

**Before the  
Federal Communications Commission  
Washington, D.C. 20554**

In the Matter of	)	
	)	
Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993	)	WT Docket No. 08-27
	)	
Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services	)	

**REPLY COMMENTS OF CTIA–THE WIRELESS ASSOCIATION®**

CTIA – The Wireless Association® (“CTIA”)<sup>1</sup> respectfully submits these Reply Comments in response to the Public Notice soliciting information and data regarding the state of competition in the Commercial Mobile Radio Service (“CMRS”) industry for incorporation into the *Thirteenth Annual CMRS Competition Report*.<sup>2</sup> To refresh the record, CTIA submits the results of the most recent Semi-Annual Wireless Industry Survey that were released on April 1, 2008 during CTIA WIRELESS 2008®.<sup>3</sup> The new survey results continue to exhibit a remarkable level of competition in the U.S. wireless marketplace.

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<sup>1</sup> CTIA is the international organization of the wireless communications industry for both wireless carriers and manufacturers. Membership in the association covers Commercial Mobile Radio Service (“CMRS”) providers and manufacturers, including cellular, broadband PCS, ESMR, and AWS, as well as providers and manufacturers of wireless data services and products.

<sup>2</sup> WTB Seeks Comment on CMRS Market Competition, *Public Notice*, WT Docket No. 08-27, DA 08-453 (Feb. 25, 2008).

<sup>3</sup> See CTIA-The Wireless Association® Announces New Wireless Industry Survey Results, Press Release, available at <http://www.ctia.org/media/press/body.cfm/prid/1747> (Apr. 1, 2008).

CTIA also takes this opportunity to address concerns that the FCC’s findings in previous CMRS Competition Reports have been undermined by the Commission’s failure to establish an a priori framework for effective competition.<sup>4</sup> Commissioner Copps, concurring in previous competition reports, expressed concern over what he identified as a lack of an objectively-measurable definition of “effective competition” and what he saw as the need to define the term in order to properly assess whether current competition data meets the Commission’s definition.<sup>5</sup> To assist the Commission with properly framing this inquiry, CTIA has retained Robert W. Hahn, the Executive Director of the Reg-Markets Center at AEI, Robert E. Litan, the Vice President for Research and Policy at the Kauffman Foundation in Kansas City and a Senior Fellow in Economic Studies at the Brookings Institution, and Hal J. Singer, President of Criterion Economics. At CTIA’s request, Drs. Hahn, Litan and Singer have prepared the attached paper to address the methodological issues raised by the Commission regarding its assessment of effective competition in the wireless industry.<sup>6</sup>

Drs. Hahn, Litan and Singer demonstrate that it is unnecessary for the Commission to develop a novel method for defining effective competition in the wireless industry. By using the FCC’s methodology for evaluating the competitiveness of

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<sup>4</sup> See 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, *Twelfth Report*, WT Docket No. 07-71, FCC 08-28, Statement of Commissioner Michael J. Copps, Approving In Part and Concurring in Part (Feb. 4, 2008) (“*Twelfth Report*”).

<sup>5</sup> See *id.*; *In re* 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, *Eleventh Report*, WT Docket No. 06-17, FCC 06-142, Concurring Statement of Commissioner Michael J. Copps (Sept. 29, 2006) (“*Eleventh Report*”).

<sup>6</sup> “Declaration of Robert W. Hahn, Robert E. Litan and Hal J. Singer” (Apr. 10, 2008) (“Hahn, Litan and Singer Paper,” attached hereto as “Attachment A”).

communications markets in other contexts, Drs. Hahn, Litan and Singer infer a composite definition of effective competition that is also consistent with relevant economic literature. Specifically, Drs. Hahn, Litan and Singer note that a communications product market is effectively supplied in the *absence* of the following conditions:

- An incumbent firm possessing classic or exclusionary market power;
- High barriers to entry that are controlled by an incumbent firm or that arise from regulation; and
- Coordinated business activities among incumbents.<sup>7</sup>

From an analysis of the *Twelfth Report* data, Drs. Hahn, Litan and Singer find that the Commission rightly concluded the U.S. wireless market is characterized by effective competition. The *Twelfth Report* provides ample evidence that each of the above conditions are absent in today’s American wireless marketplace – thus, confirming the U.S. CMRS industry is indeed competitive by standards historically used by the Commission.<sup>8</sup>

While no market is “perfectly” competitive, “effective” competition has given U.S. wireless consumers lower prices and more minutes of use than consumers in Europe and Japan.<sup>9</sup> In a recent *ex parte* filing on the state of the global marketplace,<sup>10</sup> CTIA

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<sup>7</sup> See Attachment A at para. 22.

<sup>8</sup> *Id.* at para. 23.

<sup>9</sup> The *Twelfth Report* compares the U.S. versus a number of European and Asia-Pacific countries, noting that “the United States still leads the world in average minutes of use per subscriber, and mobile calls continue to be significantly less expensive on a per minute basis in the United States than in Western Europe and Japan.” While noting the potential impact of calling party pays versus mobile party pays regimes (and the high mobile termination rates set by carriers in other countries), the section observes “the results of this international comparison can be interpreted as evidence that the U.S. mobile market is effectively competitive relative to mobile markets in Western Europe and also Japan.” See *Twelfth Report* at paras. 236, 229.

provided a summary comparing the U.S. wireless market with the markets of the rest of the Organisation for Economic Co-Operation and Development's ("OECD") top 10 countries ranked by Gross Domestic Product.<sup>11</sup> The United States wireless market leads each category reviewed, except one, where the U.S. was second. Whether it is the most affordable service or the remarkable breadth of choice and services, it is clear that American consumers continue to enjoy the benefits of a vibrantly competitive wireless market that is second to none.

Additionally, CTIA is grateful for the Commission's recent public recognition of the success of the wireless industry as "a true leader in innovation"<sup>12</sup> and as "the poster child for competition."<sup>13</sup> As Chairman Martin said in his remarks during CTIA

WIRELESS 2008@:

It is difficult to envision how the communications landscape will look in 15, 10, or even five years from now. But one thing is certain – our communications will be increasingly mobile...We are seeing unprecedented growth and dramatic innovation...[W]ireless is no longer seen as a luxury, but as a vital means of everyday communication.<sup>14</sup>

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<sup>10</sup> CTIA-The Wireless Association® Written *Ex Parte Communication*, WT Docket Nos. 07-71, 05-194, available at [http://files.ctia.org/pdf/filings/080108\\_US-OECD\\_10\\_Comparison\\_Ex\\_Parte.pdf](http://files.ctia.org/pdf/filings/080108_US-OECD_10_Comparison_Ex_Parte.pdf) (Jan. 8, 2008).

<sup>11</sup> See Gross Domestic Product, Organisation for Economic Co-Operation and Development available at <http://www.oecd.org/dataoecd/48/4/37867909.pdf> (last accessed Apr. 10, 2008).

<sup>12</sup> See Comments of Commissioner Deborah Taylor Tate, CTIA Wireless 2008, Las Vegas, NV, available at [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DOC-281335A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-281335A1.pdf) (Apr. 2 2008) ("Remarks of Commissioner Tate").

<sup>13</sup> See Remarks of FCC Chairman Kevin J. Martin, CTIA Wireless 2008, Las Vegas, NV, available at [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DOC-281259A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-281259A1.pdf) (Apr. 1, 2008) ("Remarks of Chairman Martin").

<sup>14</sup> *Id.*

CTIA appreciates the Commission's efforts to better understand the wireless industry and to maintain a regulatory environment that rewards providers' entrepreneurial efforts by ensuring that the FCC's rules do not hinder innovation.<sup>15</sup> As CTIA President and CEO, Steve Largent observed, "year after year, the wireless industry continues to evolve, innovate, compete and grow at a rapid pace, and it looks like 2008 is right on track with this impressive trend."<sup>16</sup> Just after release of CTIA's Semi-Annual Survey results, Mr. Largent remarked "these numbers hold [ ] solid clues as to how wireless is evolving in the year 2008 and beyond."

Conducted since 1985, CTIA's Semi-Annual Wireless Industry Survey has developed industry-wide information drawn from operational member and non-member wireless service providers. Although participation is voluntary, the survey has an excellent response rate. For the December 31, 2007 installment of the semi-annual survey, CTIA received responses from companies serving 96 percent of wireless subscribers.<sup>17</sup> The survey provides aggregate information solicited from service providers including the number of wireless subscribers, average minutes of use, average

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<sup>15</sup> See Remarks of Commissioner Tate; Remarks of Chairman Martin announcing the circulation of "an order dismissing a petition for declaratory ruling filed by Skype that would apply Carterfone requirements to existing wireless networks."

<sup>16</sup> CTIA-The Wireless Association® Announces New Industry Survey Results, Press Release, available at <http://www.ctia.org/media/press/body.cfm/prid/1747> (Apr. 1, 2008).

<sup>17</sup> See CTIA Semi-Annual Wireless Industry Survey Method, available at <http://www.ctia.org/advocacy/research/index.cfm/AID/10316>.

local monthly bill, number of cell sites, and total service revenues. A copy of CTIA's Year End 2007 Top-of-the-Line Survey Results is attached.<sup>18</sup>

The survey results reveal that as of December 2007, there were more than 255 million wireless subscribers in the U.S. – approximately 84 percent of the U.S. population has embraced the wireless revolution.<sup>19</sup> This represents an increase of more than 22 million subscribers in one year. These wireless subscribers increasingly use more voice minutes, which exceeded two trillion in 2007, up nearly 18 percent over 2006.<sup>20</sup> With millions of wireless consumers using their handsets as mini-computers, mini-music players, and mini-TVs, annual wireless data revenues exceeded \$23 billion, representing roughly 17 percent of total carrier revenue, an increase of 53 percent from last year.<sup>21</sup> The survey also reports that text messaging remains enormously popular, with Americans sending and receiving more than 48 billion messages during the month of December 2007 alone. Americans sent and received 1.6 billion messages per day, representing an increase of 157 percent since December 2006. A recent J.D. Power and Associates report also found that photo applications are particularly popular among wireless consumers, as 34 percent of those surveyed report using this feature, representing a 15 percent increase

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<sup>18</sup> See CTIA Year End 2007 Top-Line Survey Results, available at [http://files.ctia.org/pdf/CTIA\\_Survey\\_Year\\_End\\_2007\\_Graphics.pdf](http://files.ctia.org/pdf/CTIA_Survey_Year_End_2007_Graphics.pdf) (attached hereto as "Attachment B").

<sup>19</sup> *Id.*; See also CTIA Wireless Quick Facts Year End Figures, available at <http://www.ctia.org/advocacy/research/index.cfm/AID/10323>.

<sup>20</sup> *Id.*

<sup>21</sup> CTIA Wireless Quick Facts Year End Figures, available at <http://www.ctia.org/advocacy/research/index.cfm/AID/10323>.

from 19 percent in 2005.<sup>22</sup> Other frequently used handset features among wireless subscribers include: gaming (13%); Bluetooth capabilities (11%); ringback tones (9%); picture messaging/e-mail (9%); surfing the Internet (8%); and instant messaging (8%).<sup>23</sup>

New consumer survey data also released during CTIA Wireless 2008® by MyWireless.org® shows that U.S. wireless consumers are extremely happy with their wireless service and choices, and they are against federal or state intervention that will raise prices and slow innovation.<sup>24</sup> The top findings revealed nearly 9 out of 10 wireless consumers or 89 percent are satisfied with their service. Overwhelmingly, 82 percent agree that “competition among wireless providers gives consumers enough choices so they pick the wireless device, plan, options and content that best fits their needs.” While 75 percent of the consumers polled believe new government regulations would make cell phone service more expensive, close to two-thirds (63 percent) believe that “existing competition among cell phone providers already ensures that consumers have adequate consumer protections.” These results affirm the benefits of a relatively light-handed regulatory approach as wireless consumers are satisfied with their service and are skeptical about adding new regulations on wireless services.<sup>25</sup>

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<sup>22</sup> See J.D. Power and Associates Reports: Feature-Rich Wireless Mobile Phones Increase Average Consumer Service Spending for Both Handset Manufacturers and Service Providers, Press Release, available at <http://www.jdpower.com/corporate/news/releases/pdf/2007271.pdf> (Nov. 15, 2007).

<sup>23</sup> *Id.*

<sup>24</sup> See MyWireless.org® National Consumer Survey, Press Release, available at <http://www.mywireless.org/news/pr040108b/> and <http://www.mywireless.org/news/pr040108/>. The bi-partisan national survey of 1,000 adult wireless phone users was conducted March 17-19, 2008 by McLaughlin & Associates, partnered with Penn, Schoen & Berland Associates.

<sup>25</sup> *Id.*

## CONCLUSION

CTIA hopes that the information provided in these reply comments assists the Commission in preparing its *Thirteenth Annual CMRS Competition Report*. Consistent with its conclusion in previous CMRS Competition Reports, the Commission should once again affirm that the wireless industry is effectively competitive, and is delivering to consumers the full benefits of a competitive marketplace – lower prices, higher quality, and greater choice of services.

Respectfully submitted,

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April 10, 2008

# **ATTACHMENT**

**A**

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Federal Communications Commission  
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Implementation of Section 6002(b) of the	)	
Omnibus Budget Reconciliation Act of 1993	)	WT Docket No. 08-27
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Annual Report and Analysis of Competitive	)	
Market Conditions With Respect to	)	
Commercial Mobile Services	)	

**DECLARATION OF ROBERT W. HAHN, ROBERT E. LITAN AND HAL J. SINGER**

Introduction and Summary of Conclusions

Qualifications

- I. The FCC’s Construction of Effective Competition in Other Contexts
- II. Factors That Inform the FCC’s Definition of Effective Competition from the FCC’s 12th Report
  - A. Is There an Incumbent Firm (or Firms) that Possesses “Classic Market Power”?
  - B. Is There an Incumbent Firm (or Firms) that Possesses “Exclusionary Market Power”?
  - C. Are There High Barriers to Entry That Are Controlled by an Incumbent Firm or Arise from Regulation?
  - D. Is There Evidence of Coordinated Interaction Among Incumbents?

Conclusion

Appendix A: Curriculum Vitae of Dr. Robert W. Hahn

Appendix B: Curriculum Vitae of Dr. Robert E. Litan

Appendix C: Curriculum Vitae of Dr. Hal J. Singer

## INTRODUCTION AND SUMMARY OF CONCLUSIONS

1. In its capacity as regulator of the U.S. Commercial Mobile Radio Services (CMRS) industry, the Federal Communications Commission (“Commission” or “FCC”) periodically evaluates the state of competition within the industry. In its most recent Annual Report on the wireless industry, the Commission concluded “that the CMRS marketplace is effectively competitive.”<sup>1</sup> Although this conclusion is consistent with earlier Commission reports as well as the literature on competitive markets generally, some suggest the force of the Commission’s findings is undermined by a failure to establish an *a priori* framework for effective competition.<sup>2</sup>

2. In this declaration, we demonstrate that it is unnecessary for the FCC to develop a novel method for defining effective competition in the wireless industry. We proceed first by evaluating other contexts in which the FCC has assessed the competitiveness of a communications market. Second, we construct a definition based on the commonalities from those other regulatory proceedings. Third, we show that the definition is consistent with a sampling of the relevant economic literature on the topic of effective competition. Finally, applying data exclusively from the Twelfth Report, the analysis strongly indicates the U.S.

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1. In re 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, Twelfth Report, WT Docket No. 07-71, FCC 08-28, ¶293 (rel. Feb. 4, 2008) (hereinafter “*Twelfth Report*”)]

2. See *Twelfth Report* at Statement of Commissioner Michael J. Copps, Approving in Part and Concurring in Part (objecting to the methodology of the most recent wireless competition report and noting specifically that the report proceeds without defining an *a priori* standard for “effective competition.” The Commissioner argues: “[W]e come at the problem backwards—gathering some data throughout the year and, when report time rolls around, letting the data drive us to an undefined conclusion that competition is present. Not only does this *post hoc* process lack methodological rigor, it also leaves consumers, industry, and Congress with no clear idea of how this Commission will react to further changes in the market.” *Id.*

wireless market is characterized by effective competition, as the Commission has rightly concluded.<sup>3</sup>

### QUALIFICATIONS

3. My name is Robert W. Hahn. I am the Executive Director of the Reg-Markets Center at AEI and, before that, the AEI-Brookings Joint Center.

4. I (Hahn) am the author or editor of over ten books, including *Reviving Regulatory Reform: A Global Perspective*; *Antitrust Policy and Vertical Restraints*; *Information Markets*; *Intellectual Property Rights in Frontier Industries*; *In Defense of the Economic Analysis of Regulation*; *High-Stakes Antitrust*; *Government Policy toward Open Source Software*; *Reviving Regulatory Reform*; *Do Federal Regulations Reduce Mortality?*; and *What Has the Kyoto Protocol Wrought?*; *Economics and Politics of Climate Change*. Before joining AEI and Brookings, I was a research fellow at Harvard University, and I also served on the faculty of Carnegie Mellon University. I earned M.S. and Ph.D. degrees in economics from the California Institute of Technology, and a B.A. and M.A. from Brown University. My curriculum vitae is provided in an appendix to this report.

5. My name is Robert E. Litan. I am the Vice President for Research and Policy at the Kauffman Foundation in Kansas City and a Senior Fellow in Economic Studies at the Brookings Institution. At Kauffman, I oversee a multi-million budget for academic research relating to entrepreneurship. At Brookings, I conduct research on financial, regulatory and other policy issues related to the performance of the business sector of the economy.

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3. Significantly, the Commission notes that the U.S. wireless market compares favorably to Western European markets in several metrics, including average voice usage, the percentage of subscribers using mobile phones for web browsing, and the per-minute cost of calling. *Id.* at ¶ 2.

6. During my career, I (Litan) have authored or co-authored 22 books, edited or co-edited another 22, and authored or co-authored over 200 articles in journals, magazines and newspapers on government policies affecting financial institutions, regulatory and legal issues, international trade, and the economy in general. My most recent books include *Good Capitalism, Bad Capitalism, and Economics of Growth and Prosperity* (Yale University Press, 2007, with two co-authors); *Competitive Equity: A Better Way to Organize Mutual Funds* (AEI Press, 2007, with Peter J. Wallison); *Worldwide Financial Reporting* (Oxford University Press, 2006, with three co-authors); and *Financial Statecraft* (Yale University Press, 2006, with Benn Steil).

7. I (Litan) have consulted for numerous organizations, public and private, and testified as an expert witness in a variety of legal and regulatory proceedings involving domestic (banking, antitrust) and international (primarily trade) issues. I also have consulted for private-sector firms and the Department of Justice on other antitrust matters (especially those involving the telecommunications industry). Among my various assignments, I have written a number of influential federal reports. I co-authored two Congressionally mandated studies for the Treasury Department on the role of the Community Reinvestment Act after the Financial Modernization Act of 1999. During 1996-97, I served as a consultant to the Treasury Department, in which I was the lead author of its report to Congress on the future of the financial services industry (*American Finance in the 21st Century*), and in 1998-99, I was the main author of the Report of President's Commission to Study Capital Budgeting. In 1998, I also chaired the National Academy of Sciences Committee on Assessing the Costs of Natural Disasters, which produced a report *The Impacts of Natural Disasters: A Framework for Loss Estimation*. Among my many private reports is one written on the benefits of broadband technology in lowering the costs of medical care.

