Order and Third Memorandum Opinion and Order*, 18 FCC Rcd. 23,638, 23,664 (2003) (incumbents that started operations knowing they would have to relocate out of a band "should not receive the windfall of relocation at the expense of new licensees in the band.").

29. *See e.g.,* Review of the Pioneer's Preference Rules, *Memorandum Opinion and Order on Remand*, 9 FCC Rcd. 4055 (1994) (changing policies that award licenses to technical innovators to prevent them from obtaining financial windfall).

reasons why fairness should factor into the distribution of spectrum rights.

First, fairness supports efficiency in spectrum management. The economic argument against evenhandedness in the distribution of entitlements to competitors is based on the theory of sunk costs: In competitive markets, it should not matter that two competitors expended very different amounts for the same resource, because prices reflect marginal costs, not sunk costs. Since the cost of spectrum is a sunk cost, the price that a company paid for spectrum should not materially affect the prices it charges consumers for its services.[30] According to this conventional wisdom, the only legitimate function of regulation with respect to sunk costs is to address barriers to entry that arise when sizeable upfront investment is required (as is the case with satellites, for example), not to raise costs in order to equalize barriers to entry.[31]

This theory of sunk costs, which is itself somewhat controversial,[32] helps to explain why differential grants of spectrum access rights might not harm consumers in the short term. It does not, however, deal with the possibility that unearned spectrum access rights might distort investment, resulting in inefficient competitive outcomes in the longer term. If company A pays $10 million dollars for particular spectrum access rights, and company B pays $1 million dollars for the same rights, the theory of sunk costs suggests that company A cannot charge more for its services than does company B. But, all things being equal, company B will have a better balance sheet and be more attractive to capital. With these advantages, company B might then be able to drive prices down and out-compete company A.[33] In the end, windfalls in spectrum rights

30. *See* Stuart Benjamin, *Spectrum Abundance and the Choice Between Private and Public Control*, 78 N.Y.U. L. REV. 2007, 2081 n.237 (2003); J. Gregory Sidak & Daniel F. Spulber, *Deregulatory Takings and Breach of the Regulatory Contract,* 71 N.Y.U. L. REV. 851, 868 (1996) ("Ordinarily, sunk costs do not affect business decisions, which are only concerned with available benefits and avoidable costs."). Courts have taken the FCC to task for failing to recognize this conventional wisdom. *See e.g.,* Fresno Mobile Radio, Inc. v. FCC, 165 F.3d 965, 969 (D.C. Cir. 1999) ("the use to which an asset is put is based not upon the historical price paid for it, but upon what it will return to its owner in the future."). The FCC has since embraced the wisdom. *See generally*, PHILIP J. WEISER & JONATHAN E. NUECHTERLEIN, DIGITAL CROSSROADS: AMERICAN TELECOMMUNICATIONS POLICY IN THE INTERNET AGE 249-51 (2005) (arguing that "policymakers should be circumspect in weighing claims that it would be 'unfair' if – because of changes or anomalies in the government's assignment regime – some but not all providers within a given market had to pay for their spectrum rights at auction" or otherwise received "windfalls".).

31. *See* Daniel F. Spulber & Christopher S. Yoo, *Access to Networks: Economic and Constitutional Connections*, 88 CORNELL L. REV. 885, 914-15 (2003).

32. *See e.g.,* Matthew L. Spitzer & Elizabeth Hoffman, *Willingness to Pay vs. Willingness to Accept: Legal and Economic Implications*, 71 WASH. U. L.Q. 59 (1993) (surveying the literature on the irrational valuations of vested interests).

33. Competitors to MCI expressed this concern in relation to the Chapter 11 restructuring of MCI's debt in the aftermath of the company's massive securities fraud. *See*

could not only reduce competition among existing players, but also deter new entrants from investing in spectrum-related businesses.

Sensitivity to the competitive effects of inequitable treatment is evident in the government's persistent interest in regulatory parity – the practice of regulating like services in a like manner.[34] A regulatory system that privileges one technology over a functionally similar one may distort competition, unnecessarily picking winners and losers. This is true whether the regulatory advantage is in the form of reduced regulatory burdens or increased spectrum access rights.

Efficiency concerns aside, a second reason that fairness matters in the distribution of spectrum access rights is that spectrum has characteristics of a public resource.[35] Where an entity has an exclusive right to exploit this resource, it should compensate the public as a matter of justice and wise resource management. To be clear, fairness concerns should not stop a licensee from exploiting its spectrum access rights to the fullest extent possible. A licensee who has purchased access rights for A and B purposes should also be able to use the spectrum for C purpose, consistent with the rights of others. We would not want to impede the lumberman who has a permit to harvest timber on public lands from also harvesting the rare mushrooms that lie hidden beneath the trees. Nor does fairness dictate that the increased benefits the licensee realizes from

---

*e.g.*, Simon London, *Critics Are Hoping It Could be End of Story for Chapter 11*, FIN. TIMES, Dec. 20, 2001, at 22 (quoting Verizon CEO's complaint that WorldCom and Global Crossing can "use Chapter 11 'to cleanse their sins, then drive prices down'"); *The WorldCom Case: Looking at Bankruptcy and Competition Issues: Hearing before Senate Comm. On the Judiciary*, 108th Cong. (July 22, 2003) (testimony of William Barr, General Counsel, Verizon), *available at* http://judiciary.senate.gov/print_testimony.cfm?id=846&wit_id=2441 (restructuring "gives MCI an artificial advantage over its honest competitors"). *See also* J. Gregory Sidak, *The Failure of Good Intentions: The WorldCom Fraud & the Collapse of American Telecommunications After Deregulation*, 20 YALE J. ON REG. 207, 250 (2003) ("If WorldCom**,** having shed the fixed cost of its debt, emerges from bankruptcy, it could underprice efficient competitors."). To the extent that competitors are concerned about their balance sheets, they can theoretically retire their own debt by issuing more stock. In reality, they cannot do this without imposing often unacceptable costs on their shareholders.

34. The Omnibus Reconciliation Act of 1993, Pub. L. No. 103-66, amended Section 332(c) of the Communications Act to achieve regulatory parity among providers of commercial mobile radio services. *See generally* Senator Ted Stevens*, The Internet and the Telecommunications Act of 1996*, 35 HARV. J. ON LEGIS. 5, 16 n.77 (1998). The Satellite Home Viewer Improvement Act of 1999, Pub. L. No. 106-113, amended Section 338 of the Communications Act to create regulatory parity between satellite and cable operators with respect to the retransmission of local broadcast station signals. In addition, the FCC has attempted to ensure regulatory parity between cable and telephone providers of Internet services. *See generally* Rob Frieden, *The FCC's Name Game: How Shifting Regulatory Classifications Affect Competition*, 19 BERKELEY TECH. L. J. 1275, 1286-87 (2004).

35. A number of scholars, focusing on wireless applications that permit widespread spectrum sharing, reject the analogy of spectrum to a depletable natural resource. *See e.g.,* Werbach, *supra* note 9 at 885-86. Indeed, where spectrum use is not rivalrous, the analogy is wrong. But when uses of spectrum are mutually exclusive, spectrum use is by definition rivalrous and in that sense like a natural resource.

C purpose be taxed away simply because the licensed spectrum turns out to be more valuable than originally thought. The issue is whether the public (i.e., federal government) that granted the additional spectrum access rights – akin to additional mining or harvest rights—should share in the value proposition.

Third, and most importantly, if fairness and efficiency goals do not align, reflexively subordinating the first to the second shortchanges relevant ethical considerations. It hardly needs stating that fairness is a powerful and deep-seated social norm.[36] In many contexts, as Professor Charles Fried has put it, the fact that an outcome is efficient should not give it "any privileged claim to our approbation."[37] Efficiency properly plays a larger role in spectrum policy than in other areas of the law, but even here the pull of fairness will undermine policy choices that ignore equity. Regulations at odds with such norms lack legitimacy and are more likely to be challenged in the courts and in Congress.[38]

### *C. Measuring Fairness*

Acknowledging that fairness is an appropriate consideration in spectrum policy does not get us very far. Measuring fairness in spectrum, as in other areas, depends on the equitable goal the policy pursues and the baseline from which advantage is measured. The equitable traditions of the common law – traditions that the Communications Act invokes with its use of the term "unjust enrichment" – provide a useful framework for exploring these choices.

#### 1. Equitable Goals

Unjust enrichment is an equitable doctrine developed to achieve just results principally in tort and contract cases where legal doctrines fall

36. Fairness is so powerful that parties may not enter into bargains that benefit them if they think the bargain is not fair. *See* F. H. Buckley, *Three Theories of Substantive Fairness*, 19 HOFSTRA L. REV. 33, 54 (1990) (providing example of landowner S who will not sell land to a prospective buyer B who offers 20% more than the land is worth to S, but only 10% of what the land, for idiosyncratic reasons, is worth to B). This analysis has been corroborated by experimental research. *See e.g.*, Elizabeth Hoffman & Matthew L. Spitzer, *Entitlements, Rights, and Fairness: An Experimental Examination of Subjects' Concepts of Distributive Justice*, 15 J. LEGAL STUD. 259 (1985). For a discussion of this work, *see generally* Michael I. Swygert & Katherine Earle Yanes, *A Unified Theory of Justice: The Integration of Fairness into Efficiency*, 73 WASH. L. REV. 249, 309-14 (1998); Daniel A. Farber & Brett H. McDonnell, *Why (And How) Fairness Matters at the IP/Antitrust Interface*, 87 MINN. L. REV. 1817, 1853 (2003). *See also* Cass R. Sunstein, *Social Norms and Social Roles*, 96 COLUM. L. REV. 903, 945 (1996) (discussing how social norms like fairness can lead people to make what seem to be irrational choices).

37. CHARLES FRIED, RIGHT AND WRONG 93-94 (1978).

38. *Cf.* Farber & McDonnell, *supra* note 36 at 1851-53 (arguing why law should presumptively track social norms and discussing the literature on this point).

short.[39] If tort law deals with "nonbargained harms [and] contract law with bargained benefits and harms", unjust enrichment deals with "nonbargained benefits."[40] At common law, a defendant is unjustly enriched when the plaintiff has conferred a benefit on him, which it would be unjust for the defendant to retain.[41] For example, the doctor who provides emergency medical services to an injured person with the expectation of compensation might have a cause of action for unjust enrichment if the patient fails to pay.[42] The remedy for unjust enrichment is restitution.[43]

Matters become more complicated when it comes to the measure and goal of restitution. According to most authorities, restitution, despite its name, should be pegged to a defendant's gain, not a plaintiff's loss.[44] That is, the unjustly enriched defendant should disgorge windfall gains even if doing so makes the plaintiff better off.[45] However, the courts do not uniformly adopt this measure of restitution and often resort to harm-based measures that compensate a plaintiff for her loss, rather than force the defendant to relinquish windfall gains.[46]

We cannot translate equitable considerations directly from common

---

39. RESTATEMENT OF THE LAW (THIRD) RESTITUTION AND UNJUST ENRICHMENT ch. 1, §1 (Discussion Draft 2000) [hereinafter THIRD RESTATEMENT]. *See also*, Douglas Laycock, *The Scope and Significance of Restitution*, 67 TEX. L. REV. 1277, 1278 (1989). Under the modern view, unjust enrichment is a body of law independent of contract and tort providing both an exclusive and a supplemental mode of recovery. *See* Todd Barton, *Filling in the Gaps in Civil Liability: The Development of Unjust Enrichment in Rhode Island*, 9 ROGER WILLIAMS U. L. REV. 695, 697 (2004). For a discussion of alternative ways to view the relationship between unjust enrichment and legal doctrine, *see* Emily Sherwin, *Restitution and Equity: An Analysis of the Principle of Unjust Enrichment*, 79 TEX. L. REV. 2083, 2084 (2001) (arguing that unjust enrichment can be variously understood as a supplement to legal rules, as a "legal principle" incorporating a broad ideal of justice, and as a catch-all label for various restitution cases).

40. Saul Levmore, *Explaining Restitution*, 71 VA. L. REV. 65, 67 (1985).

41. LORD GOFF OF CHIEVELY & GARETH JONES, THE LAW OF RESTITUTION 13 (6th ed. 2002).

42. THIRD RESTATEMENT, *supra* note 39, at ch. 1, § 1, illus. 4. Unjust enrichment is also a common mode of recovery when a transfer is invalid due to mistake, fraud, duress or some other nullifying cause. *Id.* at ch. 1, § 1, cmt. d.

43. *See* RESTATEMENT OF RESTITUTION § 1 (1937) ("A person who has been unjustly enriched at the expense of another is required to make restitution to the other.").

44. *See* THIRD RESTATEMENT, *supra* note 39, at ch. 1, § 2, cmt. b; Andrew Kull, *Rationalizing Restitution*, 83 CAL. L. REV. 1191, 1202 (1995). *But see* Christopher T. Wonnell, *Replacing the Unitary Principle of Unjust Enrichment*, 45 EMORY L.J. 153, 156 (1996) (asserting that the Restatement of Restitution is actually inconsistent as to whether the measure of restitution should be the benefit received or harm caused).

45. *See generally* James J. Edelman, *Unjust Enrichment, Restitution, and Wrongs*, 79 TEX. L. REV. 1869, 1875-76 (2001) (an examination of disgorgement damages and situations in which they have been recognized).

46. *See generally* Wonnell, *supra* note 44, at 164-67 (discussing unjust enrichment cases in which defendant is liable for the harm caused regardless of whether the benefit received is greater or less than the harm).

law to communications law. Whereas common law unjust enrichment seeks justice between the benefactor and beneficiary, spectrum equity involves the benefactor (the public), the beneficiary (generally the wireless licensee) and other wireless users who have standing to participate in FCC decisions.[47] Moreover, the public interests involved in spectrum management are alien to equitable actions – interests like competition and efficient resource use.[48] Despite these differences, the distinction between gain-based and harm-based approaches to restitution helpfully frames the remedial options for inequity in spectrum distribution, particularly under the spectrum equity provisions of the Act.

The aim of "recover[ing] . . . value" for the public for use of the spectrum resource essentially expresses the restitutionary goal of making the benefactor whole.[49] By contrast, the spectrum equity provisions' other aim of avoiding "unjust enrichment" is more consistent with the gain-based conception of restitution: Spectrum users should not gain advantages that it would be unjust for them to retain, whether or not the public has recovered value for the spectrum resource. The injustice in this sense is not to the public, but to other spectrum users. Where the harm is to competitive parity, the remedy is for the spectrum user to disgorge gains, not to restore value.

We see the emphasis on unfair gains as opposed to uncompensated losses in the only other appearance of "unjust enrichment" in the Act – in the provisions governing the "ancillary and supplementary" use of digital television broadcast frequencies, which were added by the Telecommunications Act of 1996. Broadcasters obtained the rights to use spectrum for digital television without having to pay for them at auction. In the absence of any special provision, then, the use of these frequencies would not result in any compensation to the public. Congress enacted a special provision to produce compensation, but only for the "ancillary or supplementary" services offered over the spectrum, such as those for which the licensee either charges a subscription fee or receives compensation from a third party.[50] These are services that compete with commercial wireless services provided on auctioned

47. Issues of fairness most frequently arise in FCC rulemakings, not in adjudications. By contrast, the Bureau of Land Management modifies grazing permits, in some cases increasing rancher entitlements without additional compensation, using procedures that exclude third party participation. *See* Harold J. Krent & Nicholas S. Zeppos, *Monitoring Governmental Disposition of Assets: Fashioning Regulatory Substitutes for Market Controls*, 52 VAND. L. REV. 1703, 1761-62 (1999).

48. The FCC is required to promote the deployment of new technologies, competition, and the efficient and intensive use of spectrum. 47 U.S.C. § 309(j)(3)(A), (B), (D). *See also*, Goodman, *supra* note 2, at 304-11 (discussing equitable and efficiency goals of FCC spectrum management decisions).

49. 47 U.S.C. § 309(j)(3)(C).

50. 47 U.S.C. § 336(e)(1).

spectrum. As to these alone, Congress instructed the FCC to assess a fee.[51] Like the spectrum equity provisions contained in the FCC's auction authority, the digital television provisions require that the fee on ancillary and supplementary DTV services "recover for the public a portion of the value of the public spectrum resource made available for such commercial use" and avoid "unjust enrichment".[52]

The grant of rights to use the spectrum for digital broadcasting services clearly posed a problem of public compensation.[53] It did not, however, create a competitive imbalance as far as broadcast television services were concerned, since all broadcasters were similarly situated. Had restoring value to the public been the primary goal, one might have expected the fee to cover all broadcast services, not just ancillary and supplementary ones. The decision to levy the fee on only a subset of broadcasters' services – those offered in competition with wireless users who had paid for spectrum rights—reflects a concern for spectrum equity *vis a vis* competitors, not the public.

To a large extent, the value the public loses will be coextensive with the value a wireless user gains when spectrum access rights are unfairly granted. A license that is auctioned for less than market value will deprive the public of the full benefit of the spectrum resource and enrich the licensee, and in roughly the same amounts. The spectrum user can effect public restitution and competitive parity by paying market value for the spectrum.

