

**IN THE SUPERIOR COURT OF FULTON COUNTY
STATE OF GEORGIA**

PACIFIC COMMUNICATIONS, L.L.C.)	
)	
Plaintiff,)	
)	CIVIL ACTION
v.)	
)	FILE NO. 2000CV20099
AMERICAN WIRELESS, L.L.C.)	
)	
Defendant.)	

EXPERT AFFIDAVIT OF PETER CRAMTON

Introduction

- I. Pacific Communications Would Not Use the Spectrum to Provide Wireless Telecommunications Services in Honolulu, Hawaii
 - A. Recent Auction Data Show that Incumbent Wireless Carriers Value Spectrum More than Entrants
 - B. Pacific Communications Could Not Generate a Future Stream of Net Operating Revenue in Excess of a Sale Price of the License to an Incumbent Today
 - 1. The Cost of Capital for Startups Is Roughly Twice the Cost of Capital for Incumbents
 - 2. Wireless Carriers with Local as Opposed to National Footprints Cannot Achieve a Large Market Share
 - 3. The Levels of Market Share Necessary for Pacific Communications to Be Indifferent Between Deploying a Network in Honolulu and Selling the License to an Incumbent Are Not Achievable
- II. Pacific Communications Will Not Incur a Cost If the Sale to an Incumbent Is Delayed until the Ownership Issues Are Resolved
 - A. Because Pacific Communications Would Likely Sell the License to an Incumbent, the Cost of Delay Is the Cost of Delay for an Incumbent Carrier
 - B. Because Bandwidth-Intensive Applications Will Take Several Years to Develop in the United States, U.S. Incumbent Providers Are Buying the Spectrum for Future Use
 - C. Because the Cost of Delay for an Incumbent Would Be Negligible, Pacific Communications Will Not Incur Any Cost If the Sale to an Incumbent Is Delayed
 - D. The Trend in Spectrum Prices Suggests That the Price of the Honolulu License Could Rise During the Appeals Process

Conclusion

QUALIFICATIONS

1. I am Professor of Economics at the University of Maryland, President of Criterion Auctions LLC, and President of Market Design Inc. I am expert on auctions, bargaining, and market exchange. Much of my recent work has applied this expertise to spectrum policy, the restructuring of infrastructure industries (especially electricity), and e-commerce. I previously was an Associate Professor at Yale University and a National Fellow at the Hoover Institution at Stanford University.

2. With respect to spectrum management, I have served as the lead auction advisor in spectrum auctions for many clients. My auction practice is worldwide, including engagements in the United States, Belgium, the Netherlands, Italy, the United Kingdom, Switzerland, Canada, Australia, Austria, and Singapore. I have advised several foreign governments on the design and implementation of spectrum auctions.

3. From July 1997 to August 1998, I served as the U.S. Department of Justice's expert in the matter of bid signaling in the FCC spectrum auctions. As part of this work I studied collusive bidding strategies in the FCC auctions, especially the DEF-block auction which concluded January 1997. The analysis resulted in two research papers, as well as modification of the FCC auction rules. From November 1994 to November 1995, I advised the FCC on the design and implementation of spectrum auctions. During the first broadband PCS auction I advised the FCC on a daily basis with respect to bid increments and other aspects of auction implementation. I developed a tool to help the FCC and bidders track the progress of the auction. From July 1997 to December 1997, I advised the FCC on methods to improve the FCC auctions.

3. I also have extensive consulting experience in the areas of e-commerce and electricity deregulation. I have advised e-commerce market makers on market design for

business-to-business and business-to-consumer trading. For several utilities, I have led the auction design for generation asset divestiture, standard offer service, and NUG entitlements under power purchase agreements.

4. I have published numerous articles in scholarly journals, including *American Economic Review*, *Econometrica*, *Review of Economic Studies*, *Journal of Economic Literature*, *European Economic Review*, *International Economic Review*, *Journal of Regulatory Economics*, *Journal of Law and Economics*, *Journal of Labor Economics*, *Journal of Economics and Management Strategy*, *Games and Economic Behavior*, and *Journal of Law, Economics and Organization*.