8. I (Litan) also have served in several capacities in the federal government. During 1995 and 1996, I was Associate Director of the Office of Management and Budget (where I was responsible for overseeing budgetary and other policies of several federal departments and agencies). From 1993 to 1995, I was Deputy Assistant Attorney General, in charge of civil antitrust litigation and regulatory issues, at the Department of Justice (where among other matters, I supervised the first investigation of Microsoft for abusing its dominant market position in the market for personal computer operating systems through exclusionary conduct and which resulted in a consent decree, and also participated actively in a variety of telecommunications policy matters). From 1977 to 1979, I was the regulatory and legal staff specialist at the President's Council of Economic Advisers. In the early 1990s, I was a Member of the Commission on the Causes of the Savings and Loan Crisis.

9. I (Litan) received a B.S. in Economics (summa cum laude) from the Wharton School of Finance at the University of Pennsylvania; my J.D. from Yale Law School; and both my M. Phil. and Ph.D. in Economics from Yale University. My curriculum vitae is provided in an appendix to this report.

10. My name is Hal J. Singer. I am President of Criterion Economics. My areas of economic expertise are antitrust, industrial organization, and regulation. I have applied my expertise to several regulated industries, including insurance, health care, telecommunications, and video programming.

11. I (Singer) have published a book chapter in *Access Pricing: Theory, Practice and Empirical Evidence* (Justus Haucap and Ralf Dewenter eds., Elsevier Press 2005) and in *Handbook of Research in Trans-Atlantic Antitrust* (Philip Marsden, ed., Edward Elgar Publishing

2006). I am also the co-author of the book *Broadband in Europe: How Brussels Can Wire the Information Society* (Kluwer/Springer Press 2005).

12. I (Singer) have published scholarly articles in several economics and legal journals, including *American Economic Review Papers and Proceedings*, *Berkeley Technology Law Review*, *Canadian Journal of Law and Technology*, *Federal Communications Law Journal*, *Harvard Journal of Law and Technology*, *Hastings Law Journal*, *Journal of Business and Finance*, *Journal of Competition Law and Economics*, *Journal of Financial Transformation*, *Journal of Industrial Economics*, *Journal of Insurance Regulation*, *Journal of Network Industries*, *Journal of Regulatory Economics*, *Journal of Telecommunications and High Tech Law*, *Review of Network Economics*, *Telecommunications Policy Journal*, *Topics in Economics Analysis and Policy*, and *Yale Journal on Regulation*.

13. In regulatory proceedings, I (Singer) have presented economic testimony in several forums, including the U.S. Federal Communications Commission, the U.S. Federal Trade Commission, the Antitrust Division of the U.S. Department of Justice, the U.S. National Highway Traffic and Safety Administration, the House of Commons of Canada, the Canadian Radio-television and Telecommunications Commission, and the U.S. Congressional Budget Office.

14. I (Singer) have also served as a testifying expert in several litigation matters. My experience as a testifying expert in litigation is summarized in my CV, which is attached to this report. In addition to litigation, I have written expert testimony in regulatory proceedings and commissioned white papers for several firms and trade associations, including 1-800 CONTACTS, Advanced Medical Device Manufacturers Association (AdvaMed), Allegheny Communications, AT&T, Bell Canada, BellSouth, Broadband Roundtable, Cellular Telephone

Industry Association (CTIA), Coventry First, General Motors, Harvest Partners, Internet Innovation Alliance, Medical Device Manufacturers Association, National Association of Broadcasters, Qwest, SBC, TELUS, Verizon, and Walt Disney.

15. Before joining Criterion, I (Singer) worked at LECG, an economic consulting firm based in Emeryville, California. In addition, I have worked as an economist for the Securities and Exchange Commission and the Army Corps of Engineers, and I have taught microeconomics and international trade at the undergraduate level.

16. I (Singer) earned M.A. and Ph.D. degrees in economics from the Johns Hopkins University and a B.S. *magna cum laude* in economics from Tulane University.

#### **I. THE FCC'S CONSTRUCTION OF EFFECTIVE COMPETITION IN OTHER CONTEXTS**

17. In 1993, Congress established as a fundamental communications policy goal the promotion of competition in the CMRS market.<sup>4</sup> The Commission was directed to produce an Annual Report on wireless competition, in which it must evaluate:

[t]he number of competitors in various commercial mobile services, an analysis of whether or not there is effective competition, an analysis of whether any of such competitors have a dominant share of the market for such services, and a statement of whether additional providers or classes of providers in those services would be likely to enhance competition.<sup>5</sup>

Since 1995, the Commission has analyzed competitive indicators within a framework of four categories: market structure, provider conduct, consumer behavior, and market performance.<sup>6</sup> The Commission has reiterated its position that market structure indicators alone are not sufficient to show effective competition in the market; rather, an analysis of both structural and

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4. See Omnibus Budget Reconciliation Act of 1993, Pub. L. No. 103-66, Title VI, § 6002(b), amending the Communications Act of 1934 and codified at 47 U.S.C. § 332(c).

5. 47 U.S.C. § 332 (c)(1)(C).

6. *Twelfth Report* at ¶ 5.

behavioral characteristics must be adopted to determine competitiveness.<sup>7</sup> In applying this framework to the most recent data, the Commission concluded in its Twelfth Report that “the CMRS marketplace is effectively competitive.”<sup>8</sup> This position is consistent with several prior Commission statements regarding the competitiveness of the wireless marketplace.<sup>9</sup>

18. The Commission evaluates the competitiveness of communications markets in other contexts, and thus provides more than enough guidance as to how one might assess the competitiveness of wireless market now. One such context is when the Commission determines whether to approve the transfer of a wireless license as part of a merger and acquisition. The FCC’s method of analysis in such a situation illustrates how it conducts a competitive assessment.

19. Specifically, FCC merger review employs the public interest framework generally to evaluate the worthiness of a proposed transaction.<sup>10</sup> Within this structure, the Commission proceeds with a competition analysis of the proposal, and will reject it if the transaction creates or enhances significant market power or is unlikely to serve the public interest.<sup>11</sup> The evaluation relies heavily on an assessment of market structure to determine the competitive effects of the proposed transaction. In this process, the Commission defines both output and input (for example, spectrum) markets at the product and geographic levels; identifies the relevant market

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7. *Id.* at ¶ 5.

8. *Id.* at ¶ 293.

9. *See* 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, Eleventh Report, WT Docket No. 06-17, FCC 06-142, ¶¶ 2-5 (Sept. 29, 2006) (“Hereinafter *Eleventh Report*”).

10. 47 U.S.C. §§ 214(a), 310(d) (the issuance and transfer of wireless licenses must “serve the public interest, convenience, and necessity”).

11. Applications of AT&T Wireless Services, Inc., Transferor, and Cingular Wireless, Corp., Transferee, *Memorandum Opinion and Order*, 19 FCC Rcd 21522, 21543 ¶ 68 (2004) (hereinafter “*Cingular-AT&T Wireless Order*”).

participants;<sup>12</sup> and examines the effect of the proposed transaction on market concentration, consumer choice, prices, and remaining market participants' output decisions (both unilateral and in coordination with other firms).<sup>13</sup> In conducting this analysis, the Commission considers the transparency of information, presence of mavericks, and pace/potential for technological development. The Commission also considers whether the product at issue is homogenous because the substitutability of products acts as a check on anticompetitive behavior.<sup>14</sup> The merger analysis closes with a weighing of public interest benefits and harms.

20. For example, in the Sprint-Nextel merger proceedings, the merger was projected to lead to significant public interest benefits: specifically, improvement in service quality and broader deployment of the next generation of advanced wireless services.<sup>15</sup> Although it noted that the merger would tend to increase market concentration,<sup>16</sup> the Commission nevertheless found that public interest harm was unlikely, mainly due to the fact that every market had “multiple other carriers” which serve as “effective competitive constraints” on one another.<sup>17</sup>

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12. See, e.g., Applications of Nextel Communications, Inc. and Sprint Corp. Applications for Consent to Transfer Control of Licenses and Authorizations, *Memorandum Opinion and Order*, 20 F.C.C. Rcd 13967, (2005) (hereinafter “*Sprint-Nextel Order*”). The number of firms is critical to the analysis. In the *Sprint-Nextel Order*, the Commission considered whether there were “multiple... substantial carriers in each overlap market with the capacity to add subscribers and the ability to add capacity.” *Id* at ¶3. Four or more firms in a market appears to be the threshold for finding that a market is not conducive to competitive problems (i.e., unilateral price increases or reduction of output, collusion).

13. In reviewing mergers, the U.S. Department of Justice and the Federal Trade Commission—the primary agencies charged with evaluating antitrust and competition issues in the United States—similarly scrutinize the competitive effects of proposed transactions. Horizontal Merger Guidelines, issued by the U.S. Department of Justice and the Federal Trade Commission (Apr. 2, 1992, revised Apr. 8, 1997) § 2. In the context of merger review proceedings, both agencies have concluded that the U.S. wireless market is not overly concentrated and lacks a structure conducive to the exercise of market power. See, e.g., Statement of the Department of Justice Antitrust Division on the Closing of the Investigation of Sprint Corporation's Acquisition of Nextel Communications Inc. (press release) Aug. 3, 2005.

14. Significantly, the FCC has characterized wireless products in both the Sprint-Nextel and Cingular-AT&T Wireless merger as differentiated, yet substitutable. See *Sprint-Nextel Order* at ¶ 101. See also *Cingular-AT&T Wireless Order* at ¶ 116.

15. *Sprint-Nextel Order* at ¶ 3.

16. *Id.* at ¶ 3.

17. *Id.* at ¶119.

The Commission concluded the wireless market would remain “sufficiently competitive to ensure that market performance will not be impaired.”<sup>18</sup>

21. Another context in which the Commission evaluates the competitiveness of markets is when an incumbent local exchange carrier (“ILEC”) requests forbearance from enforcement of dominant carrier rules following the sunset of Section 272.<sup>19</sup> In 272 forbearance proceedings, the FCC grants relief from dominant carrier regulation where the incumbent can show the market is open to competition (that is, the incumbent firm lacks market power).<sup>20</sup> Using the 2007 Qwest forbearance analysis as an example, the starting point is to define the product and geographic markets.<sup>21</sup> Second, market participants are identified.<sup>22</sup> Third, the inquiry addresses whether there exists an incumbent with market power, either in the “classic sense” (with the ability to unilaterally raise prices above the competitive level), or through exclusive conduct (by using means other than competition on the merits to exclude rivals and thus impair competition in a relevant market).<sup>23</sup> Thus, in addressing “classic” market power, the Commission would examine existing market shares, trends in its market share, demand substitutability, price elasticity (own- and cross-price), and supply substitutability (including capacity to expand).<sup>24</sup> In seeking to determine whether the incumbent has the ability to exclude rivals, the Commission determines whether there is a bottleneck facility, and if so, whether there exists a firm (or firms) with the ability to use that bottleneck to raise rivals’ costs.<sup>25</sup> Finally, the Commission determines

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18. *Id.* at ¶184.

19. *See* Petition of Qwest Communications International Inc. for Forbearance from Enforcement of the Commission’s Dominant Carrier Rules as they Apply after Section 272 Sunsets, Memorandum Opinion and Order, 22 FCC Rcd 5207 (2007) (hereinafter “*Qwest 272 Forbearance Order*”).

20. *Id.* at ¶ 14.

21. *Id.* at ¶¶ 15-28. The forbearance proceeding is prescribed by the 47 U.S.C. § 160.

22. *Id.* at ¶¶ 29-30.

23. *Id.* at ¶¶ 31-46.

24. *Id.* at ¶¶ 31-46, 50-54.

25. *Id.* at ¶ 47.

whether the “charges, practices, classifications, and regulations” are likely to remain “just and reasonable” and not “unjustly or unreasonably discriminatory” in the absence of regulation.<sup>26</sup> Forbearance is warranted if dominant carrier regulation is no longer necessary to protect consumers, would serve the public interest, and would “promote competitive market conditions.”<sup>27</sup> Where classic market power is absent, a firm is unlikely to have the ability to impose unjust or unreasonable prices and practices. Similarly, where there is no market power, firms would not act in a manner “inconsistent with the best interests of customers” for fear of punishment in the market. It is in the public interest to forbear from regulation if it would “promote competitive market conditions and enhance competition among providers.” Conditions that permit firms to compete and to innovate are in the public interest.

22. Based on these previously employed FCC analyses, as well as the structure of the Commission’s annual reports, it is evident that a communications product market is effectively competitively supplied in the *absence* of the following conditions:

- ***An incumbent firm possesses “classic market power”—that is, the ability to raise prices unilaterally.*** Classic market power can be informed by evidence regarding market shares, trends in market share, demand substitutability, price elasticity, and supply substitutability (including capacity to expand), and size and growth of intermodal substitution.
- ***An incumbent firm possesses “exclusionary market power”—that is, the ability to exclude rivals.*** Exclusionary market power can be informed by evidence of the existence of a bottleneck facility, and if so, whether the market is characterized by firms with the ability to use that bottleneck to raise rivals’ costs.
- ***High barriers to entry controlled by an incumbent firm or that arise from regulation.*** Market-wide barriers to entry can be informed by evidence of the fixed cost of acquiring licenses, absence of additional spectrum allocation plans by the regulator, and lumpiness of investment in new technologies.

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26. *Id.* at ¶¶ 48-50.

27. *Id.* at ¶¶ 48-50.

- ***Incumbent firms coordinate business activities.*** Coordination can be informed by evidence of product homogeneity, repeated interaction among suppliers, transparency and complexity of product offerings, availability of information regarding price and quality, presence of maverick firms, and technological development.

23. If none of the above conditions is demonstrated, there should be a high degree of confidence that the market is effectively competitive. Even if one or more of the above conditions is present, the market may still be reasonably competitive. Nevertheless, as shown below, the Twelfth Report contains ample evidence to show each of the above condition is in fact absent in today's American wireless marketplace, thereby confirming that this particular market is indeed competitive by the standards the Commission historically has used.

24. The Commission's approach is also consistent with the economics literature. Professors Carlton and Perloff, in one of the leading textbooks in industrial organization, identify seven assumptions of a competitive marketplace: substitutable goods, information regarding price and quality, price taking behavior, low transaction costs, low externalities, low barriers to entry and exit, and divisible output.<sup>28</sup> Each of these core assumptions is subsumed into one or more of the elements in our synthesized definition. Substitutability and price taking behavior both inform the classic market power analysis. The availability of information and presence of externalities is best considered in the analysis of business activity coordination. Finally, transaction costs and divisible output are considered as part of the analysis of barriers to entry and exclusionary market power, which are given special focus within the context of FCC proceedings.

25. Professors Elhauge and Geradin suggest a similar picture of a competitive marketplace: entry and exit at low cost, substitutable products, informed parties, a high number

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28. See DENNIS W. CARLTON AND JEFFREY M. PERLOFF, MODERN INDUSTRIAL ORGANIZATION 57 (3d ed. 2000).

of large and competitive firms, the ability to expand or contract output, and an inability to unilaterally maintain supranormal profits.<sup>29</sup> Professor Tirole evaluates six general areas of competitive behavior (or the absence thereof): price competition, non-price competition, barriers to entry and exit, information availability, strategic behavior, and innovation through research and development.<sup>30</sup> Again, these definitions all share a majority of common elements with the Commission's competition analysis.

## **II. FACTORS THAT INFORM THE FCC'S DEFINITION OF EFFECTIVE COMPETITION FROM THE FCC'S 12TH REPORT**

26. In this section, we apply the competition framework revealed in recent Commission decisions to the data cited in the FCC's Twelfth Report. We conclude that none of the conditions defining a less-than-competitive market is satisfied—that is, we conclude that the wireless industry is effectively competitively supplied. In reaching this conclusion, we do not mean to infer that the competitiveness of the wireless industry cannot be improved. Virtually no market is “perfectly competitive,” with prices always equal to marginal costs. Instead, most markets in any economy are constantly in flux, with suppliers constantly innovating, experimenting with different pricing and marketing strategies, and so on. In such markets, prices may deviate from marginal cost because the market itself is in disequilibrium: the temporary discrepancies between price and marginal cost provide the incentive for firms to continue to innovate.<sup>31</sup> The appropriate test for policy makers, as the Commission's factors reveal, is whether a market is “effectively competitive”: are there features which permit one or more suppliers to consistently maintain prices above competitive levels or to exclude rivals or to do

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29. *SEE* EINER ELHAUGE AND DAMIEN GERADIN, *GLOBAL ANTITRUST LAW AND ECONOMICS* 1 (2007).

30. *SEE* JEAN TIROLE, *THE THEORY OF INDUSTRIAL ORGANIZATION* (6th ed. 1993).

31. *SEE* JOSEPH SCHUMPETER, *THE THEORY OF ECONOMIC DEVELOPMENT* (Redvers Opie, trans., Harvard Univ. Press, 1934).

both? It is that test that we employ and it is by that test that we conclude that the wireless market currently is indeed effectively competitive.

**A. Is There an Incumbent Firm (or Firms) that Possesses “Classic Market Power”?**

27. In its Twelfth Report, the FCC provides many indicators that suggest the absence of classic market power in the CMRS industry. Market share trends are one key consideration in determining the susceptibility of an industry to an exercise of market power. With over 150 companies<sup>32</sup> identifying themselves as terrestrial mobile wireless carriers, 95.5 percent of the U.S. population lives in areas with at least three mobile telephone operators competing to offer service;<sup>33</sup> 99.0 percent live in areas with at least two mobile providers.<sup>34</sup> The Commission notes that the market concentration in the U.S. mobile market fell in 2006.<sup>35</sup> The Report identifies four nationwide carriers, several large regional carriers, and 12 carriers with licenses covering more than 1 million square miles.<sup>36</sup> As the Commission appropriately concludes in the Twelfth Report, “No single competitor has a dominant share of the market.”<sup>37</sup> The firm with the largest market share, AT&T, accounts for only 26 percent of wireless subscribers.<sup>38</sup>

28. Demand substitutability constrains market power. The Commission reports that switching among carriers remains a significant pressure to market participants, with a monthly churn rate among the nationwide carriers of 1.8 percent in the first quarter of 2007.<sup>39</sup> All nationwide carriers today offer a family plan, and many are beginning to offer unlimited calling

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32. *Twelfth Report* at ¶ 2.

33. *Id.* at ¶ 2.

34. *Id.* at ¶ 2.

35. *Id.* at ¶ 2. (Concentration in the U.S. mobile telephone market, as measured by the Herfindahl -Hirschman Index (“HHI”), declined from 2706 at the end of 2005 to 2674 at the end of 2006. The median value at the end of 2006 was about 2730 (down from 2785 estimated in December 2005.) Significantly, average market concentration is lower in the U.S. than in Western European mobile markets except the UK. *Id.* at 59

36. *Id.* at ¶ 18.

37. *Id.* at ¶ 2.

38. *Id.* at 126, 132.

39. *Id.* at ¶ 187.

options.<sup>40</sup> The adoption of prorated early termination fees also serves to reduce barriers to customer defection.<sup>41</sup> The frequency of intramodal number porting, with 10.3 million wireless-to-wireless ports in 2006, further supports the conclusion that demand substitutability is strongly present in the CMRS marketplace.<sup>42</sup>

29. Pricing trends provide evidence regarding the capacity of a firm (or firms) to unilaterally maintain prices at supracompetitive levels. *The Commission notes that the U.S. mobile telephone industry has experienced a sharp decline in prices in the period since the launch of PCS service.* The 2006 study period experienced price stability.<sup>43</sup> From 2005 to 2006, the Cellular Consumer Price Index (“CPI”) decreased by approximately 0.6 percent while the overall CPI increased by 3.2 percent.<sup>44</sup> Ancillary services, such as text messaging, have also begun to decline in price.<sup>45</sup>

30. Intermodal competition serves as a check on market power. The Commission notes the emergence of Wi-Fi as an alternative to wireless service; in particular, dual-mode Wi-Fi and cellular handsets make it possible for customers to switch among transport providers with ease.<sup>46</sup> Similarly, the development of wireless local area networks is an increasingly important supplement and even competitor to CMRS services.<sup>47</sup>

31. Supply substitutability also constrains classic market power because providers are able to meet changes in demand or to take advantage of favorable competitive conditions through

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40. *Id.* at ¶ 112.