But this will not always be the case. If the public receives benefits from spectrum use in a form other than Treasury receipts, these benefits are unlikely to level the playing field for competitors deprived of the same spectrum benefits. The reverse is also possible, although less likely. The spectrum user who disgorges the gains from special access rights will, in satisfying the claims of a competitor, restore some economic value to the public. Whether this value is sufficient to make the public whole depends on what the alternative spectrum management scenarios might

---

51. *Id.*

52. 47 U.S.C. § 336(e)(2)(A). The method for determining this value should be "an amount that, to the extent feasible, equals . . . the amount that would have been recovered had such services" been auctioned. 47 U.S.C. § 336(e)(2)(B). *See also* Fee for Ancillary or Supplementary Use of Digital Television Spectrum Pursuant to Section 336(e)(1) of the Telecomms. Act of 1996, *Memorandum Opinion & Order*, 14 FCC Rcd. 19,931, 19,938 (1999) (the fee imposed must "approximate the revenue that would have been received had these services been licensed through an auction" and must "recover a portion of the value of the spectrum used for these services and avoid 'unjust enrichment' of DTV licensees who have been given the exclusive right to apply for DTV channels without having to bid for them at an auction."); Ancillary or Supplementary Use of Digital Television Capacity by Noncommercial Licensees, *Report & Order*, 16 FCC Rcd. 19,042, 19,058 (2001) (applying the same approach to noncommercial licensees).

53. *See* TAYLOR *supra* note 25; HAZLETT *supra* note 25.

be. For example, it might be that the fee broadcasters pay to offer ancillary and supplementary services over free spectrum raises their costs of doing business to a level that ensures competitive parity, but is less than the public would get if the broadcast spectrum were allocated for other purposes.

### 2. Baseline Problems

Whether the primary equitable goal is restoring value or disgorging gains, baseline entitlements need to be clear before we can say that a benefited party has taken more than her due. If Jane is entitled to pick fruit from public property, then she is not unjustly enriched by her harvest. If she is not so entitled, then her harvest is an unjust gain.[54] Valuing benefits is hard enough for courts dealing with ordinary property rights, where the scope of the baseline entitlement is relatively clear.[55] The baseline problems in spectrum are more difficult because spectrum entitlements, unlike property lines, are not clearly drawn.

Some baseline spectrum rights *can* be precisely articulated, like the right to transmit at a certain power or the right to operate as a mobile service. But other rights, like the right to be protected from interference from other operators, are not delineated.[56] In many cases of conflict over interference, licensees are expected simply to "work it out".[57] If the government then provides a class of licensees with interference protection, thus increasing the value of their licenses, it is not obvious how to measure this new entitlement as against the shadowy baseline.

The baseline problem in spectrum is made even more complex by the reality that most spectrum users have benefited from spectrum management decisions considered unfair by someone. In some cases, a licensee that received its license for free complains that another licensee is receiving new spectrum rights for free. There are no clean hands. As FCC Commissioner Kathleen Abernathy has put it:

---

54. *See* Wendy J. Gordon, *Of Harms and Benefits: Torts, Restitution, and Intellectual Property,* 21 J. LEGAL STUD. 449, 451-52 (1992) (discussing the importance of stable baselines for restitution).

55. *See* Ofer Grosskopf, *Protection of Competition Rules Via the Law of Restitution,* 79 TEX. L. REV. 1981, 2010-12 (2001) (discussing the dependence of restitution law on baseline entitlements).

56. *See* Werbach, *supra* note 9, at 918 ("The rights encoded in existing FCC licenses are broadly under-specified or mis-specified."). *See also id.* at 915 n.234 (discussing the failure of commentators to define spectrum property rights).

57. *See e.g.*, Wireless Operations in the 3650-3700 MHz Band, *Report & Order & Memorandum Opinion & Order*, 20 F.C.C. Rcd. 6502, 6512 (2005) (adopting rules for the non-exclusive, licensed use of spectrum under which licensees have "the mutual obligation to cooperate and avoid harmful interference to one another. . . [and to] act in good faith to help eliminate" any interference caused).

> The Commission is constantly put in the position of having to balance the equities in granting rights, limiting rights, auctioning spectrum and responding to technological change. . . . [T]he evolving nature of the Commission's statutory authority has ensured disparate treatment already. For instance, cellular service was authorized before the Commission had auction authority, international satellite is barred from auction and mutually exclusive terrestrial applications must be auctioned.[58]

Even after establishing a baseline, it may be difficult to value a windfall benefit, which is necessarily unbargained for.[59] There is the problem of subjective valuation. The owner of a vacant lot who "benefits" from plaintiff's mistaken construction on the property may not actually consider the structure an "improvement."[60] So too with spectrum, users may value the same access rights very differently depending on the wireless technologies they deploy. Moreover, with spectrum, there are also problems of objective valuation since there is not yet a robust market yielding reliable prices for spectrum access rights. The next section explores these complexities of definition and valuation in a real world spectrum context.

## II. THE PROBLEM OF EQUITY IN ACTION

Unjust enrichment, windfall benefits, restitution, and equity in spectrum access were all at issue in the recent restructuring of the 800 MHz band.[61] In 2004, the FCC "rebanded" this spectrum used by public safety and commercial wireless services, shifting entitlements to the spectrum in creative ways. The 800 MHz proceeding, which resulted in a "spectrum swap" among Nextel Communications, Inc., the federal government and other spectrum users, was "the most difficult, complex, and challenging issue [former FCC Chairman Michael Powell] faced in seven years at the Commission."[62] It was so hard largely because of

---

58. Abernathy, *supra* note 27, at 17.

59. *See* Saul Levmore, *Explaining Restitution*, 71 VA. L. REV. 65, 69-79 (1985) (identifying difficulties of fixing value in the absence of a bargain because of uncertain objective value and presence of subjective value).

60. *See generally* Kelvin H. Dickinson, *Mistaken Improvers of Real Estate*, 59 N.C.L. REV. 37 (1985) (examining implications for restitution of mistaken improvements on real estate); Levmore, *supra* note 40, at 77 (noting that a "homeowner is unambiguously worse off when his usable water is polluted but not unambiguously better off after a forced purchase of additional pure water").

61. Improving Pub. Safety Communications in the 800 MHz Band, *Report & Order, Fifth Report & Order, Fourth Memorandum Opinion & Order*, 19 FCC Rcd. 14,969 (2004), as amended by *Second Erratum*, 19 FCC Rcd. 19,651 (2004) [hereinafter 800 MHz Report & Order]. The "800 MHz band" in this context refers to spectrum at 806-824 MHz and 851-869 MHz. *Id.* at 14,972 n.2.

62. News Release, Federal Communications Commission, Statement of FCC Chairman

fairness concerns. The FCC's reallocation of spectrum access rights in this proceeding illustrates both the power of fairness as a regulatory norm and the difficulty of achieving it in the morass of current spectrum management goals.

The 800 MHz band is used by public safety agencies like fire and police departments for both routine and "first response" communications. Nextel also uses the 800 MHz band for cellular service that is technically incompatible with public safety communications. Public safety and cellular frequencies are interleaved, meaning that the spectrum use alternates, frequency by frequency. This integration of two incompatible technologies has resulted in significant interference problems.[63]

For years, the FCC was under intense pressure from the public safety community, and its supporters in Congress, to remedy the interference problem. In an ideal world, public safety agencies might have solved the problem themselves by investing in systems that were more immune to interference, but this solution proved financially impractical. The burden thus fell on Nextel. The company offered to disentangle its operations from those of public safety users.[64] Specifically, Nextel proposed to vacate most of the 800 MHz frequencies and pay public safety agencies at least $850 million to move in. In return, the FCC would modify Nextel's licenses to provide it with 10 MHz of contiguous spectrum in the 1.9 GHz band adjacent to the spectrum held by Nextel's commercial wireless service competitors.[65]

Nextel's competitors, particularly Verizon Wireless, expressed outrage at the proposed spectrum swap.[66] A vigorous debate ensured about whether the proposal was fair.[67] No one disputed that Nextel would gain spectrum that was more valuable than the spectrum it would

---

Michael K. Powell Regarding Acceptance of Nextel of 800 MHz Interference Solution (Feb. 7, 2005), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-256597A1.pdf.

63. *See* Improving Pub. Safety Communications in the 800 MHz Band, *Notice of Proposed Rulemaking*, 17 FCC Rcd. 4873, 4881-82 (2002), as amended by *Erratum*, 17 FCC Rcd. 7169 (2002) (documenting interference problems) [hereinafter 800 MHz NPRM].

64. *See* 800 MHz Report & Order, *supra* note 61, at 14,980.

65. *See id.* at 14,977-78, 14,987-88, 15,084-85. In addition, Nextel offered to pay the $512 million it estimated would be required to move existing users out of the 1.9 GHz spectrum. *Id.* at 15,098.

66. Verizon Wireless ultimately agreed not to appeal the FCC's final order in exchange for Nextel's agreeing to refrain from asserting a trademark claim against Verizon's use of Nextel's phrase "push to talk" for one of its wireless voice services. *See* Ken Belson, *Verizon and Nextel Agree to Drop Lawsuits,* N.Y. TIMES, Nov. 3, 2004, at C12.

67. *See* Jesse Drucker, *Interference Call: Nextel's Maneuvers for Wireless Rights Has Rivals Fuming,* WALL ST. J., Apr. 19, 2004, at A1; 800 MHz Report & Order, *supra* note 61, at 15,017 (discussing windfall concerns with Nextel relocation). *See also* 800 MHz NPRM, *supra* note 63, at 15,083 (Cellular Telecommunications Industry Association proposed an alternative plan under which spectrum in the 2.1 GHz band would be sold to Nextel).

relinquish.[68] What was disputed[69] was whether Nextel was unjustly enriched by the swap, given the cash it was putting on the table.[70] Because no initial licenses, and thus no auctions, were involved in the band reconfiguration, the Act's spectrum equity provisions did not apply. Nevertheless, the possibility that Nextel would receive "windfall" gains

68. Nextel itself acknowledged that the licenses it would give up were not well-suited for its business as a broadband wireless provider even setting aside the harm caused to public safety. *See* Reply Comments of Nextel Communications, Inc., to the *Notice of Proposed Rule Making* in 1998 Biennial Regulatory Review—Spectrum Aggregation Limits for Wireless Telecommunications Carriers, WT Dkt. No. 98-205 at 4 (Feb. 10, 1999) (citing FCC's own recognition that the fragmented 800 MHz spectrum is "'not currently equivalent to cellular or broadband PCS spectrum.' Because the channels are encumbered, non-contiguous and assigned on a site-by-site basis, an SMR [specialized mobile radio] licensee [in the 800 MHz band] faces more significant obstacles than its competitors in configuring a wide-area system."), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6006242156. Whereas the 800 MHz spectrum supports only low-bandwidth transmissions, the 1.9 GHz spectrum would allow Nextel to roll out high-bandwidth next generation technologies. *See FCC Eyes Draft Giving Nextel 1.9 GHz, But at Higher Pricetag,* COMMUN. DAILY, Mar. 11, 2004, at 8 (predicting that Nextel would use the new spectrum to provide "high-speed, IP-based broadband access"); Legg Mason, *Logjam Breaks on FCC Consideration of Nextel Spectrum Swap*, Mar. 10, 2004, at 3 (predicting that "the new spectrum would give [Nextel] more operational flexibility not only to formulate a data strategy but also to more effectively manage its voice service and improve quality over time") Legg Mason Wood Walker is an investment firm with ties to Nextel.

69. Another important issue was whether the FCC had authority to approve the spectrum swap without making the new contiguous spectrum available for auction. *See Ex Parte* Presentation by Verizon Wireless, to the *Notice of Proposed Rule Making* in Improving Pub. Safety Communications in the 800 MHz Band, WT Dkt. No. 02-55 (Apr. 6, 2004) at 4 (presenting legal argument that the spectrum swap constituted a private sale of spectrum to Nextel), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516086686. *See also Ex Parte* Presentation of Verizon Wireless, Legal Memorandum of Cooper & Kirk, to the *Notice of Proposed Rule Making* in Improving Pub. Safety Communications in the 800 MHz Band, WT Dkt. No. 02-55 (June 28, 2004) at 7 (arguing that the FCC violated the Antideficiency Act, 31 U.S.C. § 1341(a)(1)(B) by making unauthorized "expenditures" in the form of credits to Nextel, and violated the Miscellaneous Receipts Act, 31 U.S.C. § 3302(b), by depriving the Treasury of revenue for a public asset ordinarily subject to auction), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516282241. The Government Accountability Office ruled in favor of the FCC on these charges. Letter to Senator Lautenberg from Anthony H. Gamboa, General Counsel, U.S. Government Accountability Office (Nov. 8, 2004) at 2, *available at* http://www.gao.gov/decisions/appro/303413.pdf.

70. *See e.g.,* Comments of Cingular Wireless Inc., to the *Notice of Proposed Rule Making* in Improving Pub. Safety Communications in the 800 MHz Band, WT Dkt. No. 02-55 (Feb. 10, 2003) at 10 (arguing that the spectrum swap would result in a "disproportionate and unwarranted 'exchange' that the record amply shows is contrary to Section 309(j) of the Communications Act, case law precedent, and the FCC's policy of not favoring one competitor over another"), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513410791; Comments of the United States Cellular Corp., to the Notice of Proposed Rule Making in Improving Pub. Safety Communications in the 800 MHz Band, WT Dkt. No. 02-55 (May 6, 2002) at 4 (arguing that spectrum swap would give Nextel an "unjustified windfall" and that Nextel "has presented no compelling justification for such a gratuitous enhancement"), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513190812.

was central to the FCC's decision.[71] The elements of, and omissions from, the decision highlight the challenges of spectrum equity.

### *A. Valuing Spectrum*

The FCC could not consider fairness without first valuing the spectrum rights involved in the spectrum swap. Placing a value on the right to use spectrum involves two separate determinations. First, there is the market value of the right to use a set of frequencies in a particular area under applicable service rules (e.g., power level, equipment requirements).[72] Second, there is the market value of the spectrum user's entitlement to cause interference to others or to be free from interference caused by others. Such interference is possible even when all users are operating lawfully.[73] The very same frequency subject to the very same service rules will be worth more if the spectrum user is not liable for causing interference.

The record in the 800 MHz band proceeding reveals the radical uncertainty in the valuation of spectrum rights. The FCC set out to confer new spectrum rights on Nextel on a "value for value" basis in exchange for spectrum rights Nextel would surrender, plus the company's expenses in relocating incumbent users affected by the swap.[74] In other

71. 800 MHz Report & Order, *supra* note 61, at 15,017. The FCC grounded its anti-windfall rules on 47 U.S.C. § 154(i) (authorizing the FCC to "perform any and all acts, make such rules and regulations, and issue such orders, . . . as may be necessary in the execution of its functions") and 47 U.S.C § 303(r) (requiring the FCC to "[m]ake such rules and regulations and prescribe such restrictions and conditions, not inconsistent with law, as may be necessary to carry out the provisions of this" Act). *Id.*

72. *See* Goodman, *supra* note 2, at 315-20 (identifying the bundle of rights a spectrum user has under a licensed or property rights model). Frequencies have differential value depending on the propagation characteristics of the band, the interference constraints imposed by other spectrum users, and any service restrictions the FCC has placed on the band. These differences make it difficult to extrapolate from spectrum auctions to arrive at a generic dollar value for megahertz of spectrum per population served. Moreover, spectrum values have fluctuated widely depending on the supply of spectrum and the economic conditions under which spectrum is auctioned. 800 MHz Report & Order, *supra* note 61, at 15,107 (The FCC does not typically value spectrum because it knows "from experience that the value of spectrum is seldom static and hinges on multiple variables, some of them intangible, which exist at the moment a willing buyer and willing seller agree to a transaction, or when an informed bidder places its bid at auction.").

73. *See* Goodman, *supra* note 2, at 289-96 (showing how faulty modeling and changing technology can result in unexpected interference).

74. 800 MHz Report & Order, *supra* note 61, at 15,105. The FCC credited Nextel for (1) the net value of spectrum rights that it relinquished; (2) the actual cost Nextel will bear in relocating its own operations and those of other licensees in the 800 MHz band; and (3) the costs incurred by Nextel to clear operators out of the 1.9 GHz band. If the relocation costs turn out to be less, Nextel will have to disgorge the difference to the U.S. Treasury. *Id.* at 15,066, 15,124-25 (providing for financial reconciliation process). In a subsequent ruling, the FCC credited Nextel with an additional $452 million for its surrender of 800 MHz spectrum based on the "granular data provided by Nextel" about coverage of the relevant licenses.

words, the goal of the spectrum swap was to help public safety without advantaging Nextel – something Nextel thought could be accomplished without any offsetting payments on its part.[75] Industry analysts and competitors, by contrast, foresaw Nextel walking away from the swap with significant additional rights.[76]

In making its own judgments about the net benefit to Nextel, the FCC had to put a value on the spectrum Nextel was giving up and the spectrum it was gaining. As to the contiguous spectrum that Nextel would gain in the 1.9 GHz band, Verizon Wireless offered to pay at least $5 billion to gain access rights for itself,[77] making it relatively easy for the FCC to value the spectrum in that range.[78]

The two sections of 800 MHz spectrum were more difficult to value. Even spectrum in the same frequency range may not be worth the same on a per unit basis. One source of disparity is that contiguous spectrum, which Nextel was gaining, is generally more valuable than spectrum shared with other users.[79] In this case, the FCC concluded that there was little premium for contiguity. Looking at the subjective value of the spectrum to Nextel, given the company's past and probable future uses, the FCC concluded that the value of the interleaved spectrum Nextel was relinquishing was unusually high, and the value of the

---

Improving Public Safety Communications in the 800 MHz Band, *Supplemental Order & Order on Reconsideration*, 19 FCC Rcd. 25,120, 25,135-136 (2004).