5. I earned my B.S. in Engineering from Cornell University, and my Ph.D. in Business from Stanford University. A more detailed curriculum vitae is included in the appendix.

SUMMARY OF CONCLUSIONS

6. In Part I of my affidavit, I explain why Pacific Communications (“Pacific”), if granted transfer of the license, would not use the spectrum originally purchased by American Wireless to provide wireless telecommunications services in Honolulu, Hawaii. A basic premise of economics is that scarce resources ultimately are put to their best use. Indeed, Ronald Coase won the Nobel prize for demonstrating this result known as the Coase Theorem. Recent auction data show that incumbent wireless carriers—that is, carriers that have existing operations and spectrum in a given license area or a neighboring license area—value spectrum more than entrants. In particular, I find that, of 252 properties that were sold in the open portion of the FCC’s most recent spectrum auction, 144 (or 57.2 percent) were won by carriers that already had spectrum in the *same* license area. Of the 108 licenses that were won by bidders with no

spectrum in the license area, 70 (or 64.8 percent) were determined to be incumbents in a neighboring license area. Therefore, the aggregate number of licenses won by incumbents in or near the area in question is 214 (or 84.9 percent). When I adjust the licenses to reflect population covered—that is, when I weight licenses by populations—incumbent carriers with spectrum in the *same* license area won 89.3 percent of the open properties.

7. For at least three reasons, Pacific could not generate a future stream of net operating revenue in excess of a sale price of the license to an incumbent today. *First*, the cost of capital for startup wireless carriers is roughly twice the cost of capital for incumbents, which ensures that incumbents will almost always pay more for the *same* business opportunity as would an entrant. *Second*, wireless carriers with local as opposed to national footprints generally cannot achieve a large market share. Hence, setting aside the cost of capital explanation, the business opportunity faced by an incumbent wireless carrier and an entrant are *not* the same. Third, the levels of Pacific's expected market share necessary for Pacific to be indifferent between deploying a network in Honolulu and selling the license to an incumbent are not achievable.

8. In Part II, I explain why Pacific is likely to incur no cost at all if the sale of the license to an incumbent is delayed until the ownership issues are resolved. Because Pacific would likely sell the license to an incumbent wireless carrier, the cost of delay is the cost of delay for an incumbent carrier. Because bandwidth-intensive applications may take several years to develop, incumbents to a large extent are holding the spectrum for future use. Only in the most densely populated cells nationwide is the additional spectrum likely to be used soon. Finally, because the cost of delay for an incumbent likely would be minimal, Pacific will not incur a cost if the sale to an incumbent is delayed. To the extent that the spectrum is stored for future use,

then the expected price of spectrum increases with the interest rate, implying that there is no cost of delay. The trend in spectrum prices appears to be consistent with this result.

INTRODUCTION

9. The Federal Communications Commission (FCC) is responsible for allocating bandwidth or “spectrum” for the provision of both broadband and narrowband personal communications services (PCS). An example of broadband PCS is mobile phone service, whereas an example of narrowband PCS is two-way paging. To ensure a competitive mobile telephony market, the FCC allocated sufficient spectrum for several firms to offer service. In particular, the FCC allocated 50 MHz of cellular spectrum and another 120 MHz of PCS spectrum for mobile phone service use. The allocated bandwidth is then divided in blocks of spectrum. In this case, the FCC established 8 blocks (2 cellular and 6 PCS). An FCC license provides the holder with the right to operate a wireless communication service on a particular block within a particular geographic area. The geographic area of a license is set by the FCC as part of the spectrum allocation process. Once the bandwidth, geographic scope, and service rules are determined by the FCC, the spectrum is ready to be assigned to commercial companies.