41. *Id.* at ¶ 115. AT&T and Verizon prorate early termination fees; Sprint Nextel and T-Mobile have announced plans to follow suit. *Id.*

42. *Id.* at ¶ 190.

43. *Id.* at ¶ 195.

44. *Id.* at ¶ 198.

45. *Id.* at ¶ 202.

46. *Id.* at ¶ 255 (noting that AT&T, Sprint Nextel, and T-Mobile offer dual-mode handsets that operate on both cellular and Wi-Fi networks).

47. *Id.* at ¶ 252.

greater output. The Commission notes that mobile carriers are investing to expand network capacity for both voice and advanced services.<sup>48</sup> Next-generation technologies are adding to voice and data capacity.<sup>49</sup> The Twelfth Report also acknowledges that the Commission's spectrum policy and an accommodating stance on mergers and acquisitions have further enabled carriers to expand their national footprints, thereby achieving greater supply substitutability.<sup>50</sup>

**B. Is There an Incumbent Firm (or Firms) that Possesses “Exclusionary Market Power”?**

32. The Twelfth Report offers considerable evidence to indicate that there is neither a bottleneck facility nor an ability by incumbent firms within the CMRS industry to use their facilities to raise rivals' costs. As just discussed, the market structure alone is inconsistent with any possible claim that there is a bottleneck facility. The wireless market is characterized by a large number of firms,<sup>51</sup> many of which are national or super-regional players.<sup>52</sup> Moreover, entry and expansion within the wireless industry continues to proceed; indeed, market concentration continues to fall.<sup>53</sup> Several other facts suggest the absence of exclusionary power.

33. The substantial viability of a resale segment in the industry is evidence that incumbents do not possess exclusionary market power sufficient to prevent others from competing in the market. The Twelfth Report notes that resale sector comprised seven percent of all mobile telephone subscribers in the United States, or 15 million subscribers, at the end of June 2006.<sup>54</sup> The Commission also notes that there were over 50 mobile virtual network

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48. *Id.* at ¶ 108.

49. *Id.* at ¶ 130.

50. *Id.* at ¶ 165.

51. *Id.* at ¶ 2.

52. *Id.* at ¶ 18.

53. *Id.* at ¶ 2.

54. *Id.* at ¶ 21.

operators (“MVNOs”) operating in 2006.<sup>55</sup> Further, the practice of targeting certain “micro-niches,” for customized, leased network access service lends support to the conclusion that rivals are not excluded from the CMRS.<sup>56</sup>

34. Other intermodal and cross-platform capabilities may undercut exclusionary market power. The increasing availability of Wi-Fi equipped mobile handsets,<sup>57</sup> discussed above, shows that the access points to wireless communications networks are multiplying. Similarly, wireless local area networks are being deployed<sup>58</sup> to enable users to cross between multiple access methods seamlessly. U.S. providers also have used different technology standards and have followed divergent paths toward next-generation voice and data capabilities, which the Commission recognizes as an “important dimension of non-price rivalry.”<sup>59</sup>

35. On the subscription side of the wireless market, several practices indicate that carriers do not use exclusionary tactics to the detriment of competitors. Providers typically agree to a grace period for new customers, during which new subscribers may cancel service for any reason without incurring early termination fees (“ETFs”).<sup>60</sup> Such fees are largely avoided altogether by subscribing on a prepaid basis. The Commission reports that several firms, including major national carriers, have begun prorating ETFs, further reducing any perceived barrier to switching.<sup>61</sup> The major carriers also now agree to allow changes to contract terms without requiring extensions of the underlying agreements.<sup>62</sup> Finally, because most subscription

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55. *Id.* at ¶ 22.

56. *Id.* at ¶ 23.

57. *Id.* at ¶ 255.

58. *Id.* at ¶ 252.

59. *Id.* at ¶ 125.

60. *Id.* at ¶ 115. (The Commission highlights the competitive interaction at work related to ETFs. Verizon Wireless announced its plan to prorate termination charges in November 2006. By the end of 2007, AT&T, Sprint Nextel and T-Mobile had announced plans to follow suit. *See id.*)

61. *Id.* at ¶ 115.

62. *Id.* at ¶ 115.

contracts permit the assignment of remaining contract terms to a new subscriber, this provides another avenue for customers to terminate service without penalty.<sup>63</sup> The current wireless industry is thus characterized by multiple access methods, greater freedom for subscribers, and inclusive rather than exclusive access to mobile communications.

**C. Are There High Barriers to Entry That Are Controlled by an Incumbent Firm or Arise from Regulation?**

36. Evidence from the Twelfth Report shows barriers to entry in the CMRS industry are far from insurmountable to a would-be entrant. Again, the high count of carriers and decreasing market concentration belie the notion that new carriers are significantly precluded from entry. Several other considerations amplify this conclusion.

37. The Commission's spectrum policy has recently provided several opportunities for carriers to acquire spectrum. The Twelfth Report notes that more than half of the winning bidders in the 2006 Advanced Wireless Services (AWS) auction, totaling 20 percent of all licenses sold, were "designated entities."<sup>64</sup> Indeed, one new entrant (SpectrumCo) acquired a nearly nationwide footprint through licenses covering approximately 275 million people.<sup>65</sup> One existing carrier (T-Mobile) greatly extended its license holdings to launch a mobile broadband network.<sup>66</sup> Several smaller carriers were able to expand geographic coverage as well.<sup>67</sup> In 2008, the Commission conducted an auction of 700 MHz band spectrum, which generated a bidder other than a nationwide incumbent in every market and a new nationwide provider in EchoStar.<sup>68</sup>

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63. *Id.* at ¶ 115 (noting the presence of several Internet intermediaries which match assignors with assignees).

64. *Id.* at ¶ 2.

65. *Id.* at ¶ 75.

66. *Id.* at ¶ 75.

67. *Id.* at ¶ 75.

68. Statement by FCC Chairman Kevin J. Martin, Mar. 20, 2008, available at [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DOC-280968A1.doc](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-280968A1.doc). Further, in the Twelfth Report, the Commission noted the importance of the 700 MHz auction to its spectrum management policy and to the deployment of advanced wireless applications. *Twelfth Report* at ¶ 84.

In addition, two satellite providers received authorization from the FCC to launch service using the 2GHz band.<sup>69</sup> In recent years, the Commission also reconfigured the 800 MHz band<sup>70</sup> and the band for broadband radio service.<sup>71</sup>

38. The Commission's spectrum policy is characterized by market-based allocation, with greater flexibility given to the carrier on how to use licensed spectrum.<sup>72</sup> This creates a virtuous cycle of innovation and efficiency gains. For example, licensees may subdivide spectrum into narrower chunks. Licensees also have the power to partition licenses, dividing them into smaller geographic areas. Carriers are afforded flexibility in the deployment of Third Generation (3G) high-speed data services.<sup>73</sup>

39. The entry of new application and content providers continues apace. The Commission reports an increasing departure from a "walled garden" approach to the wireless handsets toward greater reliance on cooperative application development.<sup>74</sup> The Twelfth Report highlights the launch of innovations like Apple's iPhone, Qualcomm's MediaFLO network, and location-based services relying on global positioning system (GPS) capabilities.<sup>75</sup> The Commission also notes the Open Handset Alliance of 34 firms to promote more innovation in mobile operating systems.<sup>76</sup>

40. The effect of competitive and dynamic spectrum management policies has thus delivered several demonstrable benefits to the U.S. wireless market and U.S. wireless consumers. In particular, wireless services have broader coverage, higher quality, and lower prices than in

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69. *Twelfth Report* at ¶ 269.

70. *Id.* at ¶ 81.

71. *Id.* at ¶ 91.

72. *See id.* at ¶ 73.

73. *Id.* at ¶ 85.

74. *Id.* at ¶ 176.

75. *Id.* at ¶ 174.

76. *Id.* at ¶ 179. This is in addition to the variety of firms developing operating systems for mobile devices, such as Nokia and Microsoft.

years past. Further, these benefits are enjoyed by subscribers of all types, in both rural and urban locations.<sup>77</sup> As the Commission rightfully concludes in its Twelfth Report, “spectrum allocation and assignment policies do not create an effective barrier to entry into the U.S. mobile telecommunications market.”<sup>78</sup>

#### **D. Is There Evidence of Coordinated Interaction Among Incumbents?**

41. Many indicators discussed in the Twelfth Report support a conclusion that there is little (if any) possible coordinating interaction among incumbents. Instead, the Twelfth Report paints a picture of robust wireless rivalry.

42. The FCC notes the difficulty of comprehensively comparing prices among competing services with as much variety as exists today in the CRMS business. Nevertheless, several indicators suggest that wireless carriers compete fiercely on price terms, which ultimately is one of the acid tests for whether any market is effectively competitive. As noted above, the Cellular CPI dropped by 0.6 percent from 2005 to 2006.<sup>79</sup> The Twelfth Report notes that average revenue per minute was unchanged in 2006, following an 85 percent decline over the preceding eleven years.<sup>80</sup> Text messaging prices declined in 2006.<sup>81</sup> The price of making wireless phone calls has declined in great part due to the advent of subscription features like the family plan and unlimited calling.<sup>82</sup> Further, the advent of night and weekend calling, unlimited calling and similar packages continues to reduce the effective prices of service.<sup>83</sup> Customers also have a great deal of flexibility when it comes to pricing methods: many applications are purchased on

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77. *Id.* at ¶ 110 (“Based on our rollout analysis, information and statements provided by commenters, and industry reports, we conclude that CMRS providers are competing effectively in rural areas.”).

78. *Id.* at ¶ 76.

79. *Id.* at ¶ 198.

80. *Id.* at ¶ 199.

81. *Id.* at ¶ 200.

82. *See id.* at ¶ 204.

83. *See id.* at ¶ 114.

an a la carte basis or as part of a package; data may often be purchased as flat-fee, pay-per-use, pay-as-you-go, per-kilobyte, or even deducted from monthly airtime allowances.<sup>84</sup> Monthly packages often drive significant discounts for subscribers.<sup>85</sup> These trends in pricing provide ample evidence that carriers do not interact on a coordinated basis regarding price terms.

43. As the Commission notes in its Twelfth Report: “Service providers in the mobile telecommunications market also compete on many more dimensions other than price, including non-price characteristics such as coverage, call quality, data speeds, and mobile data content.” The FCC rightly highlights the large expenditures on marketing and advertising, large capital expenditures, service improvements, and technological innovation as key indicators of this competition.<sup>86</sup>

44. Carriers compete through an ongoing effort to make their service more robust than that of their competitors. Feature packages are one such selling point. The Twelfth Report finds that all providers offer voice mail and caller ID; 81 percent offer three way calling.<sup>87</sup> Calling packages are also common, with 96 percent of carriers offering family plans and 85 percent providing free long distance.<sup>88</sup> Carriers also compete by offering wireless data services to complement wireless voice telephony. The Commission notes the ongoing deployment of mobile broadband technologies, such as CDMA EV-DO, WCDMA/HSDPA, and WiMax.<sup>89</sup>

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84. *Id.* at ¶ 118.

85. *Id.* at ¶ 120.

86. *Id.* at ¶ 198.

87. *Id.* at ¶ 108.

88. *Id.* at ¶ 108. The Commission notes that 71% of wireless providers offer unlimited calling plans (*Id.* at ¶ 108) and specifically highlights the offerings of Alltel, Leap, MetroPCS, Sprint Nextel and T-Mobile (*Id.* at ¶ 113, 254). The Report identifies several providers offering unlimited local calling, including AT&T, Sprint Nextel, T-Mobile, and Verizon Wireless, *Id.* ¶250. Further, the Twelfth Report notes the offering of unlimited Internet access and text messaging plans by several carriers (*Id.* ¶ 119, 202).

89. *Id.* ¶¶ 2, 146.

45. The CRMS market is characterized by heavy competition for exclusive equipment and content arrangements as a key method to differentiate carriers' service. The Twelfth Report notes that carriers continue to offer a wide array of mobile data services and applications, including handset-based applications like text messaging, photo messaging, ringtones, games, and mobile music and video service. In addition, carriers offer wireless Internet access.<sup>90</sup> The Commission highlights the advent of location-based services like mobile search and mapping.<sup>91</sup> The FCC also notes several important examples of innovation in the wireless data market, including the AT&T launch of Apple's iPhone,<sup>92</sup> AT&T's exclusive content arrangement with World Wrestling Entertainment,<sup>93</sup> and the Verizon Wireless V CAST service.<sup>94</sup> These exclusive arrangements are particularly significant in relation to the question of whether wireless competitors coordinate activities. The fact that carriers invest heavily in applications and service offerings to differentiate their wireless products, including exclusive content or device arrangements, demonstrates the robust competition in the CRMS marketplace.

46. The Twelfth Report notes that carriers compete on service quality.<sup>95</sup> Investments in network coverage have increased capacity and network performance.<sup>96</sup> Movement to digital service and to next-generation networks also increases the quality of wireless service. Carriers

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90. *Id.* at ¶ 241.

91. *Id.* at ¶ 175.

92. *Id.* at ¶ 177.

93. *Id.* at ¶ 188.

94. *Id.* at ¶ 28.

95. *Id.* at ¶ 161. ("According to the senior director of wireless services at J.D. Power and Associates, 'Wireless providers have made great strides in improving call quality. With an increasingly competitive environment and an increase in the number of services used in conjunction with a cellphone, carriers that offer superior network quality are more likely to attract new customers and increase customer retention. In fact, improving network quality is a beneficial financial incentive for wireless carriers, as customers experiencing at least one call quality problem are almost four times more likely to definitely switch carriers in the future.'" *Id.* quoting *J.D. Power and Associates Reports: Wireless Call Quality Problems Continue to Decline as the Transition to 3G Networks Takes Hold*, News Release, J.D. Power and Associates (Mar. 15, 2007).

96. *Id.* at ¶ 162.

have also invested in improving customer care to resolve customer concerns more effectively.<sup>97</sup> Some carriers have improved quality through installation of in-building wireless systems, such as the Sprint Nextel use of femtocel technology for its Airave service. Competition on service quality has worked: the Twelfth Report notes that the count of reported call quality problems declined for a third consecutive period, reaching the lowest levels ever.<sup>98</sup> The Commission notes that 81 percent of wireless customers report timely resolution, up 6 percent during the year.<sup>99</sup>

47. Finally, the availability of information regarding price and quality is a key check on coordinated activity among competitors. The report notes that several third-party resources are available today to guide consumers in evaluating the availability, quality, and pricing of wireless offerings. The Commission notes:

Wireless consumers continue to demand information on the availability and quality of mobile telecommunications services, and numerous third parties have been responding to this demand by compiling and reporting such information. The sources of information available to consumers include publications such as Consumer Reports, trade associations, marketing and consulting firms, and several web sites dedicated to giving consumers an overview and comparison of the mobile telephone services available in their area.<sup>100</sup>

Such information improves the competitive process, helping to prevent opportunities for abuse. The fact that information is so broadly available gives assurance that the CRMS industry will continue its robust competition into the future.

48. The Commission's Twelfth Report thus offers substantial evidence that participants in the U.S. wireless industry do not coordinate activities. Strong price competition constrains all market participants. Carriers compete in terms of quality as well. Innovation,

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97. *Id.* at ¶ 225.

98. *Id.* at ¶ 223, The Report also finds: "The number of calls with initial disconnects has declined by 40 percent and the number of dropped calls has declined by 33 percent compared with the previous reporting period in 2007." *Id.*

99. *Id.* at ¶ 225.

100. *Id.* at ¶ 184.

including exclusive arrangements for applications and hardware,<sup>101</sup> help customers to differentiate service, and are widely pursued by carriers. Thus, unilateral and rivalrous behavior is persistent, to the benefit of all customers.<sup>102</sup>

### CONCLUSION

49. The FCC has assessed the competitiveness of communications markets in multiple other contexts. It is thus possible to infer from the Commission's own recent actions a composite definition of effective competition. A wireless market is effectively supplied in absence of: an incumbent firm possessing classic or exclusionary market power; high barriers to entry that are controlled by an incumbent firm or arise from regulation; and coordinated business activities among incumbents. This definition also is consistent with a sampling of relevant economic literature. Using data from the Twelfth Report, our analysis shows that the U.S. wireless market is indeed characterized by effective competition, lending further credence to the Commission's conclusions in its Twelfth Report that the "CMRS marketplace is effectively competitive."

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101. The Commission highlights exclusive arrangements between carriers and equipment vendors, such as the Apple iPhone. *Id.* at ¶ 188.

102. The Twelfth Report also notes: subscriber levels and penetration rates have climbed to all-time highs, *id.* at ¶ 2; average minutes of use per subscriber is increasing, *id.* at ¶ 217; and the adoption of new services like music and video continues to rise, *id.* at ¶ 213.

## APPENDIX A: CURRICULUM VITAE OF DR. ROBERT W. HAHN

### Robert W. Hahn

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#### EDUCATION

- 1977-81 California Institute of Technology, Pasadena, California  
M.S., 1979, Ph.D., Economics, 1981
- 1976-77 Stanford Graduate School of Business, Stanford, California
- 1971-75 Brown University, Providence, Rhode Island  
B.A., Mathematical Economics, 1975  
M.A., Economics, 1975  
Languages: Spanish  
Honors: Phi Beta Kappa

#### EMPLOYMENT

- 2008 Founder and Executive Director, Reg-Markets Center
- 2008 Senior Fellow, American Enterprise Institute, Washington, D.C.
- 2003-08 Executive Director, AEI-Brookings Joint Center
- 1998-02 Co-founder and Director, AEI-Brookings Joint Center
- 1999-08 Non-resident Senior Fellow, Brookings Institution, Washington, D.C.
- 1989-07 Resident Scholar, American Enterprise Institute, Washington, D.C.
- 1997-02 Research Associate, Harvard University, Cambridge, Massachusetts
- 1990-01 Adjunct Professor of Economics, Carnegie Mellon, Pittsburgh, Pennsylvania
- 1991-94 Adjunct Research Faculty, Harvard University, Cambridge, Massachusetts
- 1987-89 Senior Staff Economist, Council of Economic Advisers, Washington, D.C.
- 1985-90 Associate Professor of Economics, Carnegie Mellon, Pittsburgh, Pennsylvania
- 1982-85 Assistant Professor of Economics, Carnegie Mellon, Pittsburgh, Pennsylvania
- 1981-82 Research Fellow, California Institute of Technology, Pasadena, California
- 1981 Instructor, Pitzer College, Claremont, California
- 1978 Economist, Council on Environmental Quality, Washington, D.C. (summer)

- 1976            Economist, World Bank, Washington, D.C. (summer)
- 1975-76        Division Staff, MITRE Corporation, McLean, Virginia
- 1973-75        Math Teacher, Transitional High School, Providence, Rhode Island

#### **PUBLIC SERVICE AND ACADEMIC ACTIVITIES**

- 1983-08        Co-founder of the Community Preparatory School, Providence, Rhode Island
- 2006-08        Editorial Board - *Review of Environmental Economics and Policy*
- 2005-08        Columnist - *Economists' Voice*
- 2000-08        Editorial Board - *Milken Review*
- 2000-08        Research Advisory Board - Committee for Economic Development
- 2001-08        Editorial Advisory Board - *Regulation*
- 1994-99        Board of Directors, Annapolis Center
- 1989-93        Editorial Council - *Journal of Environmental Economics and Management*
- 1990-92        Cochairman of the U.S. Alternative Fuels Council

#### **PROFESSIONAL AFFILIATIONS**

- American Economic Association
- Association for Public Policy Analysis and Management
- Association of Environmental and Resource Economists

#### **AWARDS**

- American Association for the Advancement of Science Fellowship
- Barr Award for Outstanding Research in Applied Public Economics
- Brookings Fellowship
- Caltech McDonnell Award for best graduating student in Social Science
- Premier's Fellowship, New South Wales, Australia

#### **SELECTED RESEARCH PROJECTS AND FOUNDATION SUPPORT**

Agency for International Development, “Government Regulation of the Marketing and Processing of Crops in Uganda”

Electric Power Research Institute, “Organizational Aspects of Power Pooling”

Electric Power Research Institute, “Markets in Transferable Property Rights”

Environmental Protection Agency, “An Examination of EPA’s Controlled Trading Options”

Environmental Protection Agency, “An Evaluation of Mechanisms for Complying with the Ozone Standard”

Environmental Protection Agency, “Designing Markets in Tradable Allowances for Reducing Acid Deposition”

Environmental Protection Agency, “Promoting Conservation Through Price Rationalization”

Environmental Protection Agency, “Evaluation of Economic Incentives for Hazardous Waste Management”

Environmental Protection Agency, “Economic and Environmental Analysis of Alternative Fuels”

Matsushita Foundation, “Educational Development”

Mott Foundation, “AEI-Brookings Joint Center for Regulatory Studies”

National Science Foundation, Decision, Risk and Management Science, “The Emergence of Markets for Controlling Risks”

National Science Foundation, Regulation and Policy Analysis, “Spot Markets for Electricity”

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Rhode Island Foundation, “Options for Alternative Education”

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“An Analysis of the Ninth Government Report on the Costs and Benefits of Federal Regulations,” with Robert E. Litan, Regulatory Analysis, AEI-Brookings Joint Center, June 2006.