75. Nextel claimed that it would break even after swapping the spectrum and paying for public safety's relocation. *See* Supplemental Response of Nextel Communications, Inc., to the *Notice of Proposed Rule Making* in Improving Public Safety Communications in the 800 MHz Band, WT Dkt. No. 02-55 (Apr. 2, 2004) at 15 ("Nextel would receive little direct value, if any, from replacing" 800 MHz spectrum with 1.9 GHz spectrum), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516086270.

76. *See* Letter of John T. Scott, III, Vice President & Deputy General Counsel, Verizon Wireless, to Chairman Michael K. Powell, to the *Notice of Proposed Rule Making* in Improving Pub. Safety Communications in the 800 MHz Band, WT Dkt. No. 02-55 (Apr. 8, 2004) (citing industry analysts' reports that valued the spectrum swap to Nextel at $1.5 billion to $3.2 billion).

77. *See Ex Parte* Presentation of Verizon Wireless, in Improving Public Safety Communications in the 800 MHz Band, WT Dkt. No. 02-55 (FCC filed June 9, 2004); Letter of William P. Barr, Executive Vice President & General Counsel, Verizon Wireless, to Chairman Michael K. Powell, in Improving Public Safety Communications in the 800 MHz Band, WT Dkt. No. 02-55 (June 28, 2004) (valuing spectrum at over $5 billion), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516282241.

78. 800 MHz Report & Order, *supra* note 61, at 15,112 (valuing the 1.9 GHz spectrum at $4.8 billion using a combination of methodologies that Nextel and its competitors proposed). Legg Mason valued the spectrum at $4.5 billion. Legg Mason, *supra* note 68, at 2. Nextel itself valued the spectrum at $3.3 billion. *Ex Parte* Presentation of Nextel Communications, in Improving Public Safety Communications in the 800 MHz Band, WT Dkt. No. 02-55 at 3 (Mar. 5, 2004), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6515784904.

79. *See* 800 MHz Report & Order, *supra* note 61, at 15,115-16 (discussing Nextel's competitors valuation of contiguous spectrum).

contiguous spectrum Nextel was acquiring unusually low.[80] Just like common law unjust enrichment courts, the FCC seemed to be taking into account subjective valuations.

Interference entitlements present another difficulty in valuing the spectrum exchange to Nextel. The motivation for the spectrum swap was interference to public safety operations. Nextel's responsibility for causing and remedying that interference should be central to an accounting of the spectrum exchange. This responsibility establishes a baseline entitlement from which it is possible to determine the extent to which Nextel's enrichment is unjust.

Imagine a property dispute between two neighbors. B, who sits uphill from A, uses her property for farming. B's use of irrigation increases the flow of water onto A's property. A uses her property as a summer residence. Because of the flooding from B's property, A's grounds are often too wet for recreational use. If A and B were to arrange for an exchange of properties, plus payments for any differential in property value, A would want the value of B's property discounted by B's responsibility for flooding A's property. B would in turn assert that A herself was responsible for this flooding because she chose not to take steps, like landscaping, to absorb the water. Thus, important to the valuation of the properties and the structure of the property exchange is the determination of whether A was entitled to be free from water draining off of B's property without mitigating the damage.

The FCC should have determined whether or not Nextel was enriched by *not* having to remedy the interference problem that required the spectrum swap in the first place. This analysis would have turned on two findings. First, is Nextel responsible for interfering with public safety operations and, second, does it bear liability for such interference? In a fairly offhand manner, the FCC refused to assign interference responsibility to Nextel or any other party, instead concluding that the interference was a matter of mutual incompatibility.[81]

This conclusion sidesteps the problem. As Coase observed, the interference of one activity with another incompatible activity is in some sense always reciprocal.[82] The complaining homeowner interferes with the polluting factory just as the factory interferes with the homeowner.

---

80. *See id.* at 15,121 (FCC valuation of 800 MHz spectrum); *id.* at 15,116 (basing valuations in part on Nextel's "technical efficiencies").

81. *See* 800 MHz Report & Order, *supra* note 61, at 15,113 ("[W]hile Nextel has been implicated in great number of interference incidents, the interference problem has not been not 'caused' by any single party-Nextel, cellular, or public safety-but rather has been caused collectively by the proximity of all of these parties to one another in the 800 MHz band, even though all parties are operating in compliance with Commission rules."). *See generally id.* at 15,112-15 (discussing offsets).

82. *See* Coase, *supra* note 15, at 19.

But this reciprocity does not keep the FCC from adopting rules, or nuisance courts from making judgments, that identify the "source" of the interference.[83]

Ordinarily, a finding that Nextel had indeed caused the interference would not end the inquiry, since licensees in this band do not have an absolute entitlement to be free from interference.[84] In this particular case, however, Nextel had told the FCC that it would assume liability for interfering with public safety operations in return for more operational flexibility.[85] By declining to find Nextel responsible for the interference, the FCC in effect absolved Nextel of this commitment and granted the company an entitlement to interfere. This removed the question of how liability for interference might relate to spectrum value. Had the FCC found Nextel liable for the interference, it would have had to value the liability averted and added that value to the benefits that Nextel obtained from the spectrum swap.[86]

One explanation for the FCC's generous treatment of Nextel on the interference front is that Nextel was "supporting the optimal solution" to a problem that had multiple causes. The agency deemed this solution "consistent with equitable principles" and found that it furthered "the public interest goals of this proceeding in achieving a comprehensive long-term solution to the interference problem."[87] What we see here,

---

83. Labeling a licensee as the interferor does not necessarily result in liability for the interferor. *See* Goodman, *supr*a note 2, at 337-56 (showing how the FCC's allocation of interference entitlements sometimes protects the victim of interference and sometimes the interferor).

84. When the interferor and its victim are both operating within the terms of their license, the interferor bears a duty to take steps to avoid interference. *See* 47 C.F.R. § 90.403(e) ("Licensees shall take reasonable precautions to avoid causing harmful interference."). However, the extent of responsibility for actually remedying interference is not clear. *See* 47 C.F.R. § 90.173(b) ("Licensees of stations suffering or causing harmful interference are expected to cooperate and resolve this problem by mutually satisfactory arrangements."). Indeed, the lack of clarity in the FCC's interference liability standards is among the biggest problems in spectrum management. *See* R. Paul Margie, *Can You Hear Me Now? Getting Better Reception from the FCC's Spectrum Policy*, 2003 STAN. TECH. L. REV. 5.

85. Many of Nextel's 800 MHz licenses were originally usable only for private, two-way radio communications like taxi dispatching. In successfully seeking a waiver of these regulatory constraints, and substantially increasing the value of its licenses, Nextel promised to accord public safety systems "full and continuing protection" from interference. *See* Petition for Waiver of Fleet Call, Inc., FCC File No. LMK-90036 (Apr. 15, 1990), at A-12.

86. For the suggestion of an argument along these lines, *see e.g.,* Comments of Motient, Inc., Improving Public Safety Communications in the 800 MHz Band, Consol. the 900 MHz Industrial/Land Transp. & Bus. Pool Channels, WT Dkt. No. 02-55, 11 (FCC filed May 6, 2002) *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513190888 (arguing that the relocation plan "should not create windfalls for those causing interference to public safety.").

87. 800 MHz Report & Order, *supra* note 61, at 15,113. *See also id.* at 15,125 (explaining that the "central purpose" of proceeding was to alleviate "interference to public safety" communications).

then, is that interference did play a role in evaluating the equities of the spectrum reallocation, but only on one side of the ledger. While Nextel was not "charged" for being relieved of interference liability, it was credited with abating interference to public safety. This abatement was one of the ways in which Nextel restored value to the public for use of the spectrum resource.

### *B. Equitable Goals*

The FCC's approach to interference highlights another complication in valuing spectrum rights. This is the potential disparity between restoring value to the public and ensuring fairness among competitors. Nextel's competitors used equity as a way to protect against competitive harm. Cingular, for example, argued that the spectrum swap would result in a "disproportionate and unwarranted 'exchange' that . . . is contrary to Section 309(j) of the Communications Act . . . and the FCC's policy of not favoring one competitor over another."[88] The FCC accepted the goal of competitive parity, at least in theory.[89]

The problem with competitive parity, when laid alongside the goal of public restitution, is that the two goals may not entail the same remedy. The interests of competitive parity will usually be served by requiring the competing spectrum user to disgorge (or forego) unfair gains, as measured by the market value of particular spectrum access rights. The resulting payments may also serve to make the public whole, but there may be other ways, such as by providing service benefits or enabling other wireless users to provide them. The wireless user that is unjustly enriched $100 by obtaining preferential access to spectrum can make the public whole by paying $100 to the Treasury, thereby also leveling the playing field for its competitor. Or, the user can pay less and take other steps (costly or not) to enhance service to the public, like accommodating public safety communications.

This potential divergence between public restitution and competitive parity materialized in the 800 MHz proceeding. Focusing

88. Comments of ALLTEL Communications Inc., AT&T Wireless Services, Cingular Wireless LLC, Coupe Communications, Inc., Nokia, Inc., Southern LINC, & United States Cellular Corporation, Improving Pub. Safety Communications in the 800 MHz Band, WT Dkt. No. 02-55, 10 (FCC filed Feb. 10, 2003) *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513410791. *See also* Comments of the United States Cellular Corporation, Improving Pub. Safety Communications in the 800 MHz Band, Consolidating the 900 MHz Industrial/Land Transp. & Bus. Pool Channels, WT Dkt. No. 02-55, 4 (FCC filed May 6, 2002) *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6513190812 (arguing that Nextel's plan would result in an "unjustified windfall" and that Nextel "has presented no compelling justification for such a gratuitous enhancement . . . .").

89. 800 MHz Report & Order, *supra* note 61, at 14,975 ("Nextel, other licensees and the public" must all be "treated equitably" and Nextel must "not realize any windfall gain.").

on value to the public, the FCC took into account contributions by Nextel that Nextel's competitors did not, such as the spectral efficiency and public safety benefits of the spectrum swap. For example, Nextel's competitors proposed that the FCC give Nextel the same amount of 1.9 GHz spectrum as the company was relinquishing in the 800 MHz band (4.5 MHz). The FCC rejected this proposal in order to avoid segmenting the 1.9 GHz band into units that were too small to be used efficiently.[90] Had the FCC been more concerned with Nextel's disgorging windfall gains, it might have assessed with greater rigor what Nextel was gaining. Instead, it concluded that "no strictly economic analysis can satisfactorily resolve the ultimate question of whether interference-free public safety communications—a largely unquantifiable benefit—has a dollar value commensurate with the fair market value of the 1.9 GHz spectrum Nextel will receive."[91] Nextel's help in achieving the FCC's spectrum management goal conferred value on the public for the use of the spectrum resource even though it did not necessarily reduce (at least not in equal amounts) Nextel's "windfall" gains.

Placing a precise and consistent value on interference abatement, efficient spectrum use, or the value of spectrum to the public is almost certainly impossible.[92] It should, however, be possible for Congress and the FCC to define more clearly their equitable goals and the extent to which they include competitive parity or simply restoration of value to the public. It should also be possible for the FCC to adopt clearer spectrum entitlements, particularly in the way of interference rights, so that there is a baseline against which to measure just and unjust enrichment. Without these advances in legislative and regulatory clarity, we will see more flailing about for justice as the FCC reallocates spectrum and tweaks spectrum access rights.

## III. EMERGING ISSUES OF EQUITY

The Nextel spectrum swap shows how little the Act's spectrum equity provisions or general notions of fairness really tell us about the appropriate valuation and fair distribution of spectrum access rights. The mere fact that the FCC tried so hard to avoid "unjust enrichment" in that proceeding, even though it was not required to under the Communications Act, shows something else: that the desire for equity

90. *Id.* at 15,105 ("[P]roviding Nextel uniform nationwide access to ten megahertz in the 1.9 GHz band not only helps to ensure that Nextel receives comparable value for its loss of spectrum rights and expenses it will incur, but also will promote efficient use of the 1.9 GHz band.").

91. *Id.* at 15,107.

92. *Id.* at 15,083 (the FCC admitted that its order did not "reflect complete financial exactitude.").

exceeds the scope of the statutory command.

When the spectrum equity provisions were enacted, auctions covered the most valuable spectrum being made available for commercial wireless services. But now, large and increasing amounts of spectrum are being made available on a non-exclusive and unlicensed basis.[93] And spectrum access rights are being created as modifications to existing licenses.[94] These grants of spectrum access are not covered by the spectrum equity provisions since they do not involve initial licenses for commercial services.[95] As a result, the power of those provisions is waning even as the instinct for equity in the distribution of spectrum access rights persists.

When existing licensees receive enhanced spectrum access rights for free as a result of a license modification, the fairness questions are

93. The FCC has adopted a policy of making more spectrum available on an unlicensed basis. FEDERAL COMMUNICATIONS COMMISSION, SPECTRUM POLICY TASK FORCE REPORT, ET Dkt. No. 02-135, 65 (Nov. 15, 2002), *available at* http://hraunfoss.fcc.gov/edocspublic/attachmatch/DOC-228542A1.pdf [hereinafter, SPECTRUM POLICY TASK FORCE REPORT]. It has recently opened up unlicensed spectrum in the 5 GHz band, Revision of Parts 2 and 15 of the Comm'n's Rules to Permit Unlicensed Nat'l Info. Infrastructure (U-NII) Devices in the 5 GHz Band, *Order*, 20 FCC Rcd. 4883 (2005) and in the 3.6 GHz band, Wireless Operations in the 3650-3700 MHz Band, *Report & Order & Memorandum Opinion & Order*, 20 FCC Rcd. 6502 (2005). It has changed the unlicensed equipment rules to enhance unlicensed operations. *See* Revision of Part 15 of the Comm'n's Rules Regarding Ultra-Wideband Transmission Sys., *Second Report & Order & Second Memorandum Opinion & Order*, 19 FCC Rcd. 24,558 (2004). It has also made it easier to use radios that take advantage of unlicensed or opportunistic spectrum. *See* Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies**,** *Report & Order***,** 20 FCC Rcd. 5486 (2005). Currently, the FCC is deliberating over whether to open up licensed spectrum to unlicensed use on a non-interfering basis, Unlicensed Operation in the TV Broadcast Bands, *Notice of Proposed Rulemaking*, 19 FCC Rcd. 10,018 (2004).

94. *See e.g.,* 47 C.F.R. § 73.624 (c) (2004) (allowing broadcasters flexibility in the use of digital television spectrum); Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, & the 1.6/2.4 GHz Bands, *Report & Order & Notice of Proposed Rule Making*, 18 F.C.C.R. 1962, 2016 (2003) (modifying existing licenses to grant new spectrum usage rights and noting that Act does not require the FCC to impose fees to prevent unjust enrichment from such modifications). *Id.* at 2071 (admitting that the added flexibility to use satellite licenses for terrestrial transmissions will make licenses "more valuable" but not so much more valuable that it would amount to "unjust enrichment" or is "inequitable" to competing wireless service providers); Amendment of Part 90 of the Comm'n's Rules to Provide for Flexible Use of the 896-901 MHz and 935-940 MHz Bands Allotted to the Bus. & Indust. Land Transportation Pool, *Notice of Proposed Rulemaking & Memorandum Opinion & Order*, 20 FCC Rcd. 3814 (2005). *See also* 47 U.S.C. § 303(y) (giving the FCC additional authority to allocate spectrum to provide flexibility of use if such allocation would be in the public interest).

95. The legislative history of the Communications Act expressly excludes unlicensed spectrum users from auctions. H.R. REP. 103-111, at 253 (1993) ("competitive bidding would not be permitted for unlicensed uses"). It similarly excludes the beneficiaries of modified licenses from auctions. *Id.* (competitive bidding would not be permitted for "a renewal or modification of the license.").

relatively straightforward and the FCC has engaged them. We saw in the case of the modification to broadcasters' licenses to allow them to provide ancillary and supplementary digital services, for example, that the FCC was under a statutory obligation to collect a fee.[96] Where it has not been so obliged, the FCC has either determined that the benefits conferred on the licensee do not warrant a charge[97] or it has wrestled with the amount of the charge, as in the 800 MHz proceeding.[98]

The biggest problem in this area of the law is that so much rides on the threshold decision about whether enhanced spectrum access rights simply modify an existing license or constitute a new license. If the latter, the spectrum equity provisions are triggered and auctions will determine the value of the access rights. By characterizing the new rights as modifications, the FCC can choose whether or not to address equity questions at all and is free to resolve them without auctions.[99]

Because unlicensed spectrum has been regulated, and used, so differently than licensed spectrum, the fairness issues it presents are nascent and obscure. In this Part, I explore how the evolving use of unlicensed spectrum, or what many have called the spectrum commons, may raise issues of spectrum equity in the future.

### *A. The Problem of Fairness in the Commons*

The beauty of unlicensed spectrum is that it is open to everyone, so long as they comply with the applicable technical restrictions.[100] For the most part, these restrictions have limited unlicensed spectrum uses to low power applications, such as WiFi or cordless phone transmissions, and

96. *See supra* notes 50-52 and accompanying text.