The cellular spectrum was assigned through legislation, “beauty contests,” and lotteries. By contrast, the 120 MHz of PCS spectrum was assigned to bidders through a series of government-run auctions. The 120 MHz of PCS spectrum was divided into 3 blocks of 30 MHz each (A, B, and C blocks) and 3 blocks of 10 MHz each (D, E, and F blocks). These licenses were auctioned in three separate auctions. First, the A and B bands (99 licenses) were auctioned in 1995, then the 493 C block licenses were auctioned in 1996, and finally the 1472 D, E, and F

block licenses were auctioned in 1997. All auctions used a state-of-the-art auction design, the “simultaneous ascending auction,” in which all the licenses are auctioned simultaneously over a sequence of rounds, until no bidder is willing to bid higher on any license. This auction design promotes price discovery (the determination of market clearing prices) and efficiency (getting the licenses to those companies that value them most).

10. Because the FCC has allocated 170 MHz of spectrum in each license area in the United States (50 MHz of cellular licenses plus 120 MHz of PCS licenses), the 30 MHz license in Honolulu in question is not unique. Table 1 reveals the identity of the licensee in each band of spectrum.

TABLE 1: ORIGINAL AND CURRENT LICENSEES IN HONOLULU BTA

	Cellular-A (25 MHz)	Cellular-B (25 MHz)	PCS-A (30 MHz)	PCS-B (30 MHz)	PCS-C (30 MHz)	PCS-D (10 MHz)	PCS-E (10 MHz)	PCS-F (10 MHz)
Won in Auction			Western PCS	PCS PrimeCo	American Wireless	AT&T Wireless	Sprint PCS	Magnacom Wireless
Current Owner	AT&T Wireless	Verizon Wireless	VoiceStream	Sprint PCS	American Wireless	AT&T Wireless	Sprint PCS	Alaska Native Wireless*

Source: Cellular licensees from Fifth Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services (released Aug. 18, 2000). PCS licensees from Federal Communications Commission, Universal Licensing System, available at <http://www.fcc.gov/wtb/uls/> (Jan. 27, 2001).

Note: * 40 percent owned by AT&T with an option to purchase an additional 40 percent.

As Table 1 shows, there are currently five distinct licensees in Honolulu.

11. The licenses for usage rights to broadband PCS spectrum within the same geographic area are a fungible commodity. It can be traded in much the same way that other commodities trade through negotiated transactions between private sellers. According to FCC Commissioner Harold Furchtgott-Roth, there is a well-developed secondary market for spectrum.

Some may observe that secondary markets for spectrum are alive and thriving. Indeed, every year the FCC processes thousands of license transfers, the consummation of secondary markets for spectrum rights. In many if not most

instances, these licenses are transferred from one party to another in exchange for some form of consideration as a result of a contract.¹

Hence, it is possible for a firm to acquire usage rights in a private transaction and offer wireless services without having won spectrum in an FCC auction.

12. In my affidavit, I associate the sale price in an FCC auction with the market value of the license. It should be noted that, in theory, a government auction is a different procedure than the sale of a license between private parties in the secondary market for spectrum. Private transactions involve negotiated terms between firms, which are different than auction procedures established by the FCC. However, it is reasonable to assume that an auction by a government and a negotiated private sale in the secondary market would generate revenues of the same magnitude. If the expected prices differed by a significant amount, then a buyer would be able to do better by buying in the cheaper market. This arbitrage will tend to balance the expected prices between the FCC's auction and the private transactions in a secondary market.

I. PACIFIC COMMUNICATIONS WOULD NOT USE THE SPECTRUM TO PROVIDE WIRELESS TELECOMMUNICATIONS SERVICES IN HONOLULU, HAWAII

A. Recent Auction Data Show that Incumbent Wireless Carriers Value Spectrum More than Entrants

13. The FCC recently conducted an auction of 422 C & F block licenses (Auction #35). The spectrum was divided into open and "closed" properties, or properties that were set-aside for designated entities. For the "open" licenses, incumbent carriers were competing against themselves and against entrepreneurs with little to no spectrum holdings. Of the 422 total

1. Separate Statement of Commissioner Harold W. Furchtgott-Roth, In the Matter of Principles for Promoting the Efficient Use of Spectrum by Encouraging the Development of Secondary Markets, Federal Communications Commission 2000 FCC Lexis 6337, Release-Number: FCC 00-401 (released Dec. 1, 2000) at 54.

licenses for sale, 252 were classified as open.² For each open license, I calculated the amount of spectrum holdings within that license area—both cellular and PCS licenses—of the *winning* bidder.³

14. I found that incumbent carriers, who were “desperate for additional space on the airwaves so they [could] roll out advanced technologies that gobble up more of it,”⁴ generally won open licenses more than entrants did. In particular, incumbents with at least some spectrum in the same license area won roughly 60 percent of the open licenses. Even within incumbent carriers as a class, those incumbents with more spectrum in a given license area won more than did incumbents with less spectrum. Table 2 summarizes the results.