“An Analysis of the Government’s Proposed Risk Assessment Guidelines,” with Robert E. Litan, Regulatory Analysis, AEI-Brookings Joint Center, June 2006.

- “An Analysis of the Eighth Government Report on the Costs and Benefits of Federal Regulations,” with Robert E. Litan and Rohit Malik, Regulatory Analysis 05-02, AEI-Brookings Joint Center, April 2005.
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- “An Analysis of the Sixth Government Report on the Costs and Benefits of Federal Regulations,” with Robert E. Litan, Regulatory Analysis 03-7, AEI-Brookings Joint Center, April 2003.
- “A Review of the Office of Management and Budget’s Draft Guidelines for Conducting Regulatory Analyses,” with Robert E. Litan, Regulatory Analysis 03-6, AEI-Brookings Joint Center, March 2003.
- “Recommendations for Improving Regulatory Accountability and Transparency,” with Robert E. Litan, Testimony before the House Government Reform Committee; Subcommittee on Energy Policy, Natural Resources and Regulatory Affairs, Testimony 03-2, AEI-Brookings Joint Center, Washington, D.C., March 2003.
- “Recommendations for Improving Federal Regulation,” with Robert E. Litan, Testimony before the Subcommittee on Regulatory Reform and Oversight House Committee on Small Business, Testimony 02-5, AEI-Brookings Joint Center, Washington, D.C., June 2002.
- “An Analysis of the Fifth Government Report on the Costs and Benefits of Federal Regulation,” with Robert E. Litan, Regulatory Analysis 02-2, AEI-Brookings Joint Center, May 2002.
- “The FCC Cross-Ownership Rules Should Be Repealed,” Regulatory Analysis 02-1, AEI-Brookings Joint Center, February 2002.
- “Elevating EPA to Cabinet Status,” with Randall Lutter, Testimony before the Subcommittee on Energy Policy, Natural Resources, and Regulatory Affairs, Committee on Government Reform, U.S. House of Representatives, Testimony 01-4, AEI-Brookings Joint Center, Washington, D.C., September 2001.
- “An Evaluation of Possible Changes to the Economic Impact Procedures Used by the Export-Import Bank,” Comments prepared for the Export-Import Bank, Testimony 01-3, AEI-Brookings Joint Center, Washington, D.C., September 2001.
- “An Analysis of the Fourth Government Report on the Costs and Benefits of Federal Regulations,” with Robert E. Litan, Regulatory Analysis 01-6, AEI-Brookings Joint Center, July 2001.
- “The EPA’s Radon Rule: A Case Study in How Not to Regulate Risks,” with Jason K. Burnett, Regulatory Analysis 01-1, AEI-Brookings Joint Center, January 2001.
- “Improving Regulation: Start with the Analysis and Work From There,” with Robert E. Litan, Testimony before the Subcommittee on Regulatory Reform and Paperwork Reduction, Committee on Small Business, U.S. House of Representatives, Testimony 00-1, AEI-Brookings Joint Center, Washington, D.C., June 8, 2000.
- “Developing a Framework for Sensible Regulation: Lessons from OSHA’s Proposed Ergonomics Rule,” with Petrea R. Moyle, Regulatory Analysis 00-2, AEI-Brookings Joint Center, March 2000.
- “An Analysis of the Third Government Report on the Benefits and Costs of Federal Regulation,” with Robert E. Litan, Regulatory Analysis 00-1, AEI-Brookings Joint Center, February 2000.

“An Assessment of OMB’s Draft Guidelines to Help Agencies Estimate the Benefits and Costs of Federal Regulation,” Regulatory Analysis 99-5, AEI-Brookings Joint Center, December 1999.

“A Proposed Solution to Concerns Over Public Access to Scientific Data,” Testimony before the Subcommittee on Government Management, Information and Technology, Committee on Government Reform, U.S. House of Representatives, Testimony 99-4, AEI-Brookings Joint Center, Washington, D.C., July 15, 1999.

“The Regulatory Fair Warning Act,” Testimony before the Subcommittee on Commercial and Administrative Law, Committee on the Judiciary, U.S. House of Representatives, Testimony 99-2, AEI-Brookings Joint Center, Washington, D.C., June 29, 1999.

“Should Researchers Be Required to Share Data Used in Supporting Regulatory Decisions?,” with Linda R. Cohen, Regulatory Analysis 99-1, AEI-Brookings Joint Center, April 1999.

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### **Papers and Reports**

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“Bring the President’s Nerds Back in from the Cold,” with Scott Wallsten, *Financial Times*, October 30, 2003, 13.

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“The Misguided Debate Over Outsourcing,” Policy Matters 03-4, AEI-Brookings Joint Center, March 2003.

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“Desperately Seeking Broadband Legislation,” *CNET*, December 17, 2001.

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“Regulatory Oversight Takes Exciting New Tack,” with Cass R. Sunstein, Policy Matters 01-25, AEI-Brookings Joint Center, September 2001.

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“Old-Fashioned Trust-Busting in the New Economy,” *Washington Post*, May 25, 2000, A37.

“Breaking Up Is Hard to Do, So Don’t Do It,” *Los Angeles Times*, April 30, 2000, M5.

“Microsoft, a Monopoly No More,” *New York Times*, April 7, 2000, A23.

“Government Reporting Run Amok,” Policy Matters 00-3, AEI-Brookings Joint Center, April 2000.

“Let the Market Control Faster Access to the Internet,” *Los Angeles Times*, November 29, 1999, B7.

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“Driving and Talking Do Mix,” *New York Times*, November 12, 1999, A31.

“If Microsoft Loses, Then What?,” *Los Angeles Times*, September 20, 1999, A15.

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“Fighting Global Warming Quietly,” *Washington Post*, December 10, 1997, A25.

“Putting Regulations to a Test,” with Robert E. Litan, *Washington Post*, July 30, 1997, A23.

“Incentives Outpace Bureaucracy in Everglades Cleanup,” *Wall Street Journal*, May 15, 1997, A22.

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“Writing Better Regulations,” *Journal of Commerce* and Knight-Ridder News Service, May 14, 1996, 6A.

“Regulatory Reform—The Whole Story,” *Wall Street Journal*, February 27, 1995, A12.

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“School Reform, 83 Kids at a Time,” with Dan Corley, *Wall Street Journal*, December 30, 1994, A6.

“Let Markets Drive Down Auto Emissions,” *Wall Street Journal*, October 17, 1994, A14.

“Real Help for the Everglades,” *New York Times*, February 6, 1993, 21.

“No More Blank Checks for Regulators,” *New York Times*, Business Section, Sunday Forum, 11, August 2, 1992.

“Is It a Restoration Credit, or a Pollution Permit?,” *Miami Herald*, June 10, 1992, 13.

“Myths Fog the Debate about New Clean Air Legislation” *Chicago Tribune*, April 30, 1990, C13,

“Last Gasp for Bush Clean Air Reforms,” *Wall Street Journal*, November 7, 1989, 30.

### **SELECTED MEDIA APPEARANCES**

CSPAN, Infotopia: How Many Minds Produce Knowledge, September 12, 2006.

CSPAN, The Moral Consequences of Economic Growth, January 9, 2006.

CSPAN, The Undercover Economist, November 9, 2005.

National Public Radio, Marketplace, Rebuilding after Hurricane Katrina, September 15, 2005.

CSPAN, The Future of Telecom Deregulation, March 24, 2005.

CSPAN, State of Fear, February 12, 2005.

Fox Television News, Special Report with Brit Hume, Banning Cellular Phones in Cars, August 13, 2001.

NPR Science Friday, The President’s Climate Change Policy, June 15, 2001.

Fox Television News, AEI-Brookings Joint Center \$100 Million Club—Dairy Program, April 18, 2001.

National Public Radio, Government Regulation and the Appointment of John Graham to Head OIRA, April 13, 2001.

Fox Television News, AEI-Brookings Joint Center \$100 Million Club—Sugar Program, March 28, 2001.

Diane Rehm Show, National Public Radio, Understanding the Decision to Regulate Arsenic in Drinking Water, March 28, 2001.

National Public Radio, Marketplace, Is Government Too Small?, March 23, 2001.

National Public Radio, The Use of Cellular Phones in Vehicles, Radio Interview for Beyond Computers, June 9, 2000.

Diane Rehm Show, National Public Radio, Microsoft and the Justice Department’s Proposed Remedy, May 8, 2000.

WJFK, Internet Policy and Microsoft, Syndicated Radio Show, February 1, 2000.

National Public Radio, Resolving the Controversy over Access to Scientific Data, August 17, 1999.

National Economists Club, Economic Policy Issues, June 10, 1998.

CSPAN, Global Change, November 20, 1997.

National Public Radio, Economic Growth and Green Policies, October 29, 1997.

CSPAN, Evaluating EPA's Newly Proposed Regulations, February 9, 1997.

CSPAN, Regulatory Reform: Making Costs Count, December 9, 1996.

CBC, As it Happens, Airport Safety, October 22, 1996.

Citizens for a Sound Economy video, Combining Economic Growth and Social Progress, September 1996.

Christian Science Monitor Radio, Gasoline Price Increase, April 30, 1996.

Dateline Washington, Gasoline Price Hike, April 30, 1996.

CNN, Science and Technology: Electric Vehicles, May 10, 1995.

CSPAN, Using Cost-Benefit Analysis to Reform Regulation, Consumer Federation of America, March 17, 1995.

National Public Radio, Reforming Regulation, March 1995.

National Public Radio, Changing Support for the Environmental Community, October 1994.

National Public Radio, Superfund, August 1994.

Australian Broadcasting Company, Green and Practical, March 11, 1994.

Australian Broadcasting Company, Reinventing Government, March 6, 1994.

CSPAN, Alternative Fuels Regulation, January 17, 1994.

BBC, Linking Economic Growth and Environmental Quality, November 1993.

National Public Radio, Marketplace, Environmental Crimes, June 1993.

National Public Radio, President's Council on Sustainable Development, June 1993.

WDUQ, Cleaning the Air, December 1992.

Diane Rehm, WAMU, Green Taxes, December 1992.

MacNeil-Lehrer, The Environment and the Election, September 1992.

Diane Rehm, WAMU, Environmental Politics, August 1992.

CSPAN, President Bush: The Regulatory Record, August 1992.

CNN, Rio Conference, June 1992.

National Public Radio, The Biodiversity Treaty, June 1992.

National Public Radio, Economics of Climate Change, February 1992.

National Public Radio, The Bush Environmental Record, January 1992.

National Public Radio, Economic Approaches for Environmental Protection, January 1992.

Techno-Politics, WETA, Regulatory Negotiation, September 1991.

Australian Public Radio, Economic Approaches for Environmental Protection, March 1991.

Mike Kuthbert, WAMU, UN Conference on the Environment, November 1990.

BBC, New Approaches to Environmental Protection, March 1990.

## APPENDIX B: CURRICULUM VITAE OF DR. ROBERT E. LITAN

Robert E. Litan

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Fairway, Ks. 66205  
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202-797-6120

### Employment

- 2003- Vice President, Research and Policy, Ewing Marion Kauffman Foundation  
Overseeing multi-million dollar research grant program on entrepreneurship and education; Member of Management Team
- 2003- Senior Fellow, Economic Studies Program, The Brookings Institution  
Continuing research on financial institutions, regulatory issues  
Director, AEI-Brookings Joint Center on Regulatory Studies  
Co-Editor, The Brookings-Wharton Papers on Financial Services (1997-2003)  
Organizer and Editor, Annual Conference on International Financial Issues, with the Tokyo Club (2003- )
- 2005 Contributing Editor, Inc Magazine – Contributor of columns on entrepreneurship; consultant on stories on special projects
- 2002- Senior Consultant, Charles River Associates (antitrust and financial issues)
- 1996-2003 Vice President and Director, Economic Studies Program and Cabot Family Chair in Economics, The Brookings Institution  
Responsible for supervising the Institution’s economic research program, its 26 scholars and support staff, and for administering and raising funds for a \$9 million annual research program; continuing research on financial institutions, trade, and legal and economic issues relating to the information revolution

1999-2002                    Special Consultant, Analysis Group (Economic consulting firm)

1996-2002                    Special Consultant, Economists, Inc. (Economic consulting firm)

1995-96                    Associate Director, U.S. Office of Management Budget -- Responsible for budgets and clearance of policy for five cabinet agencies (Commerce, HUD, Justice, Treasury and Transportation) and most of the independent agencies of the U.S. Government (requiring supervision of approximately 70 professional staff)

1993-95                    Deputy Assistant Attorney General, Antitrust Division, Department of Justice -- Supervision of approximately 150 attorneys and paralegals in non-merger civil antitrust investigations; Developing DOJ policy on regulatory issues; Active participation in the development of the Administration's policies on telecommunications, trade and various regulatory issues

1984-1993                    Senior Fellow, Economic Studies Program; Director (1987-92), Center for Economic Progress and Employment; and Director (1992-93), Center for Law, Economics, and Politics, The Brookings Institution, Washington, D.C., -- Specialist in financial institutions; international trade; and regulatory policy.

1982-90                    Powell, Goldstein, Frazer & Murphy, law firm, Washington, D.C.: Senior Associate (1982-84); Partner (1984); Of Counsel (1984-90) -- Attorney specializing in administrative law, antitrust, banking, energy, international trade, and legal issues generally involving law and economics.

1979-1982                    Arnold & Porter, law firm, Washington, D.C., Associate.

1977-1979                    President's Council of Economic Advisers, Executive Office of the President, Washington, D.C. Regulatory and Energy Specialist; principal staff for the Regulatory Analysis Review Group; handled selected legal issues for the Council.

1974-1976                    Peabody, Rivlin, Lambert & Meyers - summer legal associate.

1972-1973                    The Brookings Institution, Washington, D.C. - research assistant to Dr. Arthur M. Okun.

1970-1971                    Peat, Marwick, Mitchell & Co., Wichita, Kansas - two summers as an intern tax accountant.

#### Board Memberships

2008-                    Member, Advisory Committee on Voluntary Foreign Aid (of the U.S. Agency For International Development)

2005-07                    Co-Chairman, Financial Industry Regulatory Authority (FINRA, formerly NASD) Ahead of the Curve Advisory Group

2004 -                    Member, Proxy Governance Council, Folio Fn

2004 -                    Big Four Accounting Firms, Research Advisory Board

1996- Member, Shadow Financial Regulatory Committee; Co-Chairman 1998-2002

2000- 02 Juniper Financial, Board of Advisers

2000- 01 Double Click, Inc., Board of Privacy Advisers

1999- Milken Review (Board of Editors)

1999-2001 American Antitrust Institute, Board of Advisers

1999-2002 Committee for Economic Development, Board of Advisers

1997-98 Chairman, National Research Council Committee on Disaster Loss Estimation (And co-author of The Impacts of Natural Disasters: A Framework for Loss Estimation).

1996 Department of Defense, Defense Sciences Board, Member of Task Force on Vertical Integration in the Defense Industry

1993-94 Department of Defense, Defense Sciences Board, Member of Task Force on Mergers within the Defense Industry

1991-93 Chairman, Editorial Advisory Board, Public Policy Studies Series for the Insurance Information Institute.

1991-92 Presidential-Congressional Commission on the Causes of the Savings and Loan Crisis (Member)

1988-90 Conference Board of Canada Financial Institutions Group (Advisory Board).

1988-90 Foundation for Change (Board of Directors).

1988-89 Member of Advisory Board to Office of Technology Assessment Study on Technological Change in Banking and Securities Markets.

#### Consultancies

2007 American Insurance Association (report on homeowners' insurance)

2007 Chamber of Commerce (report on impact of the U.S. legal system on Foreign direct investment)

2006-07 Financial Services Roundtable (study director for Blue Ribbon Commission On Mega-Catastrophes; primary author for study on Pandemic Flu)

2006 Committee on Capital Markets Regulation and Its Effects on U.S. Competitiveness (Author of section on Enforcement and Liability)

2006 Big Six Global Accounting Firms

2005 Securities Industries Association (report on financial services trade in the WTO Trade Negotiations)

- 2002-03 American Bankers Association (reports on predatory lending and credit card Regulation)
- 2002-03 NCAA (preparing report with Sebago on college athletic spending)
- 2001 World Bank (prepared report on Internet Commerce in Asia, with Robert Crandall)
- 2001 Monetary Authority of Singapore (prepared paper on trends in international finance)
- 2000-01 U.S. Department of the Treasury (prepared two Congressionally mandated reports On The Community Reinvestment Act, with the Harvard Joint Center on Housing Policy Studies)
- 2000 Arbitrator in electric power transmission dispute (East Coast v. PJM); Federal Deposit Insurance Corporation (expert witness in thrift goodwill cases)
- 1999 American Bankers Association (prepared report on ATM fees); Federal Deposit Insurance Corporation (expert witness in thrift goodwill cases); World Bank (prepared background paper on global finance for the World Development Report)
- 1998 Main Writer for the Report of the President ' s Commission to Study Capital Budgeting
- 1996-97 U.S. Department of the Treasury (prepared Congressionally mandated report on the future of the financial services industry and its regulation)
- 1996-97 Antitrust Division of the Department of Justice (on telecommunications issues)
- 1993 Federal Home Loan Bank of San Francisco (prepared report on the future role of the Federal Home Loan Bank System)
- 1990 Financial Institutions Subcommittee of the House Banking Committee (prepared report on the condition of the Federal Deposit Insurance Corporation with James R. Barth and R. Dan Brumbaugh, Jr.).
- 1987-92 Oxford Analytica (British News Service) -- regular contributor of reports on the U.S. banking and thrift industries.
- 1987 Senate Judiciary Committee -- organized hearings for the Chairman on antitrust and competitiveness issues, authored report on antitrust policy for the Committee.
- 1985-89 Institute for Liberty and Democracy, Lima Peru - legal and economic consulting on deregulation matters generally, including financial institutions issues.
- 1976-77 National Academy of Sciences - consultant to the Modeling Resources Group of the Committee on Nuclear and Alternative Energy Systems (CONAES).