97. *See e.g.,* Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, & the 1.6/2.4 GHz Bands *Report & Order & Notice of Proposed Rule Making*, 20 FCC Rcd. 4616 (2005) (declining to charge satellite licensees for a license modification enabling the provision of terrestrial wireless services).

98. 800 MHz Report & Order, *supra* note 61.

99. The difference between a modification and an initial license may be very small. *Compare* Cmty. Television, Inc. v. FCC, 216 F.3d 1133, 1140-41 (D.C. Cir. 2000) (upholding FCC's decision to treat new digital television licenses as modifications of existing analog licenses even though licensees received rights to provide a new service on new spectrum) with Fresno Mobile Radio, Inc. v. FCC, 165 F.3d 965, 970-71 (D.C. Cir. 1999) (upholding FCC's decision to auction enhanced licenses in the specialized mobile radio service as new licenses). There is nothing to prevent the FCC from deciding to auction off spectrum access rights and then classifying those rights as "initial licenses" rather than first classifying the rights and then letting the auction decision follow.

100. *See* 47 C.F.R. § 15.407 (2003) (listing technical requirements for "Unlicensed National Information Infrastructure Devices"); 47 C.F.R. §15.247 (2003) (listing technical requirements for unlicensed spread spectrum devices). *See generally,* Yochai Benkler, *Overcoming Agoraphobia: Building the Commons of the Digitally Networked Env't,* 11 HARV. J. L. & TECH. 287, 332-33 (1998).

have required unlicensed users to avoid interfering with licensed users.[101] These restrictions have allowed unlicensed operations to coexist with each other and with licensed users.[102] In a commons open to all and degrading to none, equity is assured. No one may appropriate value from the public resource by excluding others and no competitor can be heard to complain of unfair treatment since, in the absence of rivalry, access is available on the same terms to all.

Equity questions will surface, however, if unlicensed spectrum becomes rivalrous and confers some of the entitlements of licensed spectrum. Champions of unlicensed spectrum have emphasized the ways in which network design and new radio technologies can permit spectrum users to operate in harmony with each other, without interference.[103] It is certainly true that technological advances, like spread spectrum, mesh networks, and cognitive radios, can increase the density of spectrum use, and reduce spectrum rivalry.[104] At the same time, no one has yet shown that the carrying capacity of a band is infinite and, indeed, there is evidence that unlicensed devices have begun to interfere with each other where densely deployed.[105] Particularly as unlicensed uses expand beyond low power, localized transmissions, there

---

101. Unlicensed users are expressly prohibited from causing harmful interference under Part 15 of the Commission's rules. If an unlicensed device does cause "harmful" interference to a licensed user, the unlicensed device must cease operation until the problem is corrected. 47 C.F.R. § 15.5 (2005). If, on the other hand, harmful interference is caused to an unlicensed device by a licensed or unlicensed device operating within the FCC's rules, the aggrieved unlicensed user has no legal recourse. *Id. See also* FEDERAL COMMUNICATIONS COMMISSION, SPECTRUM POLICY TASK FORCE REPORT OF THE UNLICENSED DEVICES AND EXPERIMENTAL LICENSES WORKING GROUP 5 (2002), *available at* http://www.fcc.gov/sptf/
files/E&UWGFinalReport.pdf. ("The basic premise of all Part 15 unlicensed operation is that unlicensed services cannot cause interference to licensed operations nor are they protected from any interference received.").

102. There are, however, reports of interference among WiFi users and between WiFi and licensed uses. *See e.g.,* Associated Press, *High Speed Net, Wi-Fi Interfering with Military Radar*, USA TODAY, Jan. 28, 2005 (reporting on WiFi interference with Air Force radar tracking); Richard Shim, *College Backs Off Wi-Fi Ban,* CNET NEWS.COM (Sept. 16, 2004) (reporting on WiFi interference in college dormitories), *at* http://news.com.com/College+backs+off+Wi-Fi+ban/2100-7351_3-69921.html?tag=nefd.top; Amy Schatz, *U.S. Airports and Airlines Clash Over Radio Waves in Terminals*, THE ASIAN WALL ST. J., June 9, 2004 at M8 (reporting on WiFi interference in airports).

103. *See* Werbach, *supra* note 9, at 887-89; Yochai Benkler, *Some Economics of Wireless Communications*, 16 HARV. J.L. & TECH. 25, 45-47 (2002); Yochai Benkler, *From Consumers to Users: Shifting the Deeper Structures of Regulation Toward Sustainable Commons and User Access*, 52 FED. COMM. L.J. 561, 576–78 (2000).

104. *See generally*, Benjamin, *supra* note 30, at 2025-28; Goodman, *supra* note 2, at 364-72.

105. *See* Benjamin, *supra* note 30, at 2022-23 (providing examples of interference in unlicensed spectrum). The point at which the carrying capacity is reached will be different for different systems, depending on the sensitivity of its receiving devices to interference. *See* Goodman, *supra* note 2, at 291-93.

will be more interference and, thus, greater scarcity. In the presence of spectrum scarcity, it becomes possible to appropriate, and to appropriate unfairly, value from the spectrum. [106]

Even if unlicensed uses coexist harmoniously with each other, there will likely be conflict between licensed and unlicensed users that raise fairness issues. Questions of equity will surface, as they did in the Nextel case, when a spectrum user who has paid for access rights at auction is competing with another user who has received similar rights on preferential terms.[107] So long as unlicensed users do not have rights to interfere, or to be free from interference, the equity claims of licensed competitors will be weak.[108] But unlicensed users could come to obtain exclusive or quasi-exclusive transmission rights. This could happen if they win enforceable interference protection, entitling them to exclude the signals of licensed operators, or if licensed operators lose this protection along with the entitlement to exclude unlicensed signals.[109] In

106. The open access characteristic of unlicensed bands creates incentives for users to consume as much of the carrying capacity as they can before another user consumes it. *See* Weiser & Hatfield, *supra* note 9, at 14-15 (providing examples of how unlicensed users can hog spectrum). *See generally*, Durga P. Satapathy & Jon M. Peha, *Spectrum Sharing Without Licenses: Opportunities and Dangers*, *in* INTERCONNECTION AND THE INTERNET: SELECTED PAPERS FROM THE 1996 TELECOMMUNICATIONS POLICY RESEARCH CONFERENCE 49 (Gregory L. Rosston & David Waterman eds., 1997) (discussing the danger that unlicensed devices will over-use the spectrum by cheating on equipment specifications). The pattern of open access leading to greedy spectrum use was evident in the demise of CB radio. *See* Radio Frequency Interference to Electronic Equipment, *Notice of Inquiry*, 70 F.C.C. 2d. 1685 (1978) (describing the domino effect that took place as users resorted to amplifiers to outperform other users, leading to a degradation of service).

107. We see the beginnings of this in some of the opposition to unlicensed use of the TV broadcast band. New entrants into parts of that band (700 MHz), like Qualcomm, Inc., have paid for access through auctions. They have told the FCC that it would be unfair to allow unlicensed users quasi-exclusive use of the band for free and that the burden should be on the unlicensed users to prove non-interference before being permitted to transmit. Comments of Qualcomm, Inc. in Unlicensed Operation in the TV Broadcast Bands, ET Dkt. No. 04-186, 9-10 (FCC filed Nov. 30, 2004), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516883665. *See also* Joint Reply Comments of the Ass'n for Maximum Serv. Television, Inc. and the Nat'l Ass'n of Broadcasters, Unlicensed Operation in the TV Broad. Bands, ET Dkt. No. 04-186, 3-10 (FCC filed Jan. 31, 2005), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516982835 (arguing that the burden should be on new unlicensed entrants to prove that they will not cause interference to licensed incumbents).

108. Licensed users have no rights to exclusivity so long as they are not experiencing harmful interference from new entrants. AT&T Wireless, Inc. v. FCC, 270 F.3d 959, 964 (D.C. Cir. 2001) (in the absence of harmful interference, the introduction of new spectrum users to a band "does not trammel upon [the] rights [of] licensees").

109. Unlicensed advocates are now proposing that the FCC take steps to upgrade the spectrum access rights of unlicensed devices. *See* Petition for Clarification or Modification of New America Foundation & The Champaign Urbana Internet Network, Amendment of Parts 73 and 74 of the Comm'n's Rules to Establish Rules for Digital Low Power Television, MB Dkt. No. 03-185 (FCC filed Dec. 29, 2004), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516886246 (arguing that the FCC should

either case, unlicensed users would be in a position to appropriate spectrum value.[110]

Such a shift in interference entitlements from licensed to unlicensed users need not be explicit, but could arise through lax enforcement.[111] A licensee must be able to prove that any interference caused by an unlicensed device is "harmful" before it can expect FCC enforcement.[112] Satisfying the causation requirement alone requires significant spectrum

---

condition operation of licensed service on acceptance of interference from newly authorized unlicensed devices); Ex Parte Presentation of the Media Access Project relevant to: ET Dkt Nos. 03-108, 03-237, 04-151, & 04-186, *see also* ET Dkt. Nos. 03-108, 03-237, 04-151, and 04-186, 6 (FCC filed Dec. 14, 2004), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516885217 ("[t]he Commission has the authority to extend exclusive rights to a band of spectrum for Part 15 devices, or to make Part 15 devices co-equal or primary to traditional licensed services."). Apple Computer unsuccessfully sought protection for unlicensed devices from out-of-band emissions in the mid-1990's. *See* Benkler, *supra* note 100, at 336.

110. Recognizing the potential problems of un-bargained for protection for commons users, some unlicensed proponents have called for the auctioning of unlicensed spectrum, presumably to device manufacturers. *See* William Lehr, *The Economic Case for Dedicated Unlicensed Spectrum Below 3 GHz*, New American Foundation, 8 (July 2004), *available at* http://www.newamerica.net/Download_Docs/pdfs/Doc_File_1899_1.pdf ("An allocation of additional unlicensed spectrum could be included as part of a spectrum auction."). The FCC is encouraging the kind of "private commons" Lehr advocates. See Service Rules for the 746-764 and 776-794 MHz Bands, and Revision of the Commission's Rules, *Second Report and Order*, 15 FCC Rcd. 5299, 5311-13 (2000) (auctioning spectrum to band managers who can make spectrum available to users on an "unlicensed" basis); Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets, *Second Report & Order, Order on Reconsideration, & Second Further Notice of Proposed Rule Making*, 19 FCC Rcd. 17,503, 17,549-53 (2004) (allowing licensees to create a private commons with their exclusive rights as a way to "provide[] a cooperative mechanism for licensees (or lessees) to make licensed spectrum available . . . in a manner similar to that by which unlicensed users gain access to spectrum . . . ."). Several commentators have developed similar ideas. *See* Benjamin, *supra* note 30, at 2036-43 (endorsing the private commons as an economically efficient means of exploiting the benefits of the commons); Comments of Thomas Hazlett & Matthew Spitzer, Establishment of an Interference Temperature Metric to Quantify and Manage Interference and to Expand Available Unlicensed Operation in Certain Fixed, Mobile and Satellite Frequency Bands, ET Dkt. No. 03-237, *20 (FCC filed Apr. 5, 2004), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516086620 (proposing that licensees rent spectrum to device manufacturers who permit open access of the spectrum on the basis of the protocols they develop).

111. Indeed, under existing law, a shift in entitlements which allowed unlicensed users to cause harmful interference to licensed services would probably terminate the unlicensed status of the beneficiaries. This is because unlicensed devices are free from the licensing requirement of 47 U.S.C. § 301 only so long as they do not cause harmful interference. *See* Revision of Part 15 of Commission's Rules Regarding Ultrawideband Transmission Systems, 19 FCC Rcd. 24,558, 24,589 (2004) (a license is required for "any apparatus that transmits enough energy to have a significant potential for causing harmful interference.").

112. The FCC defines harmful interference as "[i]nterference which endangers the functioning of a radio navigation service or of other safety services or seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service." 47 C.F.R. § 2.1(c) (2004). In the 800 MHz rebanding proceeding, the FCC adopted a sui generis definition of "unacceptable interference" to apply to that proceeding only. 800 MHz Report & Order, *supra* note 61, at 14,982.

analysis, and the ability to trace the source of interference to a particular transmitter. In many situations, this will not be possible, either because the responsible party is no longer transmitting, or because the interference was caused by the cumulative emissions of multiple users.[113] Even if an unlicensed device, or set of devices, is creating "harmful interference," and the source can be pinpointed, the interference may be difficult to stop. As Sprint has observed, "once interfering unlicensed devices are in the market, it will. . . potentially be virtually impossible for the Commission to recall these devices."[114] Political as well as practical difficulties arise, such that licensee requests for recall of popular unlicensed devices risk a public relations debacle.

These sorts of conflicts between licensed and unlicensed users are bound to increase as new types of unlicensed uses proliferate, bringing unlicensed transmissions into closer contact with licensed ones. To date, most unlicensed use has taken place in frequency bands dedicated to the commons like portions of the 2 GHz and 5 GHz bands. These bands are the equivalent of public parks to which anyone can gain access so long as their uses of the parkland are relatively low impact.

Recently, "underlay" unlicensed use has been permitted in bands populated by licensed users, such that the access rights function more as easements on private property.[115] Underlay transmissions are too low power to interfere with the licensed transmissions in the same bands.[116] Related to the underlay concept is opportunistic, or "white space" use. Opportunistic usage rights, which the FCC is now considering, would allow unlicensed devices to use spectrum in licensed bands, even at higher powers and over greater distances, so long as they cease transmitting when the licensed user needed the spectrum.[117]

---

113. *See generally*, SPECTRUM POLICY TASK FORCE REPORT, *supra note* 101, at 12-15, 30-1 (2002) (discussing cumulative interference as the noise floor rises); Establishment of an Interference Temperature Metric to Quantify and Manage Interference and to Expand Available Unlicensed Operation in Certain Fixed, Mobile and Satellite Frequency Bands, *Notice of Inquiry & Notice of Proposed Rule Making*, 18 FCC Rcd. 25,309, 25,315-20 (2003). *See also* Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems, *Report & Order,* 17 FCC Rcd. 7435, 7444 (2002) (discussing the possible effects of cumulative interference from multiple unlicensed devices).

114.Sprint Reply Comments, Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band, ET Dkt. No. 02-380, 2 (FCC filed May 22, 2003), http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6514147353.

115.*See* Gerald R. Faulhaber & David Farber, *Spectrum Management: Property Rights, Markets, and the Commons, in* RETHINKING RIGHTS AND REGULATIONS: INSTITUTIONAL RESPONSES TO NEW COMMUNICATION TECHNOLOGIES 193, 213-14 (Lorrie F. Cranor & Steven S. Wildman eds., 2003) (using the term "easements" for such spectrum access).

116.*See* SPECTRUM POLICY TASK FORCE REPORT, *supra* note 101, at 40.

117.*See* Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies, *Notice of Proposed Rulemaking & Order,* 18 FCC Rcd. 26,859 (2003) (inquiring into uses of cognitive radios to facilitate opportunistic uses of

It takes little foresight to predict that opportunistic users will not always defer to licensees, whether by accident or design. The resulting conflict could result in competitive inequities if spectrum users obtain equivalent interference rights at different prices, as well as harm to the public, which has not been compensated for what amounts to exclusive usage rights.

### *B. Measuring Unjust Enrichment in the Commons*

We return to the valuation and definitional problems of spectrum equity in the context of the commons. Here, I want merely to identify relevant issues that will confront the FCC and Congress as unlicensed use grows and, possibly, becomes rivalrous within dedicated unlicensed bands or as between unlicensed and licensed spectrum users in the bands they share.

The public may be harmed by the *de jure* or *de facto* grant of exclusive rights to use the spectrum without compensation. In the case of unlicensed spectrum, it is typically the provider of unlicensed system equipment (like Intel), rather than a service provider (like Cingular), that extracts value from the spectrum. If an unlicensed system provider is able to benefit by excluding others from the spectrum, then we must ask whether the public would realize more value by auctioning the spectrum on a licensed basis.

Answering this question, of course, requires some methodology for determining the value that licensed uses of the spectrum provide. For example, a communications service that operates at elevated power levels on an unlicensed basis, but in a quasi-exclusive manner, might create so much value in terms of service and technological innovation that the public is better off with such an unlicensed service than with auction revenue. On the other hand, there may be very little innovation or poor service, leaving the public under-compensated.

Related to these potential public harms are the equitable considerations that arise when one competitor has received spectrum rights on preferential terms. A commercial unlicensed system that is

---

licensed spectrum); Unlicensed Operation in the TV Broadcast Bands, *Notice of Proposed Rulemaking*, 19 FCC Rcd. 10,018 (2004) (inquiring into use of broadcast spectrum on an opportunistic basis). The FCC is considering broad application of the underlay and opportunistic use concepts as a way to permit unlicensed users to operate on a non-interfering basis in wide swaths of spectrum. *See* Establishment of an Interference Temperature Metric to Quantify and Manage Interference and to Expand Available Unlicensed Operation in Certain Fixed, Mobile and Satellite Frequency Bands, *Notice of Inquiry & Notice of Proposed Rulemaking*, 18 FCC Rcd. 25,309 (2003). *See also* J.H. Snider & Max Vilimpoc, *Reclaiming the "Vast Wasteland," Unlicensed Sharing of Broadcast Spectrum*, New America Foundation, at 2 (July 2003), *available at* http://www.newamerica.net/Download_Docs/pdfs/Pub_File_1286_1.pdf.

operating on free spectrum may be competing against a cellular system operating on auctioned spectrum. A policy of requiring the competitor to disgorge windfall gains would result in the unlicensed system's paying into the Treasury, but how much? Even if the unlicensed system is benefiting from rules or lax enforcement conferring quasi-exclusive spectrum access rights, these rights are unlikely to be precisely the same as those conferred by a license. As in the Nextel spectrum swap, choices will have to be made about how to factor in interference entitlements and public interest factors.