TABLE 2: DISTRIBUTION OF WINNING BIDDERS IN OPEN MARKETS, AUCTION #35

Open Markets	Carrier Has Greater Than 10MHz In license area	Carrier Has Between 1 and 10MHz in License Area	Carrier Has Less Than 1 MHz in License Area
252	136 (54.0 %)	8 (3.2 %)	108 (42.9 %)
			But More Than 1 MHz in a Neighboring License Area
			With Less Than 1 MHz in a Neighboring License Area
			70 (64.8 %) 38 (35.2 %)

Source: Winning bidder information is from Federal Communications Commission Public Notice, *C and F Block Broadband PCS Auction Closes; Winning Bidders Announced; Down Payments Due February 12, 2001, FCC Forms 601 and 602 Due February 12, 2001; Ten-Day Petition to Deny Period*, DA 01-211 (released Jan. 29, 2001) (downloaded at <http://www.fcc.gov/wtb/auctions/> on Jan. 30, 2001). Cellular holdings of each carrier are from Fifth Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services (released Aug. 18, 2000) (downloaded from <http://www.fcc.gov/wtb/reports/> on Jan. 30, 2001). PCS holdings of each carrier are from RCR Wireless News, 2000 PCS Database (Fall 2000), available at <http://www.rcrnews.com/inside/databases/index.php3>.

2. Federal Communications Commission Public Notice, *C and F Block Broadband PCS Spectrum Auction Scheduled for November 29, 2000, Rescheduled for December 12, 2000*, DA 00-2259 (released Oct. 5, 2000) (downloaded at <http://www.fcc.gov/wtb/auctions/> on Jan. 30, 2001).

3. Both direct holdings and indirect holdings—that is, spectrum holdings of a subsidiary or affiliated firm—were counted.

4. Jill Carroll, *Airwaves Auction in U.S. Pulls In Record \$16.86 Billion*, WALL ST. J. EUR., Jan. 30, 2001, at 34.

As Table 2 shows, carriers with more than 10 MHz of spectrum in the license area for sale won an open license more often than carriers with less than 10 MHz of spectrum in the license area (136 licenses versus 8 licenses). When I adjust the licenses to reflect the actual population covered—that is, when I weight licenses by populations—incumbent carriers with spectrum in the *same* license area won 89.3 percent of the open spectrum.

15. Finally, I examined the degree of incumbency of the 108 licenses that were won by carriers with no spectrum in that license area. For each of those licenses, I determined whether the winning bidder had spectrum in a neighboring license area.⁵ Any winning bidder who meets that condition can be considered an “incumbent” in the sense that it is filling a hole in its nationwide footprint. Of the 108 licenses that were won by bidders with no spectrum in the license area, 70 (64.8 percent) were determined to be incumbents in a neighboring license area.

16. For example, there were two open licenses for sale in the New York Basic Trading Area (BTA). Before the auction began, Verizon held 25 MHz of spectrum in the New York BTA.⁶ Cingular, the wireless joint venture between SBC and BellSouth, received 10 MHz from VoiceStream in a swap before the auction.⁷ Yet Verizon outbid all competitors, including incumbent carriers with less of a presence in New York, in *each* of the two open licenses in New York.⁸ Based on the above analysis, one can safely infer that (1) incumbent carriers value

5. The licenses sold in FCC Auction #35 covered basic trading areas (BTAs). Because major trading areas (MTAs) are comprised of a collection of BTAs, each BTA can be assigned to a MTA. For the purpose of this analysis, I considered a winning bidder to be an incumbent in a neighboring license area if the BTA license in question resided within an MTA that was adjacent to an MTA in which the winning bidder currently owns spectrum.