Awards

2001           Zale Award for Excellence in Public Policy, Stanford University

### Teaching

2003-           Teacher of law and economics to state judges as part of the AEI-Brookings Judicial Education Program

1993           Taught principles of Western banking to Russian bankers (under a Treasury Department grant administered by KPMG Peat Marwick)

1989-90       Yale Law School - Visiting Lecturer in Law (Banking). 1986-87

1976-1977     Yale University - Lecturer in Economics (taught Economics and Law; and Elementary Macroeconomics; both large lecture courses).

1975-1976     Yale University - Instructor in Economics (taught two sections of Elementary Micro and Macroeconomics).

### Education

1987           Yale University: Ph.D. in Economics. Dissertation: An Economic Inquiry Into the Expansion of Bank Powers. (Dissertation Committee: Professors Richard Levin, Merton Peck and James Tobin).

1977           Yale University: J.D. (1977), Felix S. Cohen Prize for best essay in legal philosophy; Extra-curricular Activities: Yale Legislative Services, Barrister's Union; Employment, Consulting and Teaching 1973-1977 (see above).

1976           Yale University: M. Phil. in Economics, Distinction in Ph.D. oral examinations (international trade and finance, industrial organization).

1968-72       Wharton School of Finance and Commerce, University of Pennsylvania: B.S. Economics, summa cum laude (Valedictorian); Major - Finance; Minors - Accounting, Statistics and Mathematics.

Honors and Awards: Thouron Fellowship for Graduate Study in Great Britain (which was not used); Royal Society of Arts Silver Medal (National award given to selected outstanding graduating seniors in the U.S.); Class of 1946 Award (given by the University to an outstanding graduating senior); William D. Gordon Award (given by the Wharton School to the graduating senior with the highest scholastic average); Beta Gamma Sigma Award (given by the Wharton School to the graduating senior with the highest scholastic average); Albert A. Berg Scholarship Award, 1971, 1972, (given each year by the Wharton Faculty to an outstanding upperclassman in the Wharton School).

Extra-curricular Activities: Chairman, Activities Council (major student government body); Executive Editor of Wharton Account (major undergraduate business magazine); Vice-President of Debate Council; 2 years in intercollegiate debate; President, Beta Gamma Sigma; Friars Senior Honor Society; Beta Alpha Psi; Employment in Electrical Engineering Library (4 years).

## Publications

### Books

- Good Capitalism, Bad Capitalism, and Economic Growth And Prosperity. Yale University Press, 2007 (with William Baumol and Carl Schramm)
- Competitive Equity: A Better Way to Organize Mutual Funds  
AEI Press, 2007 (with Peter Wallison)
- Worldwide Financial Reporting: The Development and Future of Accounting Standards Oxford University Press, 2006 (with George Benston, Michael Bromwich and Alfred Wagenhofer,
- Financial Statecraft, Yale University Press, 2006 (with Benn Steil)  
*Named by Library Journal as one of the two best business Books of 2006*
- 
- Following The Money: The Enron Failure and the State of Corporate Disclosure, AEI-Brookings Joint Center on Regulatory Studies, 2003 (with George Benston, Michael Bromwich and Alfred Wagenhofer)
- Protecting the American Homeland (Brookings Institution Press, 2002, With other Brookings co-authors)
- Sticking Together: The Israeli Experiment in Pluralism (Brookings Institution Press, 2002, with Yaakov Kop)
- Beyond The Dot.Coms (Brookings Institution Press, 2001, with Alice Rivlin)
- The GAAP Gap: Corporate Disclosure in the Internet Age (AEI-Brookings Joint Center on Regulatory Studies, 2000).
- None of Your Business: World Data Flows, Electronic Commerce, and The European Privacy Directive (with Peter Swire), Brookings (1998)
- Globophobia: Confronting Fears About Open Trade (with Gary Burtless, Robert Lawrence and Robert Shapiro), Brookings, Progressive Policy Institute, and the Twentieth Century Fund, 1998
- American Finance for the 21st Century (with the assistance of Jonathan Rauch), U.S. Department of the Treasury (1997) and Brookings (1998)
- Going Digital! (with William Niskanen), Brookings Institution Press and the Cato Institute (1998)
- Footing The Bill For Superfund Cleanups (with Don Fullerton, Paul Portney and Kate Probst), Brookings Institution and Resources for the Future, 1995
- Financial Regulation in the Global Economy (with Richard Herring), Brookings Institution, 1994
- Growth With Equity: Economic Policymaking For The Next Century (with Martin Baily and Gary Burtless), Brookings Institution, 1993.
- Physical Damage and Human Loss: The Economic Impact of Earthquake Mitigation Measures (with Frederick Krimgold, Karen Clark, and Jayant Khadilkar), Insurance Information Institute, 1992).
- The Future of American Banking (with James Barth and R. Dan Brumbaugh, Jr.), W. E. Sharpe, 1992.
- The Revolution in U.S. Finance, Brookings Institution, 1991.

What Should Banks Do?, Brookings Institution, 1987.  
Saving Free Trade: A Pragmatic Approach (with Robert Z. Lawrence), Brookings Institution, 1986.  
Reforming Federal Regulation (with William D. Nordhaus), Yale University Press, 1983.

#### Books Edited

Building Inclusive Financial Systems: A Framework for Financial Access, co-editor with Michael S. Barr and Anjali Kumar (Brookings Institution Press, 2007)  
New Financial Instruments and Institutions: Opportunities and Policy Challenges, co-editor, with Yasayuki Fuchita (Brookings Institution Press, 2007)  
Financial Gatekeepers: Can They Protect Investors?', co-editor, with Yasayuki Fuchita (Brookings Institution Press, 2006)  
Finance Crises: Lessons from the Past, Preparation for the Future, co-editor, with Gerard Caprio, James A. Hanson (Brookings Institution Press, 2005)  
The Future of State-Owned Financial Institutions, co-editor, with Gerald Caprio, Jonathan Fiechter and Michael Pomerleano (Brookings Institution Press, 2004)  
The Future of Domestic Capital Markets in Developing Countries, co-editor with Michael Pomerleano and V. Sundararajan (Brookings Institution Press, 2003).  
United We Serve: National Service and the Future of Citizenship, co-editor With E.J. Dionne and Kayla Meltzer Drogosz (Brookings Institution Press, 2003)  
The Future of North American Integration, co-editor with Peter Hakim (Brookings Institution Press, 2002)  
Financial Sector Governance: The Roles of the Public and Private Sectors, editor with Michael Pomerleano and V. Sundararajan (Brookings, IMF and World Bank, 2002)  
Open Doors: Foreign Participation in Financial Systems in Developing Countries, editor with Paul Masson and Michael Pomerleano (Brookings, IMF and World Bank, 2001)  
The Economic Payoff from the Internet Revolution (Brookings Institution Press, 2001, with Alice Rivlin)  
Managing Financial and Corporate Distress: Lessons from Asia, editor with Charles Adams and Michael Pomerleano (World Bank, IMF, and Brookings Institution, 2000)  
Finance in Emerging Markets: The Crisis in Emerging Markets (with Michael Pomerleano and Alison Harwood), World Bank and Brookings Institution, 1999.  
Assessing Bank Reform: FDICIA One Year Later (with George G. Kaufman), Brookings Institution, 1993.  
Verdict: Assessing The Civil Jury System, Brookings Institution, 1993.  
Down in the Dumps: Administration of the Unfair Trade Laws (with Richard Boltuck), Brookings Institution, 1991.  
The Liability Maze: The Impact of Liability Law on Safety and Innovation, co-editor (with Peter Huber), Brookings Institution, 1991.  
American Living Standards: Threats and Challenges,(co-editor with Robert Z. Lawrence and Charles L. Schultze and author of two chapters), Brookings Institution, 1988.

Liability: Perspectives and Policy, (co-editor and co-author of two chapters, with Clifford M. Winston), Brookings Institution, 1988.

## Reports

Easing The Homeowners' Insurance Crisis on the Atlantic and Gulf Coasts (with Frank Nutter and Marc Racicot), American Insurance Association/Reinsurance Association of America, October 2007

Developing America's North Coast: A Benefit-Cost Analysis of a Great Lakes Infrastructure Program (with John Austin, Soren Anderson, and Paul Courant), Brookings Institution, Urban And Metropolitan Center, September, 2007.

Through Their Eyes: How Foreign Investors View and React to the U.S. Legal System (prepared for the U.S. Chamber of Commerce, August, 2007)

The Effects of Broadband Deployment on Output and Employment: A Cross-sectional Analysis of U.S. Data (with Robert Crandall and William Lehr, June, 2007, at www.brookings.edu)

The Benefits of New Wireline Video Competition for Consumers and Local Government Finances (with Robert Crandall, on behalf of the US Telecomm Association, May, 2006).

Great Expectations: Potential Economic Benefits to the Nation From Accelerated Broadband Deployment to Older Americans and Americans with Disabilities (New Millennium Research Council, December, 2005)

The Top Ten Financial Risks to the Global Economy: A Dialogue of Critical Perspectives (co-editor, with Suzanne Nora Johnson and Richard Herring), Global Markets Institute, Goldman Sachs

Debunking the Real Estate Risk of Charter Schools (Kauffman Foundation, with Leslie Lukens)

North Carolina's Anti-Predatory Lending Law: Still A Problem Despite New Study (AEI-Brookings Joint Center for Regulatory Studies, September, 2003)

The Effects of Spending on Collegiate Athletics (Sebago Associates, With Jonathan Orszag and Peter Orszag), 2003

Relationships in Financial Services: Are Anti-Tying Restrictions Out Of Date? (AEI-Brookings Joint Center for Regulatory Studies, May 2003)

Financial Privacy, Consumer Prosperity and the Public Good: Maintaining The Balance, AEI-Brookings Joint Center on Regulatory Studies, March 2003 (with Fred H. Cate, Michael Staten and Peter Wallison)

Unintended Consequences: The Risks of Premature State Regulation of Predatory Lending (on behalf of the American Bankers Association, 2003)

The Case for Government-Sponsored Terrorism Reinsurance for U.S. Aircraft Manufacturers (with CRA and on behalf of Boeing, GE, And United Technologies, 2002)

Assessing the Department of Homeland Security (with other Brookings co-authors, Brookings Institution, 2002)

An Analysis of the Fifth Government Report on the Costs and Benefits Of Federal Regulation, AEI-Brookings Joint Center for Regulatory

Studies, 2002 (with Robert W. Hahn) [Similar reports for 2001, 2000, 1998]

The Net Impact Study (with Hal Varian and Momentum Research, on behalf Of Cisco Corporation, January 2002)

A Prudent Approach to Preventing “Predatory” Lending (on behalf of The American Bankers Association, February, 2001)

The Community Reinvestment Act After Financial Modernization: A Final Report (U.D. Department of the Treasury, January, 2001, With Eric Belsky, Gary Fauth, Maureen Kennedy, Paul Leonard, And Nicolas P. Restinas)

The Community Reinvestment Act After Financial Modernization: A Baseline Report (U.S. Department of the Treasury, April 2000, With Nicolas P. Retsinas, Eric S. Belsky and Susan White Haig)

Reforming Bank Capital (co-authored with other members of the Shadow Financial Regulatory Committee), AEI, 2000

ATM Fees: An Economic Analysis (sponsored by the American Bankers Association, November 1999)

Report of the President’s Commission to Study Capital Budgeting (Main Writer, 1999)

Improving Regulatory Accountability (with Robert Hahn), AEI and Brookings, 1997

An Agenda for Federal Regulatory Reform (with Robert Crandall, Christopher DeMuth, Robert Hahn, Pietro Nivola, Paul Portney), AEI and Brookings, 1997

Options for Reinforcing and Expanding the Role of the Federal Home

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Loan Bank System, Financing Affordable Housing in America

Conference (sponsored by Affordable Housing Advisory Council, Federal Home

Loan Bank of San Francisco), Washington, D.C., April 20, 1993.

The Economics of Credit Cards, 1993 (sponsored by MasterCard and Visa).

Charting A Future For The Civil Jury System, Brookings Institution, 1992 (with G. Marc Whitehead)

Consumers, Competition and Choice: The Impact of Price Controls on the Credit Card Industry, March 1992 (prepared for MasterCard International).

Back To Basics: Solvency As the Primary Objective Of Insurance Industry Regulation, for State Farm Insurance Companies, October 1991.

Protecting Taxpayers From Deposit Insurance: Bank Capital, Consumers Union, May 1991.

A National Earthquake Mitigation and Insurance Plan: Response to Market Failures, The Earthquake Project, April 1991.

The Banking Industry In Turmoil: A Report to the Financial Institutions Subcommittee on the Condition of the U.S. Banking Industry and the Federal Deposit Insurance Corporation, U.S. Government Printing Office, December 1990 (with James Barth and R. Dan Brumbaugh, Jr., revised later into a book; see The Future of American Banking, above).

Justice For All: Reducing Costs and Delay In Civil Litigation, Brookings Institution, 1989 (with Mark Gitenstein).

A Blueprint for Restructuring America's Financial Institutions, Brookings Institution, 1989 (with George Benston, R. Dan Brumbaugh, Jack Guttentag, Richard Herring, George Kaufman, and Kenneth Scott).

Energy Modeling for an Uncertain Future, National Academy of Sciences, 1978 (with Tjalling C. Koopmans).

## Articles

- “Commercializing University Innovations: Alternative Approaches,” in Adam B. Jaffe, Josh Lerner and Scott, eds., *Innovation Policy And The Economy* (with Lesa Mitchell and E. J. Reedy, NBER, 2007, forthcoming)
- “From the Special Issue Editors: Technology Commercialization and Entrepreneurship,” Introduction to Special Issue of *The Journal Of Product Innovation and Management*, 2008 (with Michael Song)
- “Can Europe Compete?” *Commentary*, Sept/Oct 2007 (with Carl Schramm)
- “The University As Innovator: Bumps In The Road,” *Issues in Science And Technology*, Summer 2007 (with Lesa Mitchell and E.J. Reedy)
- “The Myth of Network Neutrality and What We Should Do About It,” *International Journal of Communication* (forthcoming, with Robert W. Hahn).
- “The Economics of Wireless Net Neutrality,” SSRN Working Paper, and AEI-Brookings Joint Center on Regulatory Studies Related Publication, 2007 (with Robert Hahn and Hal Singer)
- “The Unintended Consequences of Net Neutrality Regulation,” *Journal of Telecommunications and High Technology Law* (with Hal Singer, 2007).
- “The President’s New Executive Order on Regulation,” *The Economist’s Voice*, April, 2007 (with Robert W. Hahn)
- “Polling the Risk Takers: What Entrepreneurs Really Want the Government To Do,” *Ripon Forum*, February/March 2007 (with Carl Schramm)
- “Capital Ideas,” *The American Interest*, September/October 2006 (with Carl Schramm)
- “Preparing for Future “Katrina’s”, *Brookings Policy Brief*, No. 150, March, 2006
- “Sharing and Reducing The Costs of Natural Catastrophes,” *Brookings Occasional Paper*, March 2006
- “The Future of Charge Card Networks,” Working Paper 06-03, February 2006, AEI-Brookings Joint Center for Regulatory Studies (with Alex Pollock)
- “Urgent: Wal-Mart Needs a Foreign Policy,” *Foreign Policy*, November/December, 2005
- “Seventeen workers, and \$60 million in Sales.” *Inc. Magazine*, November 2005 (with Carl Schramm)
- “Foreign Students Who Study Engineering Deserve Citizenship,” *Inc. Magazine*, October 2005 (with Carl Schramm)
- “Why Democracy is America’s Second Most Valuable Export,” *Inc. Magazine*, September 2005 (with Carl Schramm)
- “A Fairer Deal for America’s Workers in a New Era of Offshoring,” *Brookings Trade Forum*, 2005 (with Lael Brainard and Nicholas Warren)
- “Insuring America’s Workers in a New Era of Offshoring,” *Brookings Policy Brief*, No. 143, July 2005 (with Lael Brainard and Nicholas Warren)

- “Sold! Sold! Sold! But what’s the brokerage fee?”, *The Milken Review*, 4<sup>th</sup> Quarter, 2005, with Robert Hahn and Jesse Gurman
- “Corporate Disclosure in a Global Age: Next Steps,” in *Tokyo Club Papers*, Volume 16, 2004
- “Universal Broadband Access: Implementing President Bush’s Vision,” *Policy Review*, 2004, No. 127 (with Robert Crandall, Robert Hahn, And Scott Wallsten)
- “The Future of State-Owned Financial Institutions,” *Brookings Conference Report #18*, September, 2004 (with Gerald Caprio, et

al).

- “Internet Telephones: Hanging up on Regulation?”, *The Milken Review*, March 2004 (with Robert Crandall, et al.).
- “Offshoring Service Jobs: Bane or Boon and What to Do”, *Brookings Policy Brief*, April 2004 (with Lael Brainard); also published in *CES Ifo Forum*, Summer 2004.
- “The Uncertain Future of the Telecommunications Industry,” *Brookings Policy Brief*, January 2004 (with Roger G. Noll)
- “Why the Government Should Not Regulate Internet Telephony,” AEI-Brookings Joint Center working paper (with Bob Crandall, Scott Wallsten and Robert Hahn), 2003.
- “Beyond GAAP,” *Regulation*, Fall 2003, (with Peter J. Wallison)
- “A Global Economic Agenda for the United States,” in Henry Aaron, et al., eds., *Agenda for the Nation* (Brookings, 2003) (with Lael Brainard)
- “Financial Conglomerates: The Future of Finance?”, *Brookings Policy Brief*, Conference Report #14, April 2003 (with Richard J. Herring)
- “Governance in an Integrated Global Economy,” *The Brookings Review*, Spring 2003 (with Carol Graham)
- “The Bigger They Are, The Harder They Fall: The Cost of the Crisis in Corporate Governance,” *Milken Review*, First Quarter, 2003 (with Carol Graham and Sandip Sukhtankar)
- “No Stepping Back: America’s International Economic Agenda for 2003-05,” *The Brookings Review*, Winter 2003 (with Lael Brainard)
- “The Telecom Crash: What To Do Now?”, *Brookings Policy Brief*, November, 2002
- “Constitutional Issues in Information Privacy,” *Michigan Technology and Telecommunications Law Review*, Winter, 2003 (with Fred Cate)
- “The Case for Universal Service,” *Brookings Review*, Fall 2002
- “Fixing Corporate Disclosure After Enron,” *The Milken Institute Review*, Third Quarter, 2002
- “The Bigger They Are, The Harder They Fall: A Ballpark Estimate of the Cost of the Crisis in Corporate Governance,” *Brookings Policy Brief*, July 2002 (with Carol Graham and Sandip Sukhtankar)
- “Strengthening Financial Sector Governance in Emerging Markets,” *Brookings Conference Report*, July 2002 (with Michael Pomerleano and V. Sundararajan).
- “A Complicated Intersection: Public Action to Protect Private Property,” *The Brookings Review*, Summer 2002 (with Peter Orszag)
- “The Enron Failure and the State of Corporate Disclosure”, *Brookings Policy Brief*, April 2002

- “The Future of Securities Markets,” Brookings Conference Report, March 2002
- “Antitrust Policy in the Clinton Administration,” in Jeffrey A. Frankel and Peter Orszag, American Economic Policy in the 1990s (MIT Press, 2002) (with Carl Shapiro)
- “Diversity in Israel: Lessons for the United States”, Brookings Review, Winter 2002 (with Yaakov Kop)
- “The Internet, New and Old Economics, and Implications for Asia,” in Li Luoli, ed., New Economy & Asia, Proceeding of International Think Tank Forum 2001
- “Projecting the Economic Impact of the Internet”, The CAPCO Institute Journal of Financial Transformation, July 2001, No. 2
- “Economics: Global Finance,” in P.J. Simmons and Chantal de Jonge Oudraat, eds., Managing Global Issues: Lessons Learned (Carnegie Endowment for International Peace, 2001).
- “The GAAP Gap: Corporate Disclosure in the Internet Age,” University of West Los Angeles Law Review, 2001 (with Peter Wallison)
- “Foreign Participation in Financial Systems in Developing Countries” Brookings Conference Report, #6, June 2001 (with Paul Masson And Michael Pomerleano)
- “Effective Property Rights and Economic Development: Next Steps,” Brookings-Wharton Papers on Financial Services, 2001 (with Hernando De Soto)
- “Central Bank Supervision in the Digital Age,” in Anthony Santomero, Staffan Viotti and Anders Vredin, Challenges for Central Banking (North Holland, 2001)
- “The Data Paradox”, Gallup Management Journal, Spring 2001
- “The Need for More Information on Predatory Lending”, ABA Bank Compliance, May/June 2001
- “Projecting the Economic Impact of the Internet”, American Economic Review, Papers and Proceedings, May 2001.
- “A Prescription to Relieve Worker Anxiety”, Brookings Policy Brief, March 2001 (with Lori G. Kletzer)
- “Think Again: The Internet Economy”, Foreign Policy, March-April 2001
- “Antitrust and the New Economy,” University of Pittsburgh Law Review, Vol. 62, No. 3, 2001
- “Law and Policy in the Internet Age”, Duke Law Journal, February 2001
- “Accepting Foreign Capital: Lesson from Recent Crises,” Development Outreach, Fall 2000
- “The Economy and the Internet: What Lies Ahead? Brooking Conference Report #4, December 4, 2000 (with Alice Rivlin)
- “The Need for a New Financial Architecture,” The International Economy, November/December 2000 (with Tony Santomero)
- 
- “Technology and America’s Good Times”, The Brookings Review, Winter 2000
- “The First Microsoft Case”, in Simon J. Evenett, Alexander Lerhmann, and Benn Steil, eds., Antitrust Goes Global (The Brookings Institution Press, 2000).
- “Trade Policy: What Next?”, Brookings Review, Fall 2000.
- “Toward a Global Financial Architecture for the 21<sup>st</sup> Century” in Shahid Yusuf, Weiping Wu and Simon Evenett, Local Dynamics In An Era of Globalization (World Bank and Oxford Press, 2000).
- “Effective Structural Relief in US v. Microsoft” (with William D.