## CONCLUSION

The Act's spectrum equity provisions and general fairness concerns in communications policies pose a number of problems. Ascribing a value to spectrum use, for the purpose of public restitution or disgorging windfall gains, requires an appraisal of spectrum usage rights for which there is no agreed methodology and for which spectrum entitlements must be defined. Then there is the question of coverage. The Act exempted unlicensed spectrum from auction, and thus from the spectrum equity provisions, because it was non-rivalrous.[118] Should unlicensed users become rivals with each other or with licensees, their use of spectrum will implicate spectrum equity concerns even though the provisions will not apply. Rivalrous use in the commons will present the same problems of spectrum value and the different kinds of equity that are implicated when spectrum access is granted on preferential terms.

It is tempting in the face of this complexity to abandon fairness in spectrum management reform. But it is neither realistic nor proper to restructure wireless access rights without concern for fairness. The payoff for grappling with questions of equity goes beyond public restitution and competitive parity. The very same judgments about entitlements and value that need to be made for the purposes of spectrum equity need to be made for spectrum dispute resolution in a more complex world of wireless usage. As the Nextel case shows, an assessment of spectrum equity requires clarity about the rights spectrum users have to cause, and to be protected from, interference. This same clarity is needed to manage efficiently the dense and conflicting patterns of spectrum use rapidly developing in the wireless era.

118.47 U.S.C. § 309(j)(1). (If "mutually exclusive applications are accepted for any initial license . . . then . . . the Commission shall grant the license . . . through a system of competitive bidding. . .").

# COGNITIVE RADIO: MOVING TOWARD A WORKABLE FRAMEWORK FOR COMMERCIAL LEASING OF PUBLIC SAFETY SPECTRUM

TRAVIS E. LITMAN*



## INTRODUCTION

In 1910, just fifteen years after the first successful use of radio technology by Guglielmo Marconi, the United States Senate contemplated legislation to address its widespread adoption and use.[1] At that time, recognition of the imperative of public safety overrode much of the discussion surrounding the use of radio, just as it does today. This awareness was compounded by the sinking of the Titanic in 1912, which further highlighted the importance of radio communication in public safety operations. Then, as now, radio promised dramatic change to the face of an uncertain technological environment.

Cognitive radio may be roughly defined as "a radio that can change its transmitter parameters based on interaction with the environment in which it operates."[2] The technology is currently employed in wireless

* Travis E. Litman is a J.D. candidate at the University of Colorado (2006) and Programs & Finance Director of the Silicon Flatirons Telecommunications Program.

1. S. REP. NO. 61-659, at 1 (1910).

2. Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies; Authorization and Use of Software Defined Radio,

local area network services (LANS) and mobile wireless service networks.[3] Advancements in this area offer opportunities to open spectrum in "space, time and frequency dimensions that until now have been unavailable."[4] Because of an ability to interact with their environment, cognitive radio technologies promise a more efficient and comprehensive use of the spectrum with reduced risk of interference. Indeed, even the Federal Communications Commission (FCC or Commission) has recognized that a radical paradigm shift in spectrum management may come as a result of this technology.[5]

The FCC must, however, articulate clear principles and rules for cognitive radio, particularly in the public safety setting. A clear regulatory framework will, among other things, foster secondary markets for spectrum licenses, which are crucial to the broad deployment of cognitive radio technologies. To date, the pursuit of such a framework has been undermined by a contradictory regulatory path. In its Secondary Markets Order, the FCC clarified its policies surrounding types of dynamic spectrum leasing arrangements that would be permitted as result of smart or opportunistic use technologies like cognitive radio.[6] The Commission declined, however, to "permit public safety licensees to enter into spectrum leasing arrangements for commercial or other non-public safety operations."[7] Yet meanwhile, in the Notice of Proposed Rulemaking on Cognitive Radio (Cognitive Radio NPRM), the FCC continued to solicit proposals for what technologies would best work in the implementation of an interruptible public safety spectrum regime.[8]

Although models for commercial leasing of public safety spectrum have not received full treatment in the FCC's subsequent steps towards secondary markets generally,[9] the issue will likely return to the forefront. Indeed, in its Cognitive Radio NPRM, the FCC treated interruptible leasing of public safety spectrum as a foregone conclusion and solicited comments on the ways to best implement it.[10] As the potential leasing of

*Notice of Proposed Rulemaking and Order*, 18 FCC Rcd. 26,859, 26,863 (2003) [hereinafter Cognitive Radio].

3. *Id.* at 26,860; *See also* Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies; Authorization and Use of Software Defined Radio, *Report and Order*, 20 FCC Rcd. 5486, 5487 (2005)[hereinafter Cognitive Radio Order].

4. Cognitive Radio at 26,860.

5. Cognitive Radio Order, *supra* note 3, at 3. (In the same breath, the FCC also indicated that at this juncture, 'it need not' address the implications of such a shift).

6. Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets, *Second Report and Order*, 19 FCC Rcd. 17,503, 17,506 (2004) [hereinafter Secondary Markets Second Report and Order].

7. *Id.* at 17,529.

8. *See* Cognitive Radio, *supra* note 2.

9. Secondary Markets Second Report and Order , *supra* note 6, at 17,529.

10. *See* Cognitive Radio, *supra* note 2; It should be noted that the FCC retrenched from

public safety bands remains in a state of speculative legal flux, it is important for the FCC to set out criteria by which the implementation of such a system should proceed. The Cognitive Radio Order's recent treatment of the technology demonstrates both the pitfalls of shortsighted management and the facilitating effects of forward-looking regulatory treatment. All the same, the FCC's avowal of an "evolutionary" approach to management of cognitive radio technology should be grounded in a basic framework by which regulation will facilitate development.[11] Thus, the FCC should (1) beware of adopting any technical model that stifles future innovation; (2) pursue regulatory strategies that prohibit incumbent users (i.e., public safety entities) from profiting at the expense of the integrity of their systems; and (3) seek a regulatory model that is technically proven to protect the ability of public safety agencies to respond. Although these criteria might be in tension at times, it is vital that the FCC adopt a solid analytical framework for cognitive radio applications.

This paper argues that the FCC should adopt such criteria and continue its proactive stance in support of the development and implementation of cognitive radio capacities that offer new opportunities in an already-crowded spectrum environment. Section II offers a brief background of cognitive radio. Section III then illustrates how the failure to develop a suitable definition of cognitive radio results in a confused dialogue over its challenges. Sections IV-V outline the capabilities and promise of cognitive radio in the public safety spectrum. Section VI outlines the regulatory history of cognitive radio to date. Finally, Section VII illustrates the nexus of economic and technical factors that will demand heightened FCC scrutiny in its consideration of future applications of spectrum leasing in cognitive radio.

## I. BACKGROUND

### *A. History of Regulation of the Electromagnetic Spectrum*

Spectrum may be broadly understood as a series of electromagnetic frequencies between three kilohertz and three hundred gigahertz that can be used for the transmission of information over the radio waves. On June 2, 1896, Guglielmo Marconi submitted the specifications for the world's first wireless patent using this spectrum.[12] Over the next decade,

its advocacy or suggestion of technical mechanisms by which interruptible leasing could be effected in its subsequent Report and Order. Cognitive Radio Order, *supra* note 3, at 5515.

11. Cognitive Radio Order, *supra* note 3, at 5493.

12. *See* Marconi Calling, *Marconi's Life* (Jan. 18, 2005), *at* http://www.marconicalling.com/introsting.htm.

radio technology proliferated and found science, business, and safety applications.[13] Governments worldwide soon recognized the need for understanding and regulating this new technology, which led to the Berlin Radiotelegraphic Convention of 1906. The conference created a record that stated in part "[w]ireless telegraph stations are bound to give absolute priority to calls of distress from ships, to similarly answer such calls, and to take such action with regard thereto as may be required."[14] Although the United States did not adopt the language of the Convention, it has a longstanding tradition of yielding "priority to government messages by ordinary telegraph lines. . .since July 24, 1866."[15]

In turn, the early 1910s were a seminal period for the recognition and emergence of government control over the radio spectrum in the United States. At that time, the Secretary of the Navy described the radio "ether" as existing in a state of "chaos" to the detriment of both public business and the Navy.[16] As the Secretary stated in a letter to the Senate Committee on Commerce, "[c]alls of distress from vessels in peril on the sea go unheeded or are drowned out in the etheric bedlam produced by numerous stations all trying to communicate at once. . . . It is not putting the case too strongly to state that the situation is intolerable, and it is continually growing worse."[17] The installation of radio equipment on ships was one of the first applications of radio technology. Radio offered several benefits at sea, including military advantage and the promotion of safety of life and property through enhanced responsiveness and communication. Unfortunately, these innovations were undermined by significant problems of interference.[18]

The sinking of the Titanic awakened popular consciousness to the advantages of government-managed spectrum. After the loss of the Titanic, some navy analysts suggested that the chaos of the radio spectrum did not allow a nearby ship to heed the Titanic's distress calls.[19] As a result, on August 13, 1912, Congress enacted the first legislation to create a regime of control of the radio spectrum.[20]

The first regulation of the radio spectrum, the Radio Act of 1912, established the principle that a federal license was required to use the

13. *Id.*
14. S. REP. NO. 61-659, at 1 (1910).
15. *Id.* at 2.
16. *Id.*
17. *Id.* at 4.
18. *Id.*
19. LAWRENCE LESSIG, THE FUTURE OF IDEAS: THE FATE OF THE COMMONS IN A CONNECTED WORLD 73 (2002).
20. Ronald Coase, *The Federal Communications Commission*, 2 J.L. & ECON. 1, 2 (1959); *See* Radio Act of 1912, Pub. L. No. 62-264, 37 Stat. 302.

spectrum.[21] In its final consideration of the flagship bill, the Senate voiced concern about the legislation's possible unintended hampering of technological progress. As the Senate Report stated, "the claim has been made that any precise regulation of radio communication, in view of the undeveloped stage of the art, will necessarily retard the progress of science and diminish the usefulness to mankind of the invention."[22] Although radio communication represented a remarkable step forward for safety, innovation, and commerce, policymakers were wary of potential problems with its regulation.

Nevertheless, Congress has since passed several bills that regulate spectrum. The Radio Act of 1927 established the Federal Radio Commission, which was charged with the classification of radio stations and regulation of spectrum bandwidth through licensing procedures.[23] In 1934, the FCC replaced the Federal Radio Commission and was given the mandate of regulating telephone, telegraph, and radio services. Since 1934, the FCC system of spectrum allocation through licensure has remained largely unchanged with few exceptions.[24]

The apportionment of spectrum-use licenses by the FCC was ostensibly designed to reduce the potential for harmful interference.[25] Indeed, this command-and-control regulatory posture adopted by the FCC survives to this day.[26] Under this regulatory model, the allocation of spectrum bands and accompanying technical and service rules are the primary factors in the development and structure of the industry.[27] At the FCC, spectrum policy has developed on a band-by-band basis, usually in response to requests for particular allocations or assignments.[28] The command-and-control structure has drawn widespread criticism

21. SPECTRUM POLICY TASKFORCE REPORT, ET Dkt. No. 02-135, *Report* 1, at 7 (Nov. 15, 2002), available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-228542A1.pdf [hereinafter SPECTRUM POLICY TASK FORCE REPORT].

22. S. REP. NO. 62-698, at 7 (1912).

23. SPECTRUM POLICY TASK FORCE REPORT, *supra* note 21, at 7.

24. In 1983, Congress did add section 7(a) to the Act, which sets as the policy of the United States to "encourage the provision of new technologies and services to the public." *Id.* at 7. Then, in 1993, the FCC implemented an auction system for spectrum whereby the participants would bid on a non-transferable license (though not property right) to operate in a given swath. Joshua Marsh, *Secondary Markets in Non-Federal Public Safety Spectrum*, at 3 (Working Paper, 2004), *at* http://web.si.umich.edu/tprc/papers/2004/384/tprc.pdf.

25. Comments of Pulse Link, to the *Notice of Proposed Rulemaking and Order* in Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies, ET Dkt. No. 03-108, at 2-3 (May 17, 2004), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516185644 [Hereinafter Pulse Link ].

26. Philip J. Weiser & Dale N. Hatfield, *Policing the Spectrum Commons*, 74 FORDHAM L. REV 101, 104 (forthcoming 2005), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=704741.

27. *Id.*

28. SPECTRUM POLICY TASKFORCE REPORT, *supra* note 21, at 8.

since the 1950s, particularly in comparison to property rights and commons models.[29]

The late 1990s witnessed some legislative movement responding to critics of command-and-control spectrum policy. For instance, Congress expanded the Commission's authority to provide flexibility of use in spectrum management as well as the authority to use auctions to distribute spectrum licenses.[30] In response to the heightened demand for spectrum-based devices and services, the FCC also created the Spectrum Policy Task Force and considered progressive proposals like the secondary markets in spectrum licensing discussed in greater detail in the next section.[31]

The demand for spectrum space and the number of spectrum devices has increased exponentially, especially with mobile and portable spectrum-based applications.[32] As the FCC's Spectrum Policy Task Force (SPTF) stated, the "increased demand is propelled by a host of factors: the economy has moved towards the communications-intensive service sector, the workforce is increasingly mobile, and consumers have been quick to embrace the convenience and increased efficiency of the multitude of wireless devices available today."[33] The FCC is increasingly confronted with a regulatory conundrum: improving flexible efficiency in the access and usage of the finite spectrum while maintaining reliability in its use.[34] The SPTF identified software-defined radios and opportunistic technologies as one means to achieve these competing goals.[35] Thus, nearly a century later, with the advent of cognitive radio technology, identical sets of policy concerns to those that accompanied the first uses of radio have arisen.

### *B. Secondary Markets and Interruptible Leasing*

For the last century, "dumb" receivers have been the established norm in radio.[36] Administrative regulation and technology were limited by the finite nature of the electromagnetic spectrum through which radio receivers picked up their signals. Today, however, cognitive radio devices

29. *Id.* at 4-5; *see also* Coase, *supra* note 20, at 6.

30. Weiser & Hatfield, *supra* note 26, at 8; *See also*, 47 U.S.C. § 336 (2005).

31. The Spectrum Policy Task Force unequivocally states that the time for reform is now as "[i]ncreasing demand for spectrum-based services are straining long-standing, and outmoded spectrum policies. The overarching goal of effective spectrum policy is to maximize the potential public benefits to be derived through spectrum-based services and devices." SPECTRUM POLICY TASK FORCE REPORT, *supra* note 21, at 11-12.

32. *Id.*

33. *Id.* at 12.

34. Cognitive Radio, *supra* note 2, at 26,860.

35. SPECTRUM POLICY TASKFORCE REPORT, *supra* note 21, at 13-4.

36. PHIL WEISER & JONATHAN NUECHETERLEIN, DIGITAL CROSSWORDS: AMERICAN TELECOMMUNICATIONS POLICY IN THE INFORMATION AGE 235 (2005).

offer the ability to adapt and respond to their spectral environments. In so doing, cognitive radio will reorient the limits of allocable spectrum space and offer an invitation into a new era of radio and spectrum usage.

Secondary markets in spectrum develop through leasing arrangements whereby a party licensed by the FCC to use the spectrum leases the space to a third party. The concept of secondary markets in spectrum has received particular attention recently.[37] This is due in part to the increase in the number of spectrum license applications as well as the overall demand for spectrum space.[38] Moreover, in pursuit of secondary market solutions, the Commission has emphasized an "evolution toward greater reliance on the marketplace to expand the scope of available wireless services and devices," thereby "leading to more efficient and dynamic use of the important spectrum resource to the ultimate benefit of consumers."[39]

Secondary market leasing arrangements facilitate more efficient use of public safety spectrum though real-time spectrum exchanges such as interruptible leasing. Traditional spectrum leases occur where the original licensee transfers the right to use the spectrum to the lessee, thereby enjoying only minimal access to the spectrum while the lease is in effect.[40] Interruptible leasing, by contrast, enables the licensee to interrupt the lessee's use of the spectrum and return the spectrum to the licensee in a time of need. In public safety applications, a licensee may only require access to spectrum at infrequent intervals and for limited time periods. If the licensee can guarantee that its needs will be met during its critical use periods, it may pursue a leasing strategy for the non-critical times to realize potential revenue opportunities. Thus, cognitive radio technologies might serve the public interest in facilitating the active use of spectrum that might otherwise lie dormant. At the same time, in public safety spectrum bands, interruptible leasing is an acutely sensitive proposal because of the need for instant reversionary access to the spectrum.

The FCC has identified at least four ways in which cognitive radio may promote access while maintaining efficiency and reliability.[41] First, a licensee may utilize cognitive radio to improve efficiency. A coordinated system of cognitive radios would allow for more productive use of the airwaves.[42] Second, as discussed above, cognitive radio allows

37. *See, e.g.*, SPECTRUM POLICY TASK FORCE, *supra* note 21, at 1.

38. *See id.*

39. Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets, *Report and Order and Further Notice of Proposed Rulemaking*, 18 FCC Rcd. 20,604, 20,607 (2003) [hereinafter Secondary Markets Order].