6. Cellular holdings of each carrier are from Fifth Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services (released Aug. 18, 2000) (downloaded from <http://www.fcc.gov/wtb/reports/> on Jan. 30, 2001). PCS holdings of each carrier are from RCR Wireless News, 1999 PCS Database (Fall 1999), available at <http://www.rcrnews.com/inside/databases/index.php3>.

7. Nicole Harris, *Cingular Wireless, VoiceStream Plan to Swap Spectrum*, WALL ST. J., Nov. 3, 2000, at B6.

8. Federal Communications Commission Public Notice, *C and F Block Broadband PCS Auction Closes; Winning Bidders Announced; Down Payments Due February 12, 2001, FCC Forms 601 and 602 Due February 12,*

spectrum at higher levels than do entrants and (2) over the relevant range, incumbents with more spectrum in a license area value additional spectrum at higher levels than do incumbents with less spectrum in that license area.

B. Pacific Communications Could Not Generate a Future Stream of Net Operating Revenue in Excess of a Sale Price of the License to an Incumbent Today

1. The Cost of Capital for Startups Is Roughly Twice the Cost of Capital for Incumbents

17. The cost of capital is a vital input for calculating the profitability of any business plan. In particular, all future cash flows are discounted at a rate equal to the firm's cost of capital.⁹ Small differences in a firm's cost of capital—or the weighted average cost of capital (WACC) to be precise—can result in large differences in the profitability of a business plan. For example, a larger interest rate, all else being equal, will lower the present discounted value of any business opportunity. Because smaller wireless companies generally must discount future cash flows at higher rates, larger companies value spectrum—that is, the opportunity to operate a wireless business—more highly than do entrants.

18. A firm's WACC is the expected return on a portfolio of all of that firm's securities.¹⁰ The formula for WACC is simply a weighted-average of the return on equity and the return on debt or:

$$WACC = D/V (r_D) (1 - t) + E/V (r_E),$$

where D is the firm's outstanding debt, E is the market capitalization of the firm's equity, V is the sum of the firm's outstanding debt (D) and the market capitalization of the firm's equity (E),

2001; *Ten-Day Petition to Deny Period*, DA 01-211 (released Jan. 29, 2001) (downloaded at <http://www.fcc.gov/wtb/auctions/> on Jan. 30, 2001) [hereinafter AUCTION RESULTS NOTICE].

9. RICHARD A. BREALEY & STUART MYERS, *PRINCIPLES OF CORPORATE FINANCE* 457 (McGraw Hill 1996 5th ed.)

10. *Id.*

r_D is the firm's average borrowing rate, r_E is the firm's return on equity,¹¹ and t is the corporate income tax rate.

19. Suppose, for example, that Firm A has a WACC of 10 percent and Firm B has a WACC of 15 percent. Suppose each firm faces an *identical* business opportunity that would generate \$100 each year for the next ten years. Under those assumptions, firm A would be willing to pay up to \$614 to partake in that opportunity. By contrast, Firm B would only be willing to pay up to \$500 to partake in that opportunity. This simple example demonstrates that, even when the expected cash flows from a project are *identical* across two firms, the project is more valuable to the firm with the lower WACC. Applying this lesson to the case of valuing spectrum licenses, a firm with a lower WACC values a license more highly than does a firm with a higher WACC even when both firms expect to earn the *identical* cash flows.¹²

20. To test whether the WACC of an incumbent wireless firm is lower than the WACC of an entrant, I computed the WACC for each publicly traded wireless carrier listed in the FCC's most recent list of wireless carriers by subscriber.¹³ Of the 25 carriers listed in the FCC's report, 21 firms are publicly traded. For comparison purposes, I list the WACCs of the four largest and four smallest publicly-traded wireless carriers. A firm's WACC is the weighted-average of the firm's return on equity and the firm's borrowing rate. To estimate the firm's return on equity, I use the capital-asset pricing model—that is, the firm's return on equity is

11. To estimate the firm's return on equity, I use the capital-asset pricing model—that is, the firm's return on equity is equal to the risk-free rate of return plus the product of the firm's beta and the excess return on all equities.