- Nordhaus), Computer Industry, ABA Section of Antitrust Law, Summer 2000
- “Catastrophe Insurance and Mitigating Disaster Losses: A Possible Happy Marriage?” Alcira Kreimer and Margaret Arnold, eds., Managing Disaster Risk in Emerging Economies, Disaster Risk Management Series, No.2, World Bank, 2000
- “International Bank Capital Standards: Next Steps”, in Joseph Bisignano, et al., eds., Global Financial Crises: Lessons from Recent Events (Bank for International Settlements and Federal Reserve Bank of Chicago, Kluwer Academic Publishers, 2000).
- “Financial Regulation in a Global Marketplace,” Brookings-Wharton Papers on Financial Services, 2000 (with Charles Calomiris)
- “The ‘Globalization’ Challenge”, The Brookings Review, Spring 2000
- “Covering Financial Services: Advice to the Media from the Academy,” in Money, Markets and the News: Press Coverage of the Modern Revolution in Financial Institutions (Joan Shorenstein Center for Press and Politics of Harvard University, 2000).
- “Who Wins With HR 10?”, The International Economy, January/February 2000
- “Balancing Costs and Benefits of New Privacy Mandates”, Telecommunications and Space Journal, Vol. 6, 1999
- “Data Protection and Electronic Commerce”, Telecommunications and Space Journal, Vol. 6, 1999 (with Peter P . Swire)
- “Why ATM Surcharge Fees Are Pro-Consumer”, Consumers’ Research, December 1999
- “Moving Towards An Open World Economy: The Next Phase”, in Andrew Stoeckel and Hugh Corbet, eds., Reason Versus Emotion: Rrequirements for a Successful WTO Round (1999)
- “The US Economy After the Asia Crisis”, IIES Seminar Series, 1999:8
- “Antitrust and the WTO: Some Heretical Thoughts,” in Jagdish Bhagwati, The Trade Negotiating Round: Examining the Agenda for Seattle (Columbia University, Department of Economics, Law School and Center for Japanese Economy and Business, July 1999)
- “Does The IMF Have A Future? What Should It Be?”, in William C. Hunter, et al, eds., The Asian Financial Crisis: Origins, Implications, and Solutions (Federal Reserve Bank of Chicago and the International Monetary Fund, 1999)
- “The Crisis in Emerging Markets,” Brookings Conference Report, May 1999 (with Alison Harwood and Michael Pomerleano)
- “Expanding The Winner’s Circle,” Blueprint, Winter 1999.
- “Unleashing Telecommunications: The Case for True Competition,” Brookings Policy Brief, November 1998, No. 39 (with Roger G. Noll)
- “The Asian Financial Crisis,” Looking Ahead (National Planning Association), Vol. XX, No. 2, 1998
- “Treading Carefully: A Prudent Agenda for Democrats in an Age of Budget Surpluses,” The New Democrat, May/June 1998
- “Globalization and Its Discontents,” Foreign Affairs, May/June 1998 (With Richard Haass)
- “Reducing Anxiety About Trade Agreements,” in Jeffrey J. Schott, ed., Restarting Fast Track (Institute for International Economics, April 1998)
- “Institutions and Policies for Maintaining Financial Stability,” in

- Maintaining Financial Stability in a Global Economy, Federal Reserve Bank of Kansas City (Jackson Hole Symposium Conference)
- "Three-Step Remedy for Asia's Financial Flu," Brookings Policy Brief, February 1998, No. 30 (reprinted in ASLI Review, Vol. 5, 1998)
- "Avoiding a Showdown Over EU Privacy Laws," Brookings Policy Brief, February 1998, No. 29 (with Peter P. Swire)
- "The Big Bang: An Ambivalent Japan Deregulates Its Financial Markets" (with Edward J. Lincoln), The Brookings Review, Winter 1998
- "What's Next After FDICIA?," in George G. Kaufman, ed., Research In Financial Services: Private and Public Policy, 1997, Vol. 9 (JAI Press, 1997)
- "Globophobia: The Wrong Debate Over Trade Policy," Brookings Policy Brief, No.24, September, 1997 (with Robert Z. Lawrence)
- "Disciplining Large Banks After FDICIA," Journal of Retail Banking Services (Summer 1997)
- "Uncle Sam in the Housing Market: The Section 8 Rental Subsidy Disaster," The Brookings Review, Fall 1996 (with James Barth); and "The Housing Disaster That Hasn't Been Fixed," Brookings Policy Briefs, 1996, No. 1 (with James Barth)
- "Antitrust Enforcement and the Telecommunications Revolution: Friends, Not Enemies", in Revolution in the U.S. Information Infrastructure (National Academy of Engineering, 1995)
- "The Relative Decline of Banking: Should We Care?," in proceedings of the 1994 Conference on Bank Structure, Federal Reserve Bank of Chicago (1995)
- "More Value for the Legal Dollar", Judicature, January-February 1994 (with Steven C. Salop)
- "Saving Our Way out of the Deficit Dilemma", Brookings Review, Fall 1993 (with William Gale)
- "Superfund: Assessing The Program And Options For Reform", in Enhancing Environmental Quality through Economic Growth (American Council for Capital Formation, 1993).
- "Nightmare in Basle," International Economy, November/December 1992.
- "Banks and Real Estate: Regulating the Unholy Alliance," in Real Estate and the Credit Crunch, Proceedings of a Federal Reserve Bank of Boston Conference, September 1992.
- "The Impact of EC 1992 on Financial Services--A Different Perspective: A Comment on "Europe 1992," Research in International Business and Finance, 1992.
- "Interstate Banking and Product-Line Freedom: Would Broader Powers Have Helped The Banks?," Yale Journal on Regulation, Summer 1992.
- "Down in the Dumps: Administering America's "Unfair" Trade Laws," The Brookings Review, Spring 1992.
- "A Critique of the Financial Institutions Recovery, Reform and Enforcement Act of 1989 and the Financial Strength of the Commercial Banks," in James R. Barth and R. Dan Brumbaugh, Jr., eds., The Reform of Federal Deposit Insurance (Harper, 1992) (with R. Dan Brumbaugh, Jr.).
- "Speeding Up Civil Justice," in Elliot E. Slotnick, ed., Judicial Politics: Readings from Judicature, American Judicature Society, 1992.
- "Nick Brady, Call Your Office," International Economy, March/April 1992

- "Short and Long Run Snapshots of the U.S. Banking Industry," Bank Structure and Competition, Federal Reserve Bank of Chicago, 1991.
- "U.S. Financial Markets and Institutions in the 1980s: A Decade of Turbulence," in Martin Feldstein, ed., American Economic Policy in the 1980s, University of Chicago Press and NBER, 1991.
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- "Who Needs American Banks?," International Economy, January/February 1991.
- "Facing The Future: The End of the Savings and Loan Industry," Domestic Affairs, February 1991.
- "Ignoring Economics In Dealing With The Savings And Loan And Commercial Banking Crisis," Contemporary Policy Issues, January 1991 (with R. Dan Brumbaugh, Jr.).
- "The Liability Explosion and American Trade Performance: Myths and Realities," in Peter Schuck, ed., Tort Law and the Public Interest: Competition, Innovation and Consumer Welfare (American Assembly, 1991).
- "Getting Out of the Thrift Crisis, Now!," The Brookings Review, Winter 1990.
- "Let's Try Operation "Clean Sweep,"" Challenge, November-December 1990.
- "The World Trading System after the Uruguay Round," Boston University International Law Journal, May 1991.
- "Avoiding Insurer Insolvencies: Lessons from the Thrift Crisis," John Liner Review, Fall 1990.
- "Earthquake! Planning and Paying for the "Big One,"" The Brookings Review (Fall 1990).
- "Explaining Corporate Leverage and LBO Activity in the Eighties," in John B. Shoven, ed., Corporate Leverage and Tax Policy (Brookings Institution, 1990) (with Margaret Blair).
- "The Banks Are Worse Off Than You Think," Challenge Jan.-Feb. 1990 (with R. Dan Brumbaugh, Jr.).
- "U.S. Trade Policy at a Crossroad," Science, January 5, 1990 (with Peter O. Suchman), reprinted in William Dudley, ed., Trade: Opposing Viewpoints, (Greenhaven Press, 1991).
- "Speeding Up Civil Justice," Judicature, October-November, 1989.
- "Cleaning Up the Depository Institutions Mess," Brookings Papers on Economic Activity (BPEA), 1989:1 (with R. Dan Brumbaugh and Andrew Carron).
- "The S&L Crisis: How to Get Out and Stay Out," Brookings Review, Spring 1989 (with R. Dan Brumbaugh, Jr.).
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- Testimony on Accounting Issues before the Subcommittee on Capital Markets, Insurance and Government-Sponsored Enterprises of the House Financial Services Committee, May 14, 2002
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- Testimony on Lessons from the Asian Financial Crisis before the Senate Foreign Relations Committee, November 5, 1999
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- Testimony on Proposed Regulatory Reform Legislation before the Senate Committee on Government Affairs, April 22, 1999
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- Testimony on the Long-Term Economic Outlook for the U.S. before the Joint Economic Committee of the U.S. Congress, February 23, 1989.
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Testimony on Competitiveness and Concentration Issues Raised by Proposed Financial Restructuring Legislation before the Subcommittee on Monopoly of the House Judiciary Committee, September 14, 1988.

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Testimony on Proposed Financial Restructuring Legislation before the Senate Banking Committee, December 2, 1987.

"Frameworks for Financial Product Deregulation," paper presented to the annual meetings of the Eastern Economic Association, March 1987.

Testimony on "Financial Product Deregulation" before the Subcommittee on Commerce, Consumer and Monetary Affairs of the House Government Operations Committee, December 18, 1986.

Testimony on "Reforming the U.S. Escape Clause" before the Trade Subcommittee of the House Ways and Means Committee, April 15, 1986.

Testimony on "Legislative Veto and the Chadha Decision" before the Senate Subcommittee on Administrative Practice and Procedure of the Senate Judiciary Committee, July 1983.

Regular speeches, seminars on entrepreneurship, banking, insurance, international trade and regulatory issues before academic, government and other professional audiences.

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Who's Who in America  
Who's Who in the East  
Who's Who Among American Lawyers  
Member, Council on Foreign Relations

Date of Birth: May 16, 1950

Spouse: Margaret

Children: Ari (21) and Alisa (18)

## APPENDIX C: CURRICULUM VITAE OF DR. HAL J. SINGER

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### EDUCATION

THE JOHNS HOPKINS UNIVERSITY, Ph.D., 1999; M.A. (Economics), 1996.

TULANE UNIVERSITY, B.S. *magna cum laude* (Economics), 1994. Dean's Honor Scholar (full academic scholarship). Senior Scholar Prize in Economics, 1994.

### CURRENT EMPLOYMENT

CRITERION ECONOMICS, L.L.C., Washington, D.C.: President, 2004-present. Senior Vice President, 1999-2004.

### EMPLOYMENT HISTORY

LECG, INC., WASHINGTON, D.C.: Senior Economist, 1998-99.

U.S. SECURITIES AND EXCHANGE COMMISSION, OFFICE OF ECONOMIC ANALYSIS, WASHINGTON, D.C.: Staff Economist, 1997-98.

THE JOHNS HOPKINS UNIVERSITY, ECONOMICS DEPARTMENT, BALTIMORE: Teaching Assistant, 1996-98.

### AUTHORED BOOKS AND BOOK CHAPTERS

*An Antitrust Analysis of the World Trade Organization's Decision in the U.S.-Mexico Arbitration on Telecommunications Services*, co-authored with J. Gregory Sidak, in HANDBOOK OF TRANS-ATLANTIC ANTITRUST (Philip Marsden, ed. Edward Elgar 2006).

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24. Declaration of Hal J. Singer on behalf of Tomas H. Miguens, In Q International Courier v. Tomas H. Miguens (S.D.N.Y. 2003) (No. 02 Civ. 5278-JSM).
25. Declaration of Robert W. Crandall and Hal J. Singer on behalf of Bell Canada Enterprises, In the Matter of Hearings before the Standing Committee On Industry, Science And Technology of the House of Commons of Canada Pursuant to Standing Order 108(2), Consideration of Foreign Investment Restrictions Applicable to Telecommunications Common Carriers (Feb. 20, 2003).
26. Declaration of J. Gregory Sidak and Hal J. Singer on behalf of The Walt Disney Company, *et al.*, In the Matter of Nondiscrimination in the Distribution of Interactive Television Services over Cable, Notice of Inquiry, Federal Communications Commission, CS Dkt. No. 01-7 (May 11, 2001).

27. Declaration of Hal J. Singer on behalf of Allegheny Communications, Inc., In Allegheny Communications Inc. v. F.C.C. (D.C. Cir. 2000) (No. 00-1524).

#### COMMISSIONED WHITE PAPERS

1. Is Greater Price Transparency Needed in The Medical Device Industry? (prepared for Advanced Medical Technology Association), co-authored with Robert W. Hahn (Nov. 30, 2007).
2. Should the FCC Depart from More than a Decade of Market-Oriented Spectrum Policy? Reply to Skrzypacz and Wilson (prepared for CTIA), co-authored with Gerald Faulhaber and Robert W. Hahn (Jun. 18, 2007).
3. Does Retransmission Consent Contribute To Rising Cable Rates? (prepared for the National Association of Broadcasters), co-authored with Jeffrey A. Eisenach and James C. Miller III (Mar. 9, 2007).
4. Does Public Safety Need More Spectrum? (prepared for Verizon Wireless), co-authored with Peter Cramton, Thomas S. Dombrowsky, Jr., Jeffrey A. Eisenach and Allan Ingraham (Nov. 9, 2006).
5. The Budgetary Impact of Eliminating the GPOs' Safe Harbor Exemption from the Anti-Kickback Statute of the Social Security Act (prepared for the Medical Device Manufacturers Association) (Dec. 20, 2005).
6. Reply to "The Life Settlements Market: An Actuarial Perspective on Consumer Economic Value" (prepared for Coventry First), co-authored with Eric Stallard (Nov. 15, 2005).
7. The Competitive Effects of Telephone Entry into Video Markets (prepared for the Internet Innovation Alliance), co-authored with Robert W. Crandall and J. Gregory Sidak (Nov. 9, 2005).
8. How Do Consumers and the Auto Industry Respond to Changes in Exhaust Emission and Fuel Economy Standards? A Critique of Burke, Abeles, and Chen (prepared for General Motors Corp.), co-authored with Robert W. Crandall and Allan T. Ingraham (Sept. 21, 2004).
9. Inter-City Competition for Retail Trade in North Texas: Can a TIF Generate Incremental Tax Receipts for the City of Dallas? (prepared for Harvest Partners), co-authored with Thomas G. Thibodeau and Allan T. Ingraham (July 16, 2004).
10. An Accurate Scorecard of the Telecommunications Act of 1996: Rejoinder to the Phoenix Center Study No. 7 (prepared for BellSouth), co-authored with Robert Crandall (Jan. 6, 2004).
11. Competition in Broadband Provision and Implications for Regulatory Policy (prepared for the Alcatel, British Telecom, Deutsche Telekom, Ericsson, France Telecom, Siemens, Telefónica de España, and Telecom Italia), co-authored with Dan Maldoom, Richard Marsden, and Gregory Sidak (Oct. 15, 2003).
12. The Effect of Ubiquitous Broadband Adoption on Investment, Jobs, and the U.S. Economy (prepared for Verizon), co-authored with Robert W. Crandall (Sept. 17, 2003).
13. The Deleterious Effect of Extending the Unbundling Regime on Telecommunications Investment (prepared for BellSouth), co-authored with Robert W. Crandall (July 10, 2003).
14. Letter Concerning Spectrum Auction 35 to the Honorable Michael K. Powell, Chairman, Federal Communications Commission, from Peter C. Cramton, Robert W. Crandall, Robert W. Hahn, Robert G. Harris, Jerry A. Hausman, Thomas W. Hazlett, Douglas G. Lichtman, Paul W. MacAvoy, Paul R. Milgrom, Richard Schmalensee, J. Gregory Sidak, Hal J. Singer, Vernon L. Smith, William Taylor, and David J. Teece (Aug. 16, 2002).

#### WORKING PAPERS POSTED TO SSRN

1. *Irrational Expectations: Can a Regulator Credibly Commit to Removing an Unbundling Obligation?*, AEI-Brookings Joint Center Related Publication No. 07-28, co-authored with Jeffrey A. Eisenach (Dec. 2007).
2. *An Antitrust Analysis of Google's Proposed Acquisition of DoubleClick*, AEI-Brookings Joint Center Related Publication No. 07-24, co-authored with Robert W. Hahn (Sept. 2007).
3. *Inter-City Competition for Retail Trade in North Texas: Can a TIF Generate Incremental Tax Receipts for the City of Dallas?*, co-authored with Thomas G. Thibodeau and Allan T. Ingraham (revise and resubmit to JOURNAL OF REAL ESTATE RESEARCH) (July 16, 2004).
4. *An Economic Assessment of the Weight-Based CAFE Standard Proposed by the National Highway Traffic Safety Administration*, co-authored with Robert W. Crandall and Allan T. Ingraham (Apr. 2004).
5. *How Common Are "Conflicts of Interests" in the Investment Banking Industry?*, co-authored with Charles W. Calomiris (Dec. 2003).
6. *Does Clustering by Incumbent MSOs Deter Entry by Overbuilders?* (July 2002).