40. Cognitive Radio, *supra* note 2, at 26,878.

41. *Id.* at 26,861.

42. *Id.*

for the development of secondary markets in spectrum use.[43] Third, it can facilitate automated frequency coordination.[44] Finally, it can allow for the use of non-voluntary third-party access to spectrum.[45] This paper explores only the second use in a very specific context – interruptible leasing of spectrum rights in public safety bands. Before moving into this analysis, however, it is useful to define the term 'cognitive radio,' and what it indicates about the state of the technology generally.

## II. DEFINITION

The policy and implementation struggles with cognitive radio parallel the difficulties in developing a consensus as to what constitutes cognitive radio from the outset. As one commentator remarked, the FCC itself raised confusion in its use of terminology in the Cognitive Radio NPRM.[46] Although the FCC stated that a cognitive radio is not necessarily a software-defined radio (SDR), it later implied that an SDR was, in fact, a subset of cognitive radio.[47] The FCC has since clarified its definition of a software-defined radio, further evincing the difficulties plaguing this rapidly evolving area of technology.[48]

A software-defined radio is a radio with a microchip whose programming may be altered to perform on different frequencies and in different formats.[49] The Institute of Electrical and Electronics Engineers (IEEE-USA) argues that a cognitive radio does not have to be an SDR.[50] Instead, they insist that it is possible to implement cognitive radio features, like the ability to detect and avoid other users, using conventional technologies.[51] Indeed, a cognitive radio "distinguishes

43. *Id.*

44. *Id.*

45. *Id.*

46. Comments of Nat'l Pub. Safety Telecomm. Council, to the *Notice of Proposed Rulemaking and Order* in Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies, ET Dkt. No. 03-108, at 7 (May 3, 2004), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516183126 [hereinafter NPSTC].

47. *See id.*; *see also* Cognitive Radio, *supra* note 2, at 26,863, 26,864, n 16.

48. *See* Cognitive Radio Order, *supra* note 3, at 5,499-507.

49. Comments of Motorola, to the *Notice of Proposed Rulemaking and Order* in Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies, ET Dkt. No. 03-108, at 2-3 (May 3, 2004), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516183093 [hereinafter Motorola].

50. Comments of IEEE-USA, to the *Notice of Proposed Rulemaking and Order* in Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies, ET Dkt. No. 03-108, at 3 (May 3, 2004), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516183217 [hereinafter IEEE-USA].

51. *Id.*

itself from an SDR by altering its transmitter parameters based on observation of and interaction with the environment in which it operates."[52] Motorola offers perhaps the best single definition of a cognitive radio: a radio that changes its transmitters based upon observation and interaction with its environment.[53] Although both SDRs and cognitive radio can be altered after their original manufacture, only cognitive radios communicate and adapt directly to their environment.[54]

An alternate definition proffered by the New York State Office for Technology asserts that "[c]ognitive [r]adio *is* a subset of [s]oftware [d]efined [r]adio (SDR) technologies."[55] Cognitive radio is a dynamic technology in that it can alter the basic operating rules and parameters that otherwise guide SDRs. As the Office for Technology points out, "[i]t has not been shown how a [cognitive radio] can perform the learning function without the use of software."[56] In other words, cognitive radio is dependent on software at a basic level in order to analyze its environment, but can go further than traditional software defined radios by modifying its parameters of operation.[57]

Regardless of whether one conceives of cognitive radio as a subset of SDR or not, the confusion and debate surrounding its very nature is illustrative of the novelty of cognitive radio as an innovation. All can agree that the Commission should not treat cognitive radio as little more than a modified SDR, but rather, it should be regulated as a distinct entity. Indeed, if cognitive radio and software-defined radio are equated, then they will be subject to the same regulatory regimes in terms of product certification and regulation. Lurking behind the confusion regarding cognitive radio lies the risk of unintended consequences in the form of regressive regulation when no definition can be agreed on. Further, as the New York Office for Technology fears, the "additional regulation of SDR could negatively impact innovation, development, and deployment of a very important communication technology."[58] In turn, the gains to be derived from cognitive radio have yet to be fully exploited - let alone conceived; as such, the Commission should be aware of the

52. *Id.*

53. Motorola, *supra* note 49, at 2.

54. *Id.*

55. Comments of the Statewide Wireless Network New York State Office for Tech., to the *Notice of Proposed Rulemaking and Order* in Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies, ET Dkt. No. 03-108, at 5 (May 3, 2004), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516183263 [Hereinafter Wireless NY State Office] (Emphasis added).

56. *Id.* at 6.

57. *Id.*

58. *Id.*

potential impact of its regulation.

Most recently, the Commission itself has redefined "software defined radio" to include: "devices where a software change could change not only the operating parameters of frequency range, modulation type or maximum output power, but also the circumstances under which a transmitter operates in accordance with Commission rules."[59] In essence, the Commission has opted for a broader definition that is more inclusive of cognitive radios. The Commission acted to enhance the purview of its powers in order to mandate certain security features on new devices.

As the Commission has stated, "[a]s a matter of policy, the Commission wanted additional assurances that manufacturers of software-based equipment would take steps to prevent abuses, so it adopted a requirement that a device that is certified as a software defined radio must incorporate a means to ensure that only software that is part of an approved hardware/software combination can be loaded into a radio."[60] Here the importance of a settled definition again becomes clear – it enables manufacturers to know what certification protocols are necessary, and to ensure that devices which use spectrum have uniformly robust security. The FCC has redefined SDR in order to "help ensure that certain radios incorporating software cannot be easily modified on an unauthorized basis and cause harmful interference or otherwise violate our rules."[61] The FCC should be lauded for the reconsideration of its definition, but at the same time, the debate over the very definition of an SDR is emblematic of regulating the new technology as a whole. Nonetheless, a functional understanding of cognitive radios illustrates its vast potential in the public safety setting, as the next section explores.

## III. COGNITIVE RADIO CAPABILITIES

A cognitive radio works by detecting other electromagnetic signals and responding accordingly. Unlike normal receivers, cognitive radio has two principle options if a signal is being broadcast in the band of spectrum it is analyzing. First, it may practice "avoidance" by moving to another band. Second, it may practice "coexistence" through changing the transmitter parameters (like modulation) to coexist with other users.[62] Cognitive radio technologies have already been deployed in Commercial Mobile Radio Services (CMRS) and in trunked radio public safety

59. Cognitive Radio Order, *supra* note 3, at 5499.

60. *Id.* at 5500.

61. *Id.* at 5502.

62. Motorola, *supra* note 49, at 2; Modulation is defined as "to vary the amplitude, frequency, or phase of (a carrier wave or light wave) for the transmission of intelligence (as by radio)." MERRIAM-WEBSTER ONLINE DICTIONARY (Feb. 5, 2005), *available at* http://www.m-w.com/cgi-bin/dictionary?book=Dictionary&va=modulating.

systems.[63] At this point, one of the primary technological obstacles to progress in cognitive radio technologies is the phenomenon known as "false positives," or indications that the spectrum is in use when, in fact, it is not.[64] Nevertheless, such difficulties are being researched and have not yet proved to be prohibitive in the development and deployment of cognitive radio.

In the Cognitive Radio Order, the FCC isolated several characteristics that distinguish cognitive radios from dumb receivers.[65] First, cognitive radios demonstrate frequency agility – the ability to change frequency to optimize use.[66] Second, cognitive radios may employ Dynamic Frequency Selection (DFS), where the signals of transmitters nearby are taken into account.[67] Further, cognitive radios may exhibit Transmit Power Control (TPC), where the radio can constrain its emissions power depending upon its environs.[68] Finally, cognitive radios may feature locational awareness vis à vis other transmitters and be able to negotiate use based upon terms agreed upon by a licensee and third party.[69]

As the FCC stated, "[c]ognitive radio technologies have the potential to provide a number of benefits that would result in increased access to spectrum and also make new and improved communication services available to the public."[70] Using these tools, cognitive radio can exploit the use of "white spaces" in the spectrum.[71] Cognitive radio may be deployed in any number of architectures and can be used by both licensed and unlicensed users of spectrum.[72] Cognitive radio technology also promises to further the "interoperability between or among communications systems in which frequency bands and/or transmission formats differ."[73] It can thereby 'bridge' two different systems by receiving signals at one frequency and format and retransmitting them in another. The FCC also has indicated that cognitive radio technologies could have applications that improve rural access to spectrum-based

63. Motorola, *supra* note 49, at 6; In trunked systems, frequency is controlled automatically by control-channel signaling and the assigned to users based upon availability and priority. Wireless NY State Office, *supra* note 55, at 7.

64. Interview with Dale Hatfield, Adjunct Professor, University of Colorado in Boulder, Colo. (Feb. 3, 2005).

65. Cognitive Radio Order, *supra* note 3, at 5489-90.

66. *Id.*

67. *Id.*

68. *Id.*

69. *Id.*

70. Cognitive Radio, *supra* note 2, at 26,866.

71. "White spaces" are known as spaces in the spectrum that are not in use at a given time or location. *Id.*

72. Indeed, cognitive radios can be used in network-centric, distributed, ad hoc and mesh architectures. *Id.* at 26,867.

73. *Id.* at 26,866.

services.[74] Finally, and most significantly, cognitive radio can allow for negotiation between users of spectrum, resulting in increased efficiency.[75]

One of the most promising possibilities presented by cognitive radio is the ability to identify unused spectrum which may be made available for leased use and then to allow for its reversion to the original licensee at designated times or in certain scenarios.[76] Interruptible spectrum leasing would allow a licensee to retain the right to "'interrupt' or preempt a lessee's use temporarily in order to satisfy their particular operational requirements for immediate access, reliability, or security."[77] In the public safety context, where events are time critical, the interruptible spectrum leasing model is the logical choice for secondary markets in spectrum because of its capability for instant interruption and reversion. As the FCC noted in the Cognitive Radio NPRM, "public safety licensees. . . are likely to demand robust technical mechanisms to ensure interruptible spectrum leasing."[78] The FCC went on to conclude that "[c]ognitive radio technology can provide the technical mechanisms to ensure the leased spectrum is instantly and reliably available for public safety use during emergencies [and can] serve a critical role in making leased use of public safety spectrum possible."[79] As such, in its mission to provide more flexibility in its command and control of the spectrum, the FCC sought input on cognitive radio through its rulemaking processes.[80]

Finally, although many leases are likely to be negotiated on a long-term basis, the capability of cognitive radio to negotiate leases in real-time merits further exploration.[81] As the FCC noted, "the negotiation of spectrum leasing opportunities would most likely require information about spectrum availability, e.g., which channels, scope of authorized service area, and the characteristics of spectrum available, e.g., modulation power limits."[82] In other words, not only is there the potential to lease raw spectrum in real-time (from moment to moment),

74. *Id.* at 26,867.

75. Cognitive Radio Order, *supra* note 3, at 5489-90.

76. Cognitive Radio, *supra* note 2, at 26,880.

77. *Id.* at 26,878.

78. *Id.*

79. Cognitive Radio, *supra* note 2, at 26,879. In its comments in response to the NPRM, the Industrial Telecommunications Association, Inc. was dubious of the FCC claims, instead advocating further testing. *See* Comments of the Indus. Telecomm. Ass'n, Inc., to the *Notice of Proposed Rulemaking and Order*, in Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies, ET Dkt. No. 03-108 (May 8, 2004), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516182865 [hereinafter ITA].

80. *See generally* Cognitive Radio, *supra* note 2; SPECTRUM POLICY TASKFORCE REPORT, *supra* note 21.

81. *See* Cognitive Radio Order, *supra* note 3, at 5489-90.

82. Cognitive Radio, *supra* note 2, at 26,881.

but in order to do so, information must be rapidly conveyed and analyzed, including the expected duration and variable costs. Although the promise of real-time leasing has remained largely unfulfilled, the discussion of the technical barriers and ramifications will likely mirror that of cognitive radio in relation to interruptible leasing generally. The real-time and interruptible leasing that are now possible or on the immediate horizon through cognitive radio technologies may yield economic efficiencies when employed in the management and use of public safety spectrum, as illustrated by the following section.

## IV. PUBLIC SAFETY SPECTRUM

Part 90 of the FCC's rules defines public safety services. Specifically, public safety services are services:

> (A) the sole or principle purpose of which is to protect the safety of life, health or property;
> (B) that are provided –
> (i) by State or local government entities; or
> (ii) by nongovernmental organizations that are authorized by a government entity whose primary mission is the provision of such services; and
> (C) that are not made commercially available to the public by the provider.[83]

Public safety services operate on bands of spectrum licensed under FCC rules for non-federal radio communications of state and local governmental entities.[84] The communications that are used in these bands are "time-critical, but episodic in nature."[85] In other words, these communications may not be consistent, but arise on an as-needed basis, such as in the event of a disaster. Thus, instant communication is required because lives may hang in the balance. The communications may include "communications among members of a firefighting team, directions to an ambulance crew, and coordination among different police and fire agencies responding to a regional crisis."[86]

Traditionally, public safety entities have used dedicated systems to handle their individual communication needs.[87] Public safety

83. 47 C.F.R. § 90.523 (2005); *see also*, 47 U.S.C. § 337(f)(1) (2005).
84. Cognitive Radio, *supra* note 2, at 26,878.
85. Secondary Markets Order, *supra* note 39, at 20,709.
86. *Id.*
87. Comments of Ericsson Inc., to the *Notice of Proposed Rulemaking and Order* in Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies, ET Dkt. No. 03-108 at 8 (May 3, 2004), *available at*

communications may be conventional or trunked and operate using analog or digital modulation.[88] Trunked operations usually operate on multiple channels and may employ Frequency Division Multiple Access (FDMA) or Time Division Multiple Access (TDMA).[89] In so doing, communications between mobile-to-base station and base station-to-mobile are kept on distinct frequency channels. In contrast, in conventional systems, access is available on a first-come, first served basis. Conventional operations may use a repeater station or rely on direct communications and can operate on one or two frequency channels for communications.[90]

Regardless of the technology employed, some have argued that the amount of spectrum currently available to public safety services is not enough to meet their needs.[91] Conversely, others argue that public safety spectrum often lies fallow or is used only intermittently and should be exploited by secondary leasing strategies.[92] These contending ideas may both be correct depending on the market, though cognitive radio technologies can theoretically be used in either scheme. Public safety operations currently wanting for spectrum will be able to employ cognitive radio to make better and more efficient use of the spectrum they have; cognitive radio also will aid licensees in allowing third parties access to their under-utilized public safety spectrum.

## V. REGULATORY HISTROY OF COGNITIVE RADIO

On March 21, 2000, the FCC released a Notice of Inquiry regarding software-defined radios, which sought input from industry on the current state of the technology and how the Commission might adjust its rules so as to facilitate its deployment.[93] Then, on September 14, 2001, the FCC released its First Report and Order on Software Defined Radios in which it released a new set of rules governing SDRs.[94] Following this, on December 30, 2003, the FCC terminated the

http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516183063 [hereinafter Ericsson].

88. Wireless NY State Office, *supra* note 55, at 7.

89. *Id.*

90. *Id.*

91. NPSTC, *supra* note 46, at 4.

92. Comments of St. Clair County, to the *Notice of Proposed Rulemaking and Order* in Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies, ET Dkt. No. 03-108 at 3 (July 23, 2004), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516285240. [hereinafter St. Clair County].

93. Inquiry Regarding Software Defined Radios, *Notice of Inquiry*, 15 FCC Rcd. 5,930 (2000).

94. Authorization and Use of Software Defined Radios, *First Report and Order*, 16 FCC Rcd. 17,373 (2001).

Authorization and Use of Software Defined Radios in favor of a Notice of Proposed Rule Making surrounding cognitive radio.[95] Concurrent with the termination order, the FCC released its Notice of Proposed Rule Making and Order, which sought comment on the opportunities to facilitate spectrum usage through cognitive radio technologies. Specifically, within the NPRM, the FCC sought comment on the technical controls and reversion models that would make interruptible public safety leasing a reality.[96]

In his accompanying statement to the NPRM, then Chairman Powell focused on the upside of cognitive radio features, including the promise of interoperability amongst public safety authorities, and in particular, first responders.[97] Meanwhile, in a separate statement, Commissioner Copps was reluctant to move forward with interruptible leasing until it has been proven "safe."[98] Finally, Commissioner Adelstein suggested that cognitive radio would provide an important role in "spectrum facilitation" through which regulatory, technical, and economic barriers would be eliminated from spectrum usage.[99]

At the time of the release of the Cognitive Radio NRPM, the FCC gave no indication whether interruptible public safety leasing would be of limited, commercial or other character, and in fact, made no affirmative decision whether interruptible public safety leasing would become a reality at all. Yet, at the same time, the NPRM sought comment on the feasibility of various access reversion models – namely, a beacon-system. In turn, the FCC received an array of responses from both the public and private sector through 103 filed comments.[100]

Meanwhile, the broader issue of developing secondary markets for spectrum was concurrently being addressed elsewhere. On November 27, 2000, the Commission issued a NPRM regarding secondary markets,

---

95. Cognitive Radio, *supra* note 2, at 26,859.

96. *Id.* at 26, 779-80.

97. Separate Statement of Chairman Michael K. Powell, *Notice of Proposed Rulemaking and Order*, in Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies, ET Dkt. No. 03-108 18 FCC Rcd. 26,859, 26,908 (2004).

98. Commissioner Copps was particularly concerned about the potential that public safety entities would compromise their systems by leasing out their 'core' spectrum in order to make up for other budgetary shortfalls. Separate Statement of Commissioner Michael C. Copps, *Notice of Proposed Rulemaking and Order*, in Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies, ET Dkt. No. 03-108 18 FCC Rcd. 26,859, 26,909 (2004). [hereinafter Copps Statement]

99. Separate Statement of Chairman Jonathan S. Adelstein, *Notice of Proposed Rulemaking and Order*, in Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies, ET Dkt. No. 03-108 18 FCC Rcd. 26,859, 26,911 (2004).

100. *See* ECFS Comment Search, Federal Communications Commission, *at* http://gullfoss2.fcc.gov/cgi-bin/websql/prod/ecfs/comsrch_v2.hts.

in order to "to remove unnecessary regulatory barriers to the development of more robust secondary markets in radio spectrum usage rights."[101] The Commission chose to specifically exclude public safety bands from consideration at the time because of the critical nature of those services.[102] In the October 6, 2003 Report and Order, however, the Commission followed the Spectrum Policy Taskforce's recommendation and solicited comment on the possibility for interruptible leasing mechanisms in the public safety bands.[103] As the Commission stated, "[n]ew technologies. . .may allow both ultra-reliable near-instant access by public safety licensees and use by other licensees at times of low public safety demand."[104] Finally, on September 2, 2004, the Commission elected to allow public safety entities to cross-lease their spectrum so long as the lease is dedicated to the support of public safety operations.[105] In the same breath, the Commission also decided to "decline *at this time* to permit public safety licensees to enter into spectrum leasing arrangements for commercial or other non-public safety operations."[106]

On March 10, 2005, the Commission released its Report and Order surrounding its cognitive radio proceeding.[107] In the Report and Order, the Commission offered a new definition of software defined radio, adjusted its thinking on the technical controls necessary in an interruptible spectrum leasing regime, yet did not take specific action with regard to the public safety spectrum. As a result, the Commission has left an open question as to how such markets will develop and be regulated.[108]

## VI. INTERRUPTIBLE SPECTURM LEASING

As a result of the differing needs and mechanisms necessary for operation between differing frequency bands, it is not feasible to broadly define criteria for applications of cognitive radio.[109] In fact, "[c]ognitive radio technologies, while promising to maximize spectral efficiency in the future, are only in their infantile stages of development."[110]

---

101. Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets, *Notice of Proposed Rulemaking*, 15 FCC Rcd. 24,203, 24,204 (2000).

102. *Id.* at 24,208.

103. Secondary Markets Order, *supra* note 39, at 20,709.

104. *Id.* at 20,709.

105. Secondary Markets Second Report and Order, *supra* note 6, at 17,529.

106. *Id.* (emphasis added)

107. Cognitive Radio Order, *supra* note 3.

108. *Id.*

109. Motorola, *supra* note 49, at 6.

110. ITA, *supra* note 79, at 4.

Nevertheless, as discussed in the previous section, the FCC has identified the capability of cognitive radio technologies to allow for the facilitation of a secondary market in leasing rights and has taken initial exploratory action.

In the Second Report and Order on Secondary Markets, the FCC moved forward in the leasing of public safety spectrum. Specifically, with regard to the public safety bands allocated under the Part 90 rules, the FCC decided to permit public safety licensees to lease their spectrum rights to other public safety entities to provide communications for operations support.[111] At the same time, commentators concluded that cognitive radio technology is "here to stay" and "will undoubtedly increase exponentially in the coming months and years."[112] Thus, one can reasonably expect that, as the technologies improve, further consideration of the interruptible leasing of spectrum rights will ensue.

The Cognitive Radio NPRM was a move in this direction. Therein, the FCC sought comment as to the technological means of implementing interruptible spectrum leasing in the public safety bands. Furthermore, in the Second Report and Order on Secondary Markets, the Commission stated, "[a]s our next step in this area, we intend to consider the technical issues raised in that proceeding, which appear to be important groundwork in addressing broader public safety spectrum leasing."[113]

The deliberations on the Cognitive Radio NPRM were guided by the intention to "allow a full realization of the potential of these technologies under [the FCC's] regulatory models for spectrum based use."[114] Nevertheless, the Commission has "failed to propose an overarching vision for a future spectrum policy and how the proposals in the NPRM fit."[115] In terms of the public safety analysis, industry and public safety entities have proffered a variety of different models by which cognitive radio and interruptible spectrum leasing may be implemented. Outside of continuing to explore the possibility of spectrum leasing, the FCC did little to clarify the prospect of such leasing arrangements. Nevertheless, it is vital for the Commission to adopt a set of criteria whereby the proposals and actions may be

111. Secondary Markets Second Report and Order, *supra* note 6, at 17,529. (emphasis added).

112. NPSTC, *supra* note 46, at 6.

113. Secondary Markets Second Report and Order, *supra* note 6, at 17,531. (emphasis added).

114. Cognitive Radio, *supra* note 2, at 26,861.

115. Comments of "The Technology Companies," to the *Notice of Proposed Rulemaking and Order* in Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies, ET Dkt. No. 03-108 at 2 (June 1, 2004), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516208162.

measured so as to avoid either stifling innovation or facilitating the potential for abuse in spectrum leasing. In moving forward, the Commission must analyze interruptible spectrum leasing in the public safety sector through a prism encompassing the economic and technical values that it purports to uphold.

### *A. Economic Considerations*

Interruptible spectrum leasing offers both promising avenues for the financial health of public safety agencies as well as potential pitfalls to the sanctity of emergency services. As such, the FCC or a similar regulatory body should oversee any potential regime of spectrum leasing to ensure that (1) the public and commercial buyers are not exploited by rent-seeking of public safety agencies and (2) the sale of rights is not in derogation of the needs of public safety operations.

In the First Report and Order on Secondary Markets, the Commission inquired as to whether interruptible public safety spectrum leasing would further the public interest.[116] Specifically, it highlighted the potential for public safety entities to exploit the full use of their spectrum and to gain compensation for leasing of their unused spectrum.[117] In raising the possibility of revenue generation, the Commission avoided specifying how the monies could be used, but did suggest that equipment upgrades would be one logical expenditure.[118] Public safety spectrum users usually employ different funding mechanisms, are more budget constrained, and have longer equipment replacement cycles than commercial entities.[119] In the Cognitive Radio NPRM , the Commission again stated that interruptible spectrum leasing was likely to yield an array of public interest benefits, including "more efficient use of public safety spectrum, providing an avenue of multiple public safety entities to use the same spectrum, and providing financial resources to public safety licensees."[120] The Commission noted an opportunity to reduce transaction costs within interruptible lease arrangements if action is taken to standardize equipment designs, particularly with regard to reversion mechanisms.[121] Fundamentally, as the Commission has recognized, financial opportunities and motives will determine the viability of the adoption and course of interruptible public safety leasing.

Several commentators have echoed the FCC's preliminary

116. Secondary Markets Order, *supra* note 39, at 20,710.
117. *Id.*
118. *Id.*at 20,710, n 481.
119. SPECTRUM POLICY TASKFORCE REPORT, *supra* note 21, at 43.
120. Cognitive Radio, *supra* note 2, at 26,879.
121. *Id.* at 26,880.

conclusion that interruptible leasing may lead to a significant revenue source. Spectrum can be leased through either a flat rate per-subscriber charge or a per-second use charge.[122] One municipality, St. Clair County, IL, has stated that the cash-generation aspect of the leasing arrangements is absolutely vital to incentivize its participation in such a regime.[123] St. Clair County imagines a world in which the unused channels of its trunked safety systems could easily be leased to a taxi service on an as-needed basis through prices defined by a broker system.[124] Although its system is subject to periods of peak activity, the County estimates that ninety percent of the time it operates at only thirty-five percent capacity.[125] Likewise, the Association of Public Safety Communication Officials International, Inc. (APCO) recognizes that spectrum leasing authority could be an asset used for financial gain.[126] The rents received from spectrum leasing may even lead some state entities to acquire more channel capacity than they need.[127] As such, secondary markets in interruptible spectrum leasing "will be a major contributor to ensuring efficient usage of spectrum through permitting market forces to govern how portions of the radio spectrum are used."[128] Therefore, the public safety agencies will have a means to fund the cost of conversion to an interruptible spectrum leasing regime and have a potential source of revenue to apply to their operations and expansion.

Despite the benefits that may be afforded to public safety agencies as a result of interruptible leasing, it is not a panacea. The costs associated with the transition to a regime conducive to interruptible leasing may be prohibitive. In order to allow spectrum leasing for any non-public safety entity, statutory barriers must be removed, an effort requiring considerable lobbying expenses. For instance, in the 700 MHz band, eligibility for spectrum is limited by the Communications Act to non-commercial services for which "the sole or principal purpose is to

122. St. Clair County, *supra* note 92, at 5.

123. *Id.*

124. *Id.*

125. *Id.* at 4.

126. Comments of Ass'n of Public-Safety Communications-Officials Int'l, Inc., to the *Notice of Proposed Rulemaking and Order* in Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies, ET Dkt. No. 03-108, at 2-3 (May 3, 2004), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516183023. [hereinafter APCO Cog Rad].

127. Wireless NY State Office, *supra* note 55, at 13.

128. Comments of Vanu Inc., to the *Notice of Proposed Rulemaking and Order* in Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies, ET Dkt. No. 03-108, at 1 (May 3, 2004), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516183203. [hereinafter Vanu].

protect the safety of life, health and property."[129] At the state and local levels, other statutory limitations may further limit the practicability of spectrum leases.[130] Moreover, state and local agencies may otherwise lack the legal authority to effectuate a spectrum lease.[131] All of these costs of removing or revising regulatory and legal constraints must be accounted for in evaluating the benefits of leasing public safety spectrum.

The initial costs to move to a spectrum leasing model may be prohibitive in light of an uncertainty of return. Significant one-time costs associated with moving toward secondary markets in the public safety sector include research and development for access and reversion mechanisms.[132] One of the main assumptions underlying the feasibility of secondary markets in the public safety spectrum is that the spectrum is "characterized by high peak-to-average use ratios and low average use."[133] However, the degree to which the public safety spectrum is underutilized will vary depending on the agency, the type of system (trunked or conventional), and whether it is urban or rural.[134] Ironically, in urban areas where a market for spectrum leases is most practicable, there will be no channels available to lease, whereas in rural areas, the opposite may be the case.[135] Demand for emergency services is much greater in urban centers than in rural areas. Indeed, as APCO states, "the presumed market for interruptible spectrum leasing will be greatest in urban areas, where non-interruptible commercial spectrum is unavailable."[136]

Another challenge is that a market for spectrum that could be rendered unavailable for indeterminate amounts of time (for instance, during major disaster like a wildfire or terrorist incident) remains a dubious proposition.[137] Like a public safety agency, during a large-scale emergency, a commercial lessee's need for spectrum may see a concurrent spike as their customer demand for channels is likely to grow instead of diminish.[138] Unfortunately, "the economic value of spectrum subject to such pre-emption would be very low, and unlikely to justify the substantial investment in cognitive radio technologies" that could make

129. 47 U.S.C. § 337(a)(1) (2005); 47 U.S.C. § 337(f)(1)(a) (2005).

130. Comments of Ass'n of Public-Safety Communications-Officials Int'l, Inc., to the Further *Notice of Proposed Rulemaking* in Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets, WT Dkt. No. 00-230, at 3 (Dec. 5, 2003), *available at* http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6515292189. [hereinafter APCO 2ND Markets].

131. Wireless NY State Office, *supra* note 55, at 13.

132. Vanu, *supra* note 128, at 1-2; *see also* APCO Cog Rad, *supra* note 126, at 3.

133. *See generally* Cognitive Radio, *supra* note 2; APCO Cog Rad, *supra* note 126, at 3.

134. APCO Cog Rad, *supra* note 126, at 2.

135. *Id.*

136. *Id.* at 4.

137. NPSTC, *supra* note 46, at 14.

138. *Id.*

implementation possible in the first place.[139] Others have also predicted the transaction costs inherent in any variable system like an interruptible leasing regime to be high.[140] Finally, potential lessees of public safety spectrum may be deterred by the risk of liability for injuries that may arise by a failure to revert the spectrum immediately.[141]

The FCC also should be wary of perverse incentives that may accompany interruptible leasing of public safety spectrum should such markets prove to be lucrative. First, public safety agencies would have a financial incentive to acquire more spectrum or greater channel capacity assets than are needed.[142] This would not only deprive other public safety licensees of needed spectrum, but also would undermine the public interest. As APCO has stated, this could "distort and potentially corrupt spectrum management, worsening the already serious spectrum shortages that exist in many areas."[143]

Further, the authority to lease spectrum by state and local government entities may confuse their mission in serving the health and safety of the public at large. The leasing funds received may not be subject to legal constraint, and hence, may be likely to go into general revenue coffers in order to cover overall budget shortfalls.[144] The costs of spectrum use would be immediately quantifiable and comparable, perhaps leading to lower quality public safety services in favor of seeking a profit. There is also concern that a public safety entity may become a 'front' for a commercial entity that operates under the auspices of a public safety use.[145] Similar problems have occurred in the ITFS and MMDS frequency bands, serving as a warning for applications of interruptible leasing in the public safety arena.[146] Should the FCC authorize public safety spectrum leasing for profit, it must be vigilant in the face of both the over-acquisition of spectrum licenses as well as the potential for abuse in the interruptible leasing systems.

Some commentators have urged a market-based model for handling the public safety spectrum. Ericsson proposed that the public safety agencies abandon the idea of interruptible leasing in favor of using the public mobile networks on a cost basis.[147] Even John Muleta, former chief of the FCC Wireless Bureau, suggested that a reevaluation of the paradigm of self-provisioning government agencies may be

139. APCO 2ND Markets, *supra* note 130, at 4.
140. Ericcson, *supra* note 87, at 8.
141. *Id.*
142. Wireless NY State Office, *supra* note 55, at 13.
143. APCO Cog Rad , *supra* 126, at 3.
144. APCO 2ND Markets, *supra* note 130, at 4, n 6.
145. *Id.*
146. *Id.* at 5.
147. Ericcson, *supra* note 87, at 8-9.

appropriate.[148] For Ericsson and others, the commercial networks are the logical vehicle to carry the public safety transmission because "they offer nationwide and improved in-building coverage, position location, encryption, priority access, group communications, and complete functionality for voice, messaging, data and imaging."[149] Further, the commercial networks would not be subject to the high transaction, research, and development costs associated with a spectrum regime driven by cognitive radio. Finally, Ericsson has posited that the commercial networks already offer flexibility for the integration and information sharing within the databases that the public safety agencies utilize.[150]

Although the market-based model effectively highlights some of the flaws of an interruptible spectrum leasing system, it is not the best solution. Certainly, the potential transaction costs associated with the establishment of a new proprietary network will be enormous and the efficiency of commercial networks merits consideration. However, the idea of public safety agencies as beholden to commercial interests for their spectrum needs is a dubious proposition at best. Even if the charges for spectrum use were kept at 'cost,' it is unclear how that 'cost' would be negotiated. Commercial interests may be tempted to overextend their spectrum commitments and subject the public to price-gouging or inferior or intermittent service. Indeed, Commissioner Copps stated his concern over the "lure of big dollar figures from commercial companies" that might lead to "states and municipalities living in difficult budget environments to lease out not only extra spectrum, but core spectrum."[151]

In an area where timing is often mission critical, it is both logical and necessary to keep the public safety systems proprietary and not subject to the technical constraints and market forces inherent in the commercial sector. In short, the risk of market failure is unacceptable in situations where public safety agencies need access to their spectrum bands.[152] Finally, if public safety agencies were forced to compete in the market at large (in spectrum auctions), they would have to ask Congress for funding. If the congressional allocation is inadequate, there could be a "catastrophic failure of public safety duties nationwide."[153]

As a result, the Commission should proceed cautiously and outline

148. *Id.* at 9 *citing* John Muleta, Chief, Wireless Telecommunications Bureau, Federal Communications Commission, Presentation to National Academy of Science, Computer and Telecommunications Board (Feb. 12, 2004).

149. Ericsson, *supra* note 87, at 9.

150. *Id.* at 8.

151. Copps Statement, *supra* note 98, at 26,909.

152. Joshua Marsh, *supra* note 24 at 8.

153. *Id.*

specific steps to avert any possibility for inappropriate spectrum management on the part of public safety entities or the government agencies that oversee them. The Commission should consider several possible actions to accomplish such a monitoring function. The FCC may conduct frequent comprehensive studies of the use of spectrum and/or may provide a forum for dispute settlement by parties aggrieved by the system. The FCC might wish to oversee the entire system to guard against 'fronts' for spectrum and the exploitation of monies for undue gain. Finally, the statutory scheme currently in place around public safety bands may serve as an express block to the implementation of cognitive radio in spectrum leasing. A calculus of whether outlay of funds to reconfigure the dominant legal and technological regimes can be recouped will be necessary. If the barriers to entry can be minimized and the operation of interruptible leasing proves economical, the move toward such a regime should be advanced with appropriate vigilance.

### *B. Technical Considerations*

Aside from the economic and legal pitfalls discussed above, there are also a number of technical impediments that need to be considered in addressing cognitive radio technology and interruptible public safety leasing. One objective of the Cognitive Radio NPRM was to identify an access and reversion mechanism that would be acceptable.[154] The Commission has subsequently backed away from endorsing any specific technical model for interruptible leasing in the Cognitive Radio Report and Order.[155] Instead, the Commission rightly chose to isolate a number of guiding principles in the technical consideration of future spectrum leasing applications. The Commission's one step forward and two steps back approach illustrates the difficulties attendant any regulation of prospective technology. As such, the Commission needs to be guarded in its consideration of such technologies so that (1) it does not inadvertently stifle their development and (2) it does not endorse an inferior or infeasible technology.

In the FCC's 5-Year Strategic Plan, it identified a number of overriding objectives in relation to public safety.[156] One objective is that the Commission's policies shall facilitate rapid restoration of the United States communications infrastructure and facilities "after disruption by any cause."[157] In the Plan, the Commission noted the imperative to act "swiftly and responsibly" in relation to matters of public safety and the

154. Cognitive Radio, *supra* note 2, at 26,879.

155. Cognitive Radio Order, *supra* note 3, at 5516.

156. *See* FCC, Strategic Plan 2006-11 (rel. July 5, 2005), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-261434A1.doc.

157. *Id.* at 15.

need to "coordinate with *private industry* to develop policies that will further the vision, goals, and objectives of public safety."[158]

The foremost concern in moving forward in spectrum leasing should be the reliability of reversion systems so as to avoid a breach of the public confidence or loss of life.[159] And again, secondary questions of how the government will adopt the best standard without stifling innovation also needs to be considered. Finally, current fears of after-market alteration of cognitive radio devices need to be addressed prior to the adoption of the interruptible leasing model.[160]

Without technology that would allow reliable and near-instant access to leased spectrum, interruptible leasing would fail outright. The Cognitive Radio NPRM states that in applications of public safety spectrum leasing, "access to, as well as reliable and secure use of, spectrum are critical and the public interest may require strong technical assurances."[161]Thus, the FCC expressed interest in identifying a technical method of accessing and reclaiming spectrum for the purpose of standardizing all leasing equipment in order to lower transaction costs to interruptible leasing.[162] Fundamentally, "[c]ognitive radio technologies can be used both to identify spectrum that is available for leased use and to ensure that it reverts to the licensee under the prescribed conditions."[163] As a result of these considerations, the FCC initially favored a "beacon" model of access/reversion. It is important to note the FCC's initial preference for the beacon model as it set the initial dialogue for how the system would be implemented, even without guiding principles. However, by putting the cart before the horse in this manner, the FCC acted prematurely.

In any case, the FCC has since disavowed its support of the beacon method and likewise criticized the 'hand-shaking' method. Instead, the FCC espoused general principles by which technical controls can be judged instead of specific mechanisms of such control. Here, then, the attendant dangers of the FCC's favoring or forcing technology are

158. *Id.* at 16 (emphasis added).

159. The Commission itself has isolated five guiding principles in this light: "1. The licensee must have positive control as to when the lessee can access the spectrum; 2. The licensee must have positive control to terminate the use of spectrum by the lessee so it can revert back to the licensee's use; 3. Reversion must occur immediately upon action by the licensee unless that licensee has made specific provisions for a slower reversion time; 4. The equipment used by the licensee must perform access and reversion functions with an extremely high degree of reliability; 5. The equipment used by the licensee and the lessee must incorporate security features to prevent inadvertent misuse of, and thwart malicious use of, the licensee's spectrum." Cognitive Radio Order, *supra* note 3, at 5515-16, ¶ 86.

160. After market alterations may include any non-factory adjustments made to a cognitive radio that would alter or change its performance characteristics.

161. Cognitive Radio, *supra* note 2, at 26,879.

162. *Id.*

163. *Id.* at 26,880.

manifest – the perverse outcomes associated with the adoption of an inferior control can inhibit innovation. As seen in the analysis of the beacon model below, there are many challenges associated with cognitive radio with regard to adequate functionality in the public safety context. However, these challenges are not unique to public safety. Instead, they demonstrate the broader uncertainties facing this nascent technology. As a result, the lessons to be learned by the FCC's latent adoption of underlying principles in assessing such technologies are instructive. Indeed, the FCC should adopt overarching principles as related to interruptible spectrum leasing in sum total, particularly as it moves from the speculative realm toward reality.

According to the analysis in the Cognitive Radio NPRM , a beacon-based access/reversion system offers the most robust security and reliability to allow for interruptible spectrum leasing.[164] Under a beacon system, the lessee will receive a continuous control signal from the licensee during times when the lessee is permitted to transmit on the frequency. As the FCC noted,

> The lessee may not commence transmissions if the beacon signal is not received, and if the beacon signal is present but then stops while the lessee is transmitting, transmission must cease within a specified time interval. The beacon could be an RF signal sent by the licensee on a designated control frequency, or it may be a signal received over a physical connection such as fiber, copper or coaxial cable.[165]

A public safety licensee would have control of the beacon and demand the reversion of its spectrum as needed. This may be analogized to a light-switch: during times when the lights are off another user may be in the room, but when the lights come on, that user must cease its activities immediately and leave the room. The beacon is self-reinforcing, for if there is a weak-signal or any question as to whether the signal has been triggered, the activity must cease (the light will be turned on). With the release of the NPRM, the FCC postulated that the beacon system promised not only to be the most reliable, but also the most cost-effective to implement.[166]

Also in the Cognitive Radio NPRM, the FCC offered a framework for the security of the beacon system dependent on time signatures and encryption.[167] Given the proliferation of smart and cognitive radio technologies, it is foreseeable that someone might seek an unauthorized

164. *Id.*
165. *Id.*
166. *Id.,* at 26,881.
167. *Id.* at 26,881-82.

use of the spectrum or attempt to cause chaos through spoofing the beacon signal.[168] Spoofing occurs where an unauthorized party originates a rogue beacon signal.[169] To combat spoofing, the beacon might include the time of day and an electronic signature for proper authentication.[170] To further avert the possibility of unauthorized use, "the beacon would contain information on the channel(s) available to prevent unauthorized use of channels by lessees."[171]This electronic signature would be encrypted to further enhance the security profile.[172]

The potential for spoofing or making deleterious after-market modifications to cognitive radios is a daunting one. Some worry that interference from signals emanating from illegal devices may be impossible to track.[173] Others have argued that cognitive and smart radio technologies may make public safety operations susceptible to large-scale virus-like attacks as have occurred on the Internet.[174] The Commission has invited feedback on peer enforcement mechanisms to deal with such problems, and its authentication signature is one step in the right direction. [175] However, before the widespread deployment of cognitive radio technology in the public safety setting, more will need to be done to ensure the sanctity of transmission and security of the overall system.

Unfortunately, the beacon system is not without other flaws. First, as the FCC notes, this "mechanism is fallible. . . because the licensee's signal may not be heard by the lessee under unfavorable propagation conditions."[176] Second, the beacon system assumes that the public safety user would broadcast its presence, which is often neither desired nor operationally acceptable.[177] Battery limitations on some public safety systems would be overwhelmed by the responsibilities of a beacon system, thus making it "simply an impossibility" according to the National Public Safety Telecommunications Council (NPSTC).[178]

Within a beacon system, a quality of performance requirement would demand that a 250 millisecond period be the controlling

168. Webopedia defines spoofing as "to fool" or, in some contexts (like networking and cognitive radio), spoofing "involves trickery that makes a message appear as if it came from an authorized IP address." Webopedia, *What is spoof?*, *at* http://www.webopedia.com/TERM/s/
spoof.html (last visited Sept. 30, 2005).

169. *Id; See also*Cognitive Radio, *supra* note 2, at 26,881-82

170. Cognitive Radio, *supra* note 2, at 26,881-82

171. *Id.* at 26,881.

172. *Id.*

173. ITA, *supra* note 79, at 5.

174. *See* Cognitive Radio, *supra* note 2, at 26,870.

175. *Id.*

176. Cognitive Radio, *supra* note 2, at 26,880.

177. NPSTC, *supra* note 46, at 15.

178. *Id.*

variable.[179] The 250 ms period is derived from the current performance of both small and large public safety networks, including multi-channel analog and digital trunking systems.[180] According to the NPSTC, in the 250 ms period, "the secondary market user would have to detect the presence of a public safety user and relinquish the spectrum while still allowing sufficient time for the public safety user to complete a number of network and device set-up functions."[181] As a result, the reversion time would be expected to be less than 250 ms. Although not an impossibility, such a reversion time would cause high transaction and monitoring costs and would require a concurrent high speed beacon signal that would be subject to numerous radio frequency propagation limits.[182] The Commission has suggested that given the non-linear growth rate of service demands in response to an emergency, instantaneous reversion may be unnecessary.[183] In other words, even in an emergency, a public safety agency may not need to utilize its full spectrum allowance. However, as the NPSTC also points out, attempting to differentiate a critical versus non-critical emergency response is ridiculous in light of the ease with which a crisis situation may arise.[184]

Furthermore, the Industrial Telecommunications Association (ITA) highlighted an important illustration of the need for secure wireless systems, including those currently employed by many public safety agencies and potential beacon systems. According to the ITA, crane operators in shipping ports use private wireless systems to coordinate with workers on the dock and the ships. As the ITA concluded, a delay of even a second can have disastrous consequences in such applications.[185] Likewise in a setting where police, fire, or other emergency crews rely on instantaneous communication, it is vital that spectral pathways be clear to assure the safety of life and service.

The sanctity of human life and property may be compromised in the public safety setting where an alert is delayed to due a slow resource release. In non-continuous use situations like interruptible leasing, predictions regarding initiation and reversion of the principle user's activity will be futile. In both TDMA and traditional systems, the time between assignments and access may vary.[186] As Motorola has indicated, "[t]he consequences of non-voluntary third parties lingering on a

179. *Id.*
180. *Id.* at 14.
181. *Id.*
182. *Id.* at 15.
183. Cognitive Radio, *supra* note 2, at 26,883.
184. NPSTC, *supra* note 46, at 15.
185. ITA, *supra* note 79, at 4-5 n 7.
186. Motorola, *supra* note 49, at 12.

resource when the primary user needs it could be significant and should not be casually dismissed."[187] Many observers thus remain 'skeptical' when dealing with the mission critical functions of public safety radio.[188] The uncertainty of implementing a frequency sensing element in cognitive radio is thus exacerbated in the public safety bands and has led some to conclude that "the Commission should not undermine the reliability of mission critical communications in current or additional future frequency bands used for public safety."[189]

Others, no less skeptical, have argued for a rigorous testing regimen before the deployment of a beacon or like technology.[190] The FCC responded to these and similar criticisms by discontinuing its support for the beacon model, stating that "[u]ltimately, a licensee must itself be satisfied that the technical mechanism being implemented under a lease does in fact provide it with the ability in real time to reclaim use of its spectrum when necessary."[191] Although the FCC has articulated some criteria by which success of reversionary mechanisms may be judged, it has left the definition of such criteria to the discretion of the lessee.[192] In the public safety spectrum, however, the FCC will need to address more specifically the type of mechanism, the criteria by which it will be implemented, and a rigorous testing regimen (either through the non-public safety commercial market or under artificial conditions). Testing would need to occur in non-public safety environments that would approximate the timeliness of the reversion and offer confidence to public safety agencies, interested parties, and the public at large.

Alternative access/reversion mechanisms also merit mention. Overt permission mechanisms might be employed at greater expense, but with greater reliability than beacon-like systems.[193] In one type of overt system, "handshaking," a lessee would be required to "request and receive explicit permission to use spectrum before each transmission."[194] However, this approach would be hampered by the pure number of interactions required, and may necessitate allocation of a separate 'control frequency.'[195] Although overt permission models might yield the greatest reliability, thus far, these models have been deemed unacceptable because of their high transaction costs, as well as their attendant need for further allocation of scarce spectrum space.

---

187. *Id.*
188. APCO Cog Rad, *supra* note 126, at 4.
189. Motorola, *supra* note 49, at 10.
190. *See, e.g.*, APCO Cog Rad, *supra* note 126, at 4.
191. Cognitive Radio Order, *supra* note 3, at 5516.
192. *Id.* at 5515-16; *see supra* text accompanying note 155.
193. Cognitive Radio, *supra* note 2, at 26,880.
194. *Id.*
195. *Id.*

Above all, the potential for interruptible spectrum leasing should not be cast aside lightly for a fear of access or reversion failures. The acute environmental sensory abilities of cognitive radio are likely to overcome any access/reversion and spoofing obstacles in time. The criteria by which viability in reversion will be judged will be determinative and vital in facilitating a successful transition. Certainly, the FCC should not prematurely push the technology at the expense of the public interest and the needs of first responders.

By the same token, it is important that the technology is not unduly delayed or overburdened by regulation that would inhibit its development. The FCC should continue its recently enunciated policy to avoid "inadvertently…[becoming] a barrier to the development and deployment of these technologies."[196] As such, the FCC has correctly moved back from its endorsement of the beacon model and outlined a specific set of criteria by which interruptible leasing technologies will have to be judged in the future.[197] In the public safety context, however, the Commission must be ready to closely scrutinize any technical control before allowing interruptible leasing to become a reality.

## CONCLUSION

The sinking of the Titanic has come to be understood as a defining moment in United States history. The loss of the ship served as a catalyst for the development of a unified spectrum policy to promote rescue operations. Likewise, on September 11, 2001, the United States suffered a tragedy that was a turning point in modern history. There is evidence that firefighters responding inside of the World Trade Center were not able to communicate effectively and did not receive or heed the call to evacuate just prior to its collapse.[198] The failing of September 11 was "chiefly found in the response by the New York City Fire and Police Departments, which was [sic] hampered by inadequate command, unreliable communications equipment and an overwhelmed dispatching system."[199]

At the Pentagon, the lack of interoperability between radio systems caused confusion and delay. The non-federal responders at the Pentagon included responders from Maryland Fire & Rescue, Virginia Fire & Rescue, Virginia State Police, Virginia Department of Transportation, as well as the numerous federal responders, including the FBI and the

196. Cognitive Radio Order, *supra* note 3, at 5487.

197. *Id.* at 5514-16.

198. *See* The National Commission on Terrorist Attacks, THE 9/11 COMMISSION REPORT, 287-88, 290, 307, 318 (2004)

199. Eric Lipton, *Study Suggests Design Flaws Didn't Doom Towers*, N.Y. TIMES, Oct. 20, 2004, at A1.

United States Park Police.[200] All of these responders operated "across the entire span of the 138-174 MHz band."[201] Cognitive radio technologies can facilitate greater interoperability within the public safety bands and allow for greater coordination on the part of first responders. As Chairman Powell has stated, "smart radios could… translate signals between two different radio systems" and accordingly, "[t]his ability may enable more interoperability between public safety first responders – so that, in an emergency, firefighters from one jurisdiction could more effectively communicate with firefighters in another jurisdiction."[202] Cognitive radio technologies offer much hope for the public interest, not only in the form of interoperability, but also in promoting efficient use of the spectrum.

According to the Spectrum Policy Task Force, the "overarching goal of effective spectrum policy is to maximize the potential public benefits to be derived through spectrum-based services and devices."[203] FCC Commissioner Jonathan Adelstein stated that "cognitive radios can potentially play a key role in shaping our spectrum use in the future [and]. . . [c]ognitive radios may also provide licensees with innovative ways to use their current spectrum more efficiently, and to lease their spectrum more easily on the secondary market."[204] One of the most exciting and provocative areas in the application of secondary markets for spectrum is in the public safety realm. The advent of cognitive radio has, for the first time, allowed consideration of the leasing of spectrum on an interruptible basis. Cognitive radio will allow the identification of fallow bands that may be exploited for non-public safety use and the return thereof when needed. Currently, only public safety agencies are allowed to lease one another's spectrum, though the future is likely to bring commercial leasing to the forefront.

Although the public interest may be served by the opportunities for new revenue sources for public safety and a greater use of the radio spectrum, the adoption of interruptible public safety leasing merits pause. First, though the theory behind the interruptible leasing is sound, it is unclear what, if any, market there will be for such spectrum and if it will be self-sustaining. Equally as important, if interruptible spectrum leasing is widely adopted and deployed, criteria or safeguards need to be identified to prevent the potential for economic exploitation, technical failure, and social misunderstanding. In so doing, the nexus of

200. Cognitive Radio, *supra* note 2, at 26,887, n. 86.

201. *Id.*

202. Cognitive Radio, *supra* note 2, at 26,908; Separate Statement of Chairman Michael K. Powell, *supra* note 97, at 26,908.

203. SPECTRUM POLICY TASK FORCE REPORT, *supra* note 21, at 11-12.

204. Cognitive Radio, *supra* note 2; Separate Statement of Chairman Jonathan S. Adelstein, *supra* note 99, at 26,911.

unintended consequences, stifling of innovation, failure of mission critical systems, and the possibility of government responsiveness to the undue influence of commercial parties interested in leasing public safety spectrum may be avoided.

The FCC should venture forth and articulate guiding principles for leasing of the public safety spectrum. Embodied in these principles should be the notion that only legitimate commercial markets will be permissible. This would preclude the possibility that a public safety entity would unduly rent-seek at the expense of its intended beneficiaries. Secondly, since the public is the intended beneficiary of this system, all such leases should be able to demonstrate an end toward the public interest. Third, the market should be free to develop only to the extent that it can demonstrate a robust security profile. Finally, leasing of public safety spectrum should not be considered without a proven, reliable, and cost-effective reversion mechanism.