12. The assumption of identical cash flows suggests identical market shares, which is unrealistic given the fact that an incumbent firm has an advantage in gaining customers over entrants.

13. Fifth Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services (released Aug. 18, 2000) (downloaded from <http://www.fcc.gov/wtb/reports/> on Jan. 30, 2001) [hereinafter FIFTH REPORT].

equal to the risk-free rate of return plus the product of the firm's beta and the excess return on all equities. Table 3 summarizes the results.

TABLE 3: WEIGHTED-AVERAGE COST OF CAPITAL FOR THE LARGEST AND SMALLEST PUBLICLY-TRADED U.S. WIRELESS CARRIERS

Company	Market Value of Debt (Million Dollars) [D]	Current Borrowing Rate (Percent) [r_D]	Beta [b]	Expected Rate of Return on Equity (Percent) [r_E]	Market Value of Current Equity (Million Dollars) [E]	Market Value of Firm (Million Dollars) = Debt + Equity [V=D+E]	After-Tax WACC (Percent)	Subscribers (Thousands) (1999)
Verizon	51,713	6.77	0.59	10.09	148,315	200,028	8.62	25,790
SBC	25,303	6.59	0.70	11.01	163,663	188,966	10.11	16,488
BellSouth	16,766	6.33	0.53	9.58	78,721	95,487	8.62	
AT&T	61,785	6.54	0.97	13.29	143,285	205,070	10.56	9,987
Qwest	18,165	6.65	1.45	17.31	69,954	88,119	14.63	466
Cincinnati Bell	2,416	8.19	0.99	13.45	6,069	8,484	11.13	162
Telecorp	1,256	10.40	1.02	13.70	2,123	3,379	11.12	142
US Unwired	248	13.38	0.74	11.35	701	949	10.65	93

Sources: Risk free rate is the 10-Year Treasury Constant Maturity Rate on December 29, 2000, downloaded from the Federal Reserve Bank of Chicago's web site at http://www.chicagofed.org/economicresearchanddata/economicandfinancialdata/prnfiles/specinterestrates/const_cd.prn. Subscribers are from Fifth Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services (released Aug. 18, 2000) (downloaded from <http://www.fcc.gov/wtb/reports/> on Jan. 30, 2001).

As Table 3 demonstrates, Verizon has the lowest cost of capital (8.6 percent) and the largest subscriber base (25.8 million subscribers). The next largest firm in terms of subscribers, Cingular (a joint venture between SBC and BellSouth), has a WACC between 8.6 and 10.1 percent. The smallest carriers have much higher WACCs.

21. It is interesting to note that Mr. William Redpath, the plaintiff's wireless valuation expert, assumed a WACC of 15.9 percent for his present discounted cash flow calculations for Pacific.¹⁴ That is low rate for a small, startup company like Pacific. As illustrated above, smaller companies must discount future cash flows at higher rates than larger companies. Hence, the larger companies value spectrum—that is, the opportunity to operate a wireless business—more highly than do entrants.

14. Affidavit of William Redpath on behalf of Pacific Communications, Jan. 16, 2001, at ¶ 19 [hereinafter REDPATH AFFIDAVIT].

22. I have advised several start-up companies in spectrum auctions funded in part by venture capital.¹⁵ In each case, these companies have had a cost of capital between 25 and 30 percent. New ventures like Pacific involve much greater risks than the investments made by Verizon or other major carrier. As a result the cost of capital is substantially higher to compensate for this additional risk. Because Pacific would not value the license to the same extent as would an incumbent carrier, Pacific would likely sell the license to an incumbent carrier.

2. Wireless Carriers with Local as Opposed to National Footprints Cannot Achieve a Large Market Share

23. The wireless industry is experiencing a tremendous amount of consolidation as carriers attempt to combine footprints to offer nationwide coverage. The FCC has recognized this trend and offers the following explanation:

The Commission previously concluded that operators with larger footprints can achieve economies of scale and increased efficiencies compared to operators with smaller footprints. Such benefits permit companies to introduce and expand innovative pricing plans such as digital-one-rate type