#### SPEAKING ENGAGEMENTS

1. *The Debate Over Network Management: An Economic Perspective*, AMERICAN ENTERPRISE INSTITUTE CENTER FOR REGULATORY AND MARKET STUDIES, Washington, D.C., Apr. 2, 2008.
2. *Telecommunications Symposium*, U.S. DEPARTMENT OF JUSTICE ANTITRUST DIVISION, Washington, D.C., Nov. 29, 2007.
3. *Wireless Practice Luncheon*, FEDERAL COMMUNICATIONS BAR ASSOCIATION, Washington, D.C., Nov. 29, 2007.
4. *Association for Computing Machinery's Net Neutrality Symposium*, GEORGE WASHINGTON UNIVERSITY, Washington, D.C., Nov. 12, 2007.
5. *Regulators' AdvanceComm Summit*, NEW YORK LAW SCHOOL, New York, N.Y., Oct. 14, 2007.
6. *Annual Conference*, CAPACITY USA 2007, New York, N.Y., Jun. 26, 2007.
7. *William Pitt Debating Union*, UNIVERSITY OF PITTSBURGH, SCHOOL OF ARTS & SCIENCES, Pittsburgh, PA., Feb. 23, 2007.
8. *Annual Conference*, WIRELESS COMMUNICATIONS ASSOCIATION INTERNATIONAL, Washington, D.C., June 27, 2006.
9. *Annual Conference*, MEDICAL DEVICE MANUFACTURERS ASSOCIATION, Washington, D.C., June 14, 2006.
10. *Annual Conference*, ASSOCIATION FOR ADVANCED LIFE UNDERWRITING, Washington, D.C., May 1, 2006.
11. *Entrepreneur Lecture Series*, LAFAYETTE COLLEGE, Easton, PA., Nov. 14, 2005.

#### EDITORIALS AND MAGAZINE ARTICLES

1. *Foxes in the Henhouse: FCC Regulation through Merger Review*, MILKEN INSTITUTE REVIEW (2007), co-authored with J. Gregory Sidak.

2. *Don't Drink the CAFE Kool-Aid*, WALL STREET JOURNAL, Sept. 6, 2007, at A17, co-authored with Robert W. Crandall.
3. *The Knee-Jerk Reaction: Misunderstanding the XM/Sirius Merger*, WASHINGTON TIMES, Aug. 24, 2007, at A19, co-authored with J. Gregory Sidak.
4. *Net Neutrality: A Radical Form of Non-Discrimination*, REGULATION, Summer 2007.
5. *Telecom Time Warp*, WALL STREET JOURNAL, July 11, 2007, at A15, co-authored with Robert W. Crandall.
6. *Earmarked Airwaves*, WASHINGTON POST, June 27, 2007, at A19, co-authored with Robert W. Hahn.
7. *Not Neutrality*, NATIONAL POST, Mar. 29, 2007, at FP19.
8. *Should ATM Fees Be Regulated?*, NATIONAL POST, Mar. 8, 2007, at FP17, co-authored with Robert W. Crandall.
9. *Life Support for ISPs*, REGULATION, Fall 2005, co-authored with Robert W. Crandall.
10. *No Two-Tier Telecommunications*, NATIONAL POST, Mar. 7, 2003, at FP15, co-authored with Robert W. Crandall.

#### MEMBERSHIPS

American Economics Association

#### REVIEWER

MANAGERIAL AND DECISION ECONOMICS

JOURNAL OF COMPETITION LAW AND ECONOMICS

JOURNAL OF REGULATORY ECONOMICS

TELECOMMUNICATIONS POLICY JOURNAL

#### PERSONAL INFORMATION

American citizen, born March 31, 1972. Married to Ingrid Arraut Singer. Two daughters: Alexis and Kayla. Resident of Oakton, Virginia.

# **ATTACHMENT B**

## Background on CTIA's Semi-Annual Wireless Industry Survey

CTIA-The Wireless Association®'s Semi-annual wireless industry survey develops industry-wide information drawn from operational member and non-member wireless service providers. It has been conducted since January 1985, originally as a cellular-only survey instrument, and now including PCS and ESMR providers. No break-out of results specific to PCS or ESMR is performed at this time.

The information solicited from the service providers includes: direct employment, number of cell sites, total service revenues, roaming revenues as a subset of total service revenues, the average local monthly bill, and the average length of call. The average local monthly bill is developed on a weighted basis, to avoid skewing the figures. It is not an average of averages. No adjustments are made to these figures.

The CTIA survey also develops information on the number of reported wireless service subscribers for the responding systems, and an estimated total subscriber figure (taking into account non-responding systems). Because the CTIA survey is a voluntary survey, it cannot compel responses from wireless carriers. However, the survey has an excellent response rate. For the December 31, 2007, installment of the semi-annual survey, CTIA received responses from companies serving 96.2 percent of wireless subscribers.

Because not all systems do respond, CTIA develops an estimate of total subscribership. The estimated subscriber figure is developed by determining the identity and character of non-responding markets (*i.e.*, RSA/MSA or equivalent-market designation, age of system, market population), and using a surrogate penetration rate applicable to similar, known systems to derive probable subscribership. These numbers are then summed with the reported subscriber numbers to reach the total estimated subscriber figures. No carrier-specific or market-specific information is maintained as a result of the survey. All such information is aggregated by an independent accounting firm to a nationwide level. The underlying source material for the survey is then destroyed per confidentiality agreements.

The following tables and charts reflect selected top-of-the-line data. Complete results of CTIA's semi-annual survey are available for purchase in the comprehensive report, *CTIA's Wireless Industry Indices: 1985 – 2007*, including data on prepaid and toll revenues, subscriber usage, investment, digital subscribership, and other operational indicators and ratios. The report is available for a member price of \$850 and a non-member price of \$1,075. Subsequent copies are available to members at \$475 each and to non-members at \$535 each. Annual subscriptions are available at a member price of \$1,445 and non-member price of \$1,825. The report may be ordered by contacting [research@ctia.org](mailto:research@ctia.org) or by ordering directly from CTIA's Research eStore at [http://www.ctia.org/store/producttyperesults.cfm?group\\_id=1](http://www.ctia.org/store/producttyperesults.cfm?group_id=1).

**CTIA-THE WIRELESS ASSOCIATION®**  
**ANNUALIZED WIRELESS INDUSTRY SURVEY RESULTS - DECEMBER 1985 TO DECEMBER 2007**  
**Reflecting Domestic U.S. Commercially-Operational Cellular, ESMR and PCS Providers**

<b>Date</b>	<b>Estimated Total Subscribers</b>	<b>Twelve-Month Total Service Revenues (in \$000s)</b>	<b>12-Month Roamer Revenues (in \$000s)</b>	<b>Cell Sites</b>	<b>Direct Service Provider Employees</b>	<b>Average Local Monthly Bill (Dec. Survey Periods)</b>	<b>Average Local Call Length (Dec. Survey Periods)</b>
1985	340,213	\$482,428	N/A	913	2,727	N/A	N/A
1986	681,825	\$823,052	N/A	1,531	4,334	N/A	N/A
1987	1,230,855	\$1,151,519	N/A	2,305	7,147	\$96.83	2.33
1988	2,069,441	\$1,959,548	N/A	3,209	11,400	\$98.02	2.26
1989	3,508,944	\$3,340,595	\$294,567	4,169	15,927	\$89.30	2.48
1990	5,283,055	\$4,548,820	\$456,010	5,616	21,382	\$80.90	2.20
1991	7,557,148	\$5,708,522	\$703,651	7,847	26,327	\$72.74	2.38
1992	11,032,753	\$7,822,726	\$ 973,871	10,307	34,348	\$68.68	2.58
1993	16,009,461	\$10,892,175	\$1,361,613	12,824	39,810	\$61.49	2.41
1994	24,134,421	\$14,229,922	\$1,830,782	17,920	53,902	\$56.21	2.24
1995	33,785,661	\$19,081,239	\$2,542,570	22,663	68,165	\$51.00	2.15
1996	44,042,992	\$23,634,971	\$2,780,935	30,045	84,161	\$47.70	2.32
1997	55,312,293	\$27,485,633	\$2,974,205	51,600	109,387	\$42.78	2.31
1998	69,209,321	\$33,133,175	\$3,500,469	65,887	134,754	\$39.43	2.39
1999	86,047,003	\$40,018,489	\$4,085,417	81,698	155,817	\$41.24	2.38
2000	109,478,031	\$52,466,020	\$3,882,981	104,288	184,449	\$45.27	2.56
2001	128,374,512	\$65,316,235	\$3,752,826	127,540	203,580	\$47.37	2.74
2002	140,766,842	\$76,508,187	\$3,895,512	139,338	192,410	\$48.40	2.73
2003	158,721,981	\$87,624,093	\$3,766,267	162,986	205,629	\$49.91	3.07
2004	182,140,362	\$102,121,210	\$4,210,331	175,725	226,016	\$50.64	3.05
2005	207,896,198	\$113,538,221	\$3,786,331	183,689	233,067	\$49.98	3.00
2006	233,040,781	\$125,456,825	\$3,494,294	195,613	253,793	\$50.56	3.03
2007	255,395,599	\$138,869,304	\$3,742,015	213,299	266,782	\$49.79	N/A

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# CTIA'S SEMI-ANNUAL WIRELESS INDUSTRY SURVEY RESULTS

DECEMBER 1985 – DECEMBER 2007

Date	Estimated Subscribers	Total Six- Month Revenues (\$000)	Roamer Service Revenues (\$000)	Cell Sites	Employees	Average Local Monthly Bill	Avg. Local Call Length (Min)	Avg. Roam Call Length
Dec-85	340,213	\$306,197	N/A	913	2,727	N/A	N/A	N/A
Jun-86	500,000	\$360,585	N/A	1,194	3,556	N/A	N/A	N/A
Dec-86	681,825	\$462,467	N/A	1,531	4,334	N/A	N/A	N/A
Jun-87	883,778	\$479,514	N/A	1,732	5,656	N/A	N/A	N/A
Dec-87	1,230,855	\$672,005	N/A	2,305	7,147	\$96.83	N/A	N/A
Jun-88	1,608,697	\$886,075	N/A	2,789	9,154	\$95.00	N/A	N/A
Dec-88	2,069,441	\$1,073,473	\$89,331	3,209	11,400	\$98.02	N/A	N/A
Jun-89	2,691,793	\$1,406,463	\$121,368	3,577	13,719	\$85.52	N/A	N/A
Dec-89	3,508,944	\$1,934,132	\$173,199	4,169	15,927	\$89.30	N/A	N/A
Jun-90	4,368,686	\$2,126,362	\$192,350	4,768	18,973	\$83.94	N/A	N/A
Dec-90	5,283,055	\$2,422,458	\$263,660	5,616	21,382	\$80.90	N/A	N/A
Jun-91	6,380,053	\$2,653,505	\$302,329	6,685	25,545	\$74.56	N/A	N/A
Dec-91	7,557,148	\$3,055,017	\$401,325	7,847	26,327	\$72.74	N/A	N/A
Jun-92	8,892,535	\$3,633,285	\$436,725	8,901	30,595	\$68.51	N/A	N/A
Dec-92	11,032,753	\$4,189,441	\$537,146	10,307	34,348	\$68.68	N/A	N/A
Jun-93	13,067,318	\$4,819,259	\$587,347	11,551	36,501	\$67.31	2.38	3.38
Dec-93	16,009,461	\$6,075,916	\$774,266	12,824	39,810	\$61.49	2.41	3.26
Jun-94	19,283,306	\$6,519,031	\$778,116	14,740	45,622	\$58.65	2.36	2.89
Dec-94	24,134,421	\$7,710,891	\$1,052,666	17,920	53,902	\$56.21	2.24	2.85
Jun-95	28,154,414	\$8,749,625	\$1,120,337	19,844	60,689	\$52.45	2.27	2.74
Dec-95	33,758,661	\$10,330,614	\$1,422,233	22,663	68,165	\$51.00	2.15	2.79
Jun-96	38,195,466	\$11,194,247	\$1,314,943	24,802	73,365	\$48.84	2.24	2.8
Dec-96	44,042,992	\$12,440,724	\$1,465,992	30,045	84,161	\$47.70	2.32	3.14

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# CTIA's SEMI-ANNUAL WIRELESS INDUSTRY SURVEY RESULTS

DECEMBER 1985 – DECEMBER 2007

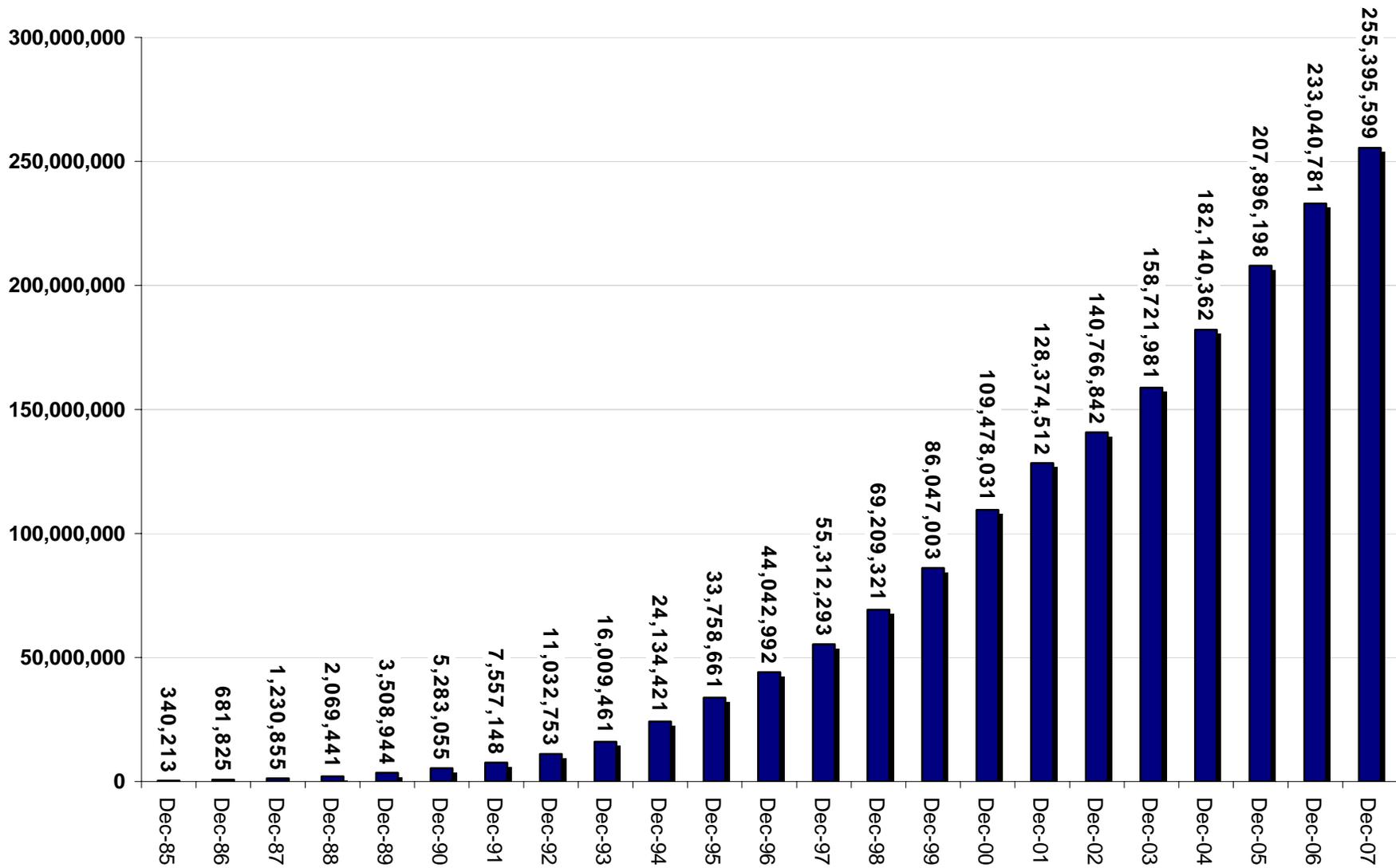
Date	Estimated Subscribers	Total Six- Month Revenues (\$000)	Roamer Service Revenues (\$000)	Cell Sites	Employees	Average Local Monthly Bill	Avg. Local Call Length (Min)	Avg. Roam Call Length
Jun-97	48,705,553	\$13,134,551	\$1,392,440	38,650	97,039	\$43.86	2.25	2.95
Dec-97	55,312,293	\$14,351,082	\$1,581,765	51,600	109,387	\$42.78	2.31	2.94
Jun-98	60,831,431	\$15,286,660	\$1,584,891	57,674	113,111	\$39.88	2.34	2.65
Dec-98	69,209,321	\$17,846,515	\$1,915,578	65,887	134,754	\$39.43	2.39	3.11
Jun-99	76,284,753	\$19,368,304	\$1,922,416	74,157	141,929	\$40.24	2.40	2.96
Dec-99	86,047,003	\$20,650,185	\$2,163,001	81,698	155,817	\$41.24	2.38	3.11
Jun-00	97,035,925	\$24,645,365	\$1,971,625	95,733	159,645	\$45.15	2.48	3.19
Dec-00	109,478,031	\$27,820,655	\$1,911,356	104,288	184,449	\$45.27	2.56	3.23
Jun-01	118,397,734	\$30,905,721	\$1,727,058	114,059	186,317	\$45.56	2.62	3.01
Dec-01	128,374,512	\$34,410,513	\$2,205,768	127,540	203,580	\$47.37	2.74	2.94
Jun-02	134,561,370	\$36,707,086	\$1,846,267	131,350	186,956	\$47.42	2.60	3.07
Dec-02	140,766,842	\$39,801,101	\$2,049,245	139,338	192,410	\$48.40	2.73	3.11
Jun-03	148,065,824	\$41,384,171	\$1,825,243	147,719	187,169	\$49.46	2.63	3.15
Dec-03	158,721,981	\$46,239,922	\$1,941,024	162,986	205,629	\$49.91	3.07	3.45
Jun-04	169,467,393	\$49,275,671	\$2,015,799	174,368	212,186	\$49.49	3.06	3.45
Dec-04	182,140,362	\$52,845,539	\$2,194,532	175,725	226,016	\$50.64	3.05	2.80
Jun-05	194,479,364	\$55,689,208	\$1,941,960	178,025	225,162	\$49.52	3.04	2.66
Dec-05	207,896,198	\$57,849,013	\$1,844,371	183,689	233,067	\$49.98	3.00	3.36
Jun-06	219,652,457*	\$60,450,669	\$1,713,680	197,576	238,236	\$49.30	2.94	3.40
Dec-06	233,040,781	\$65,006,156	\$1,780,614	195,613	253,793	\$50.56	3.03	3.47
Jun-07	243,428,202	\$67,887,668	\$1,830,435	210,360	257,401	\$49.94	3.13	3.35
Dec-07	255,395,599	\$70,981,636	\$1,911,579	213,299	266,782	\$49.79	N/A	3.40

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## Estimated Subscribers

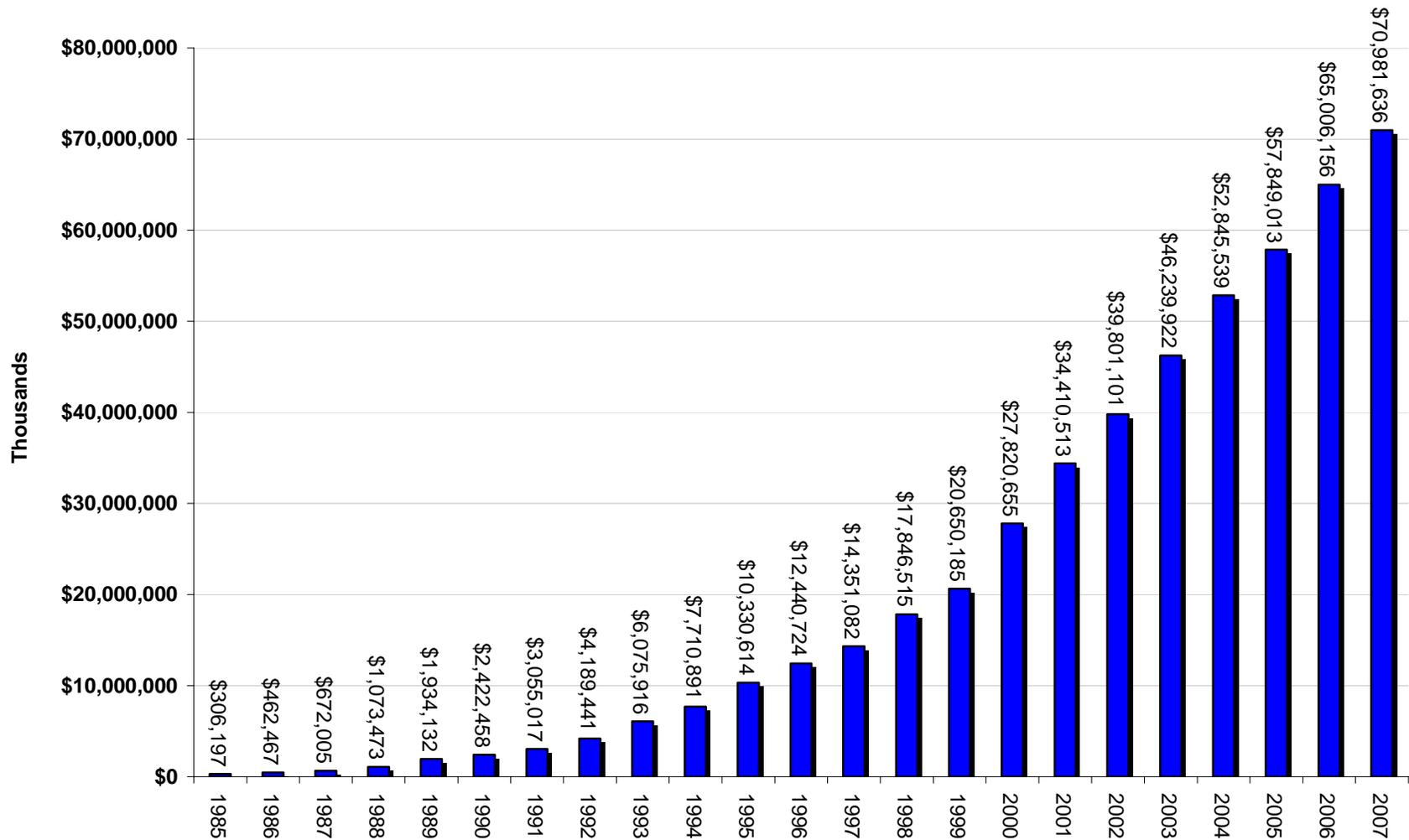


### Year-End 2007 Estimated Wireless Subscribers Up More Than 22 Million from December 2006

Source: CTIA

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## Total Six-Month Service Revenues (000s)

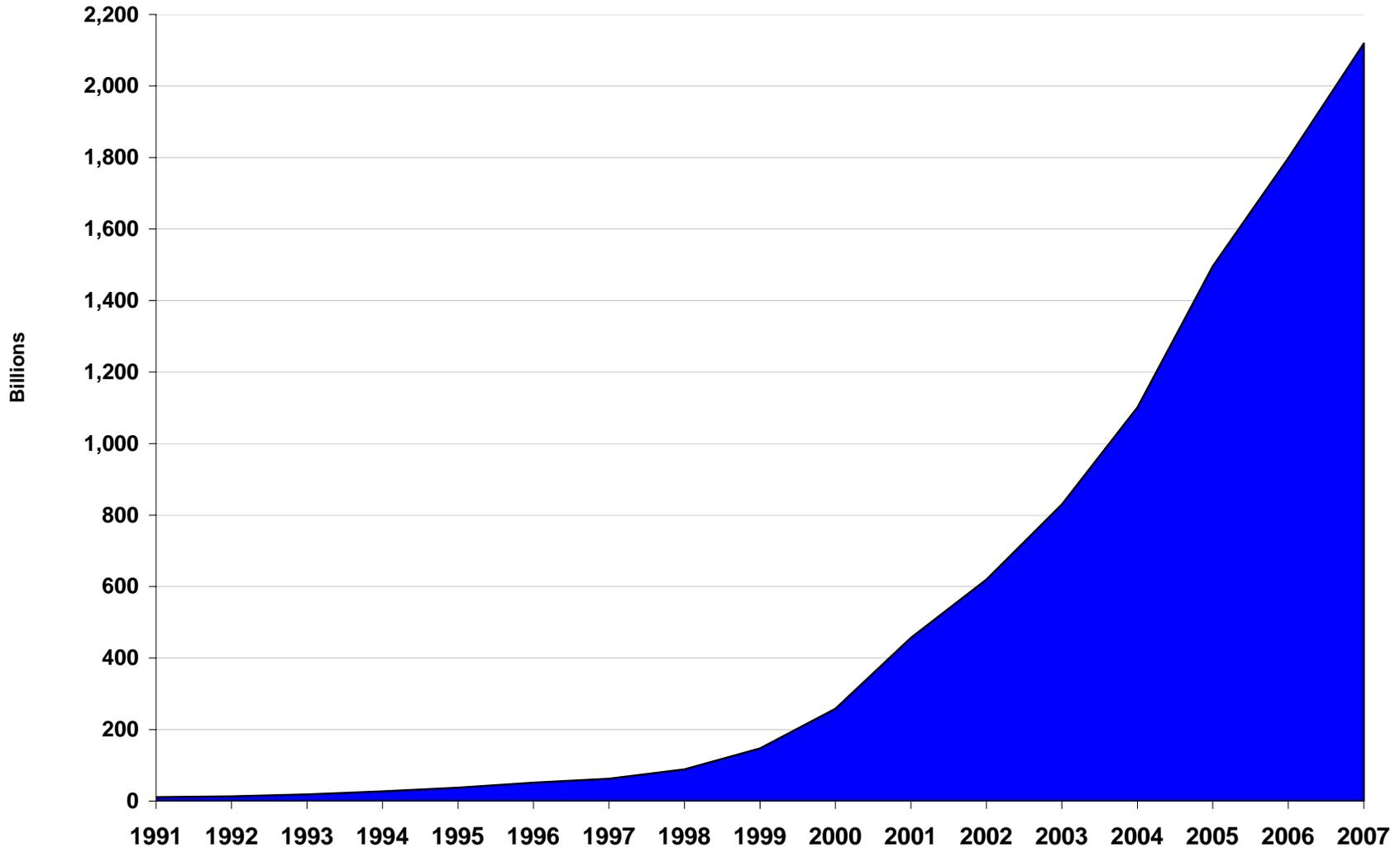


**Total Wireless Service Revenues Reach More Than \$70 billion for the Last Six Months of 2007  
- Total Twelve-Month Revenues Reach More Than \$138 Billion in 2007**

Source: CTIA

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## Reported Wireless Minutes of Use Exceed Two Trillion in 2007

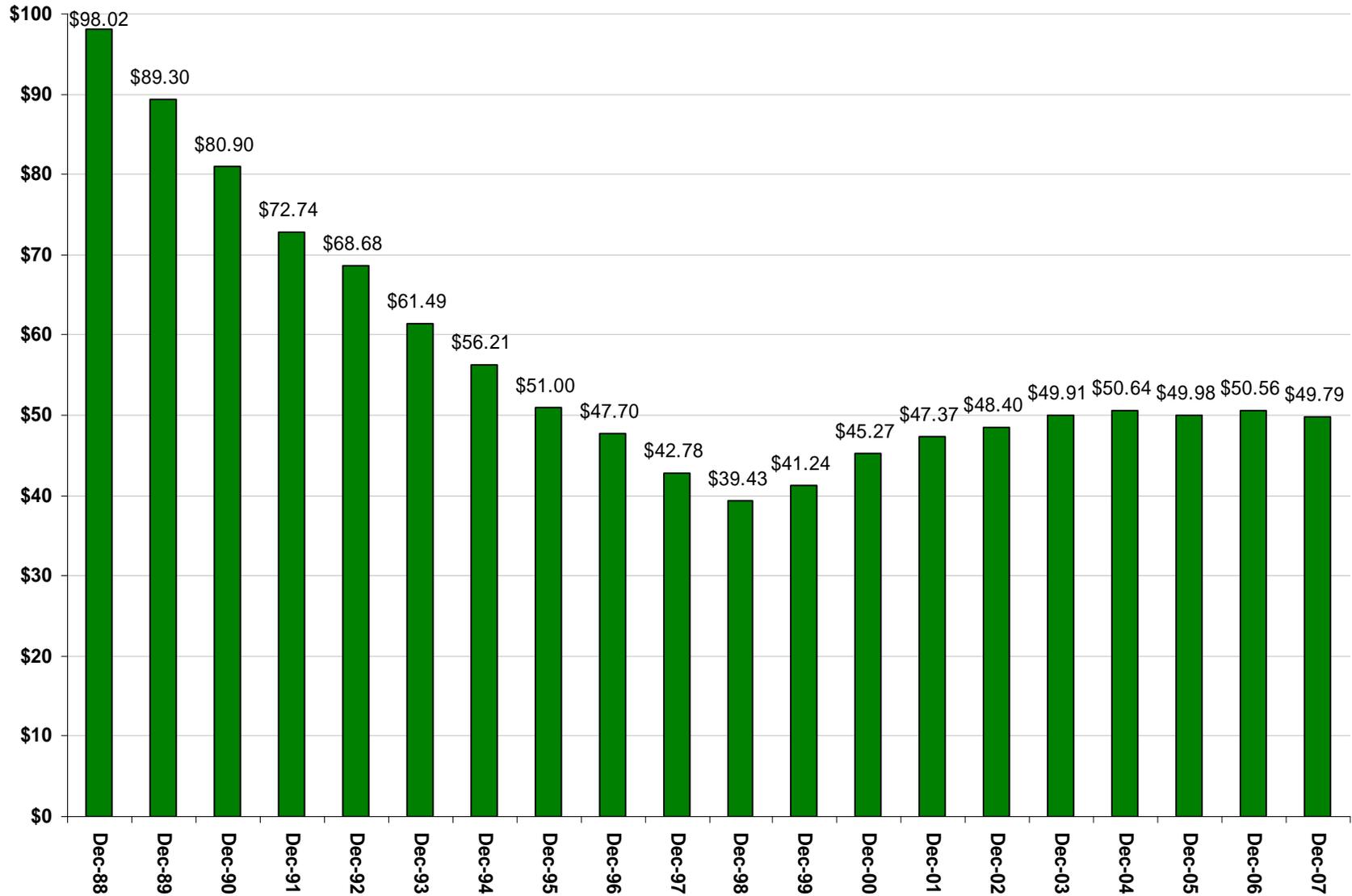


**Total Annual Reported Wireless MOUs Grow More Than 17% Year-over-Year**

Source: CTIA

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# Average Local Monthly Bill

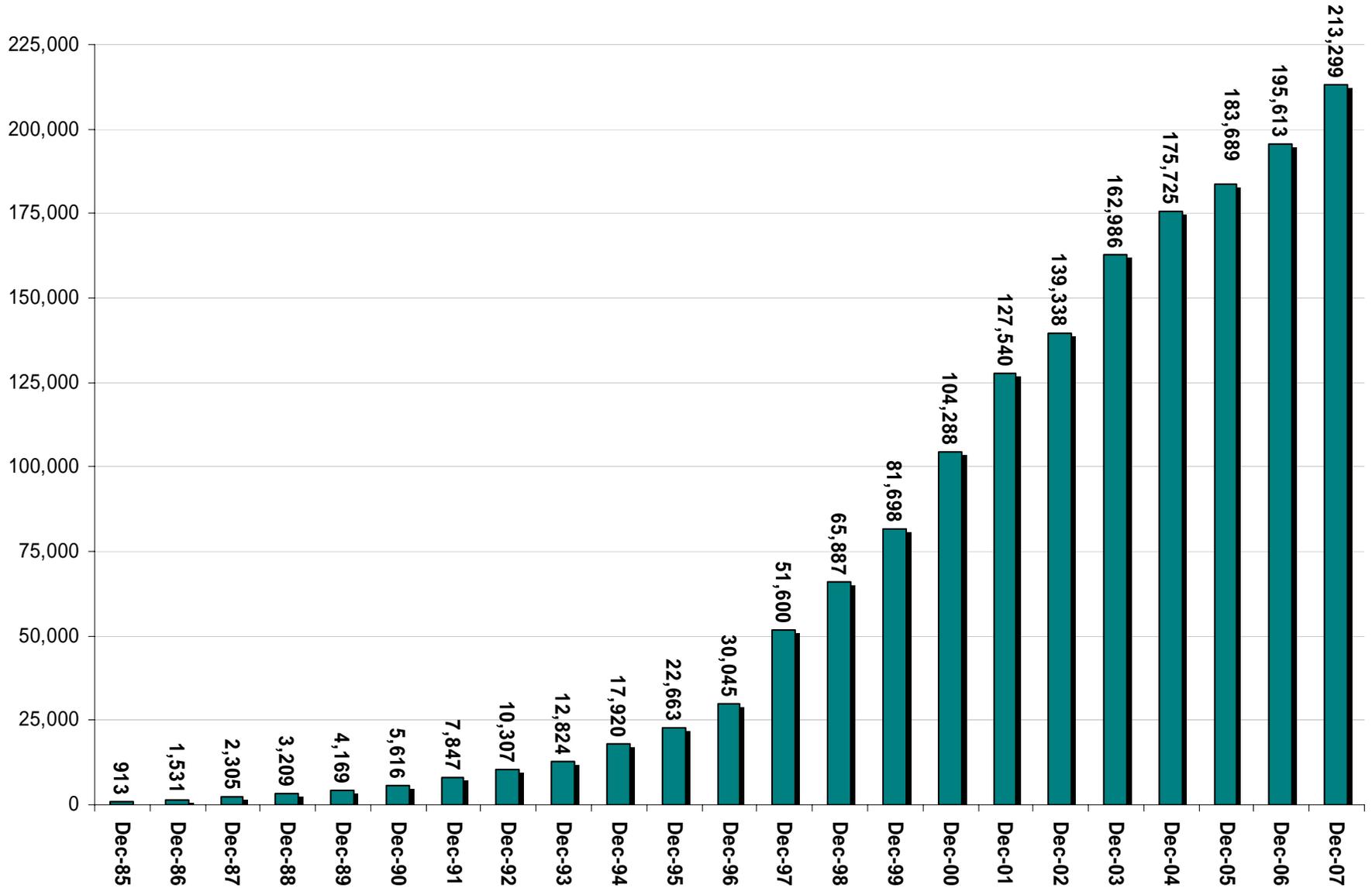


## Average Local Monthly Bill Falls 1.5% Year-over-Year

Source: CTIA

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# Cell Sites



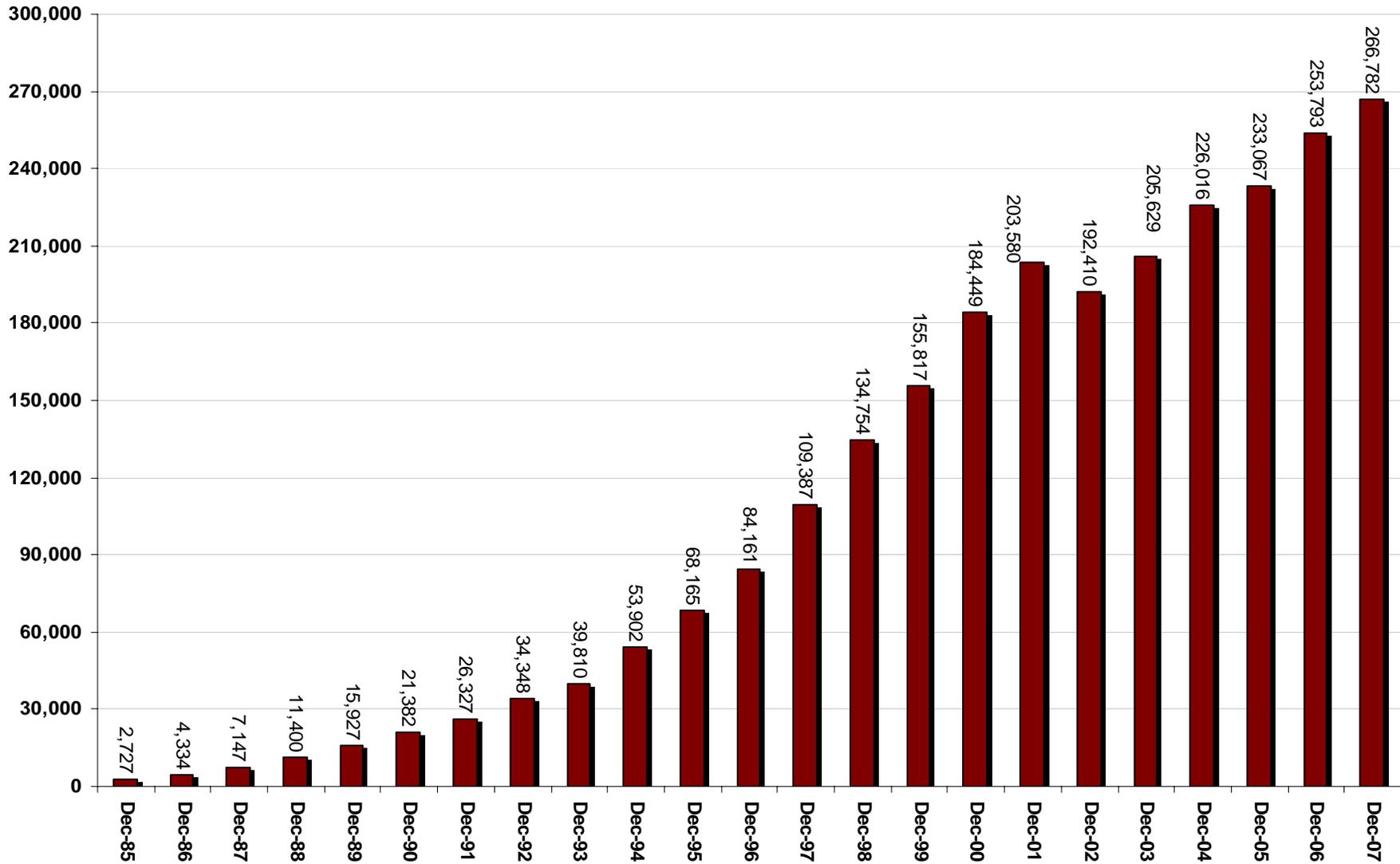
## Reported Cell Sites in Service are Up 9% Year-Over-Year

Source: CTIA

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## Direct Carrier Employees



**Direct Wireless Carrier Employment Grows 5% Year-over-Year  
Direct Employment Exceeds 266,000 at Year-End 2007**

Source: CTIA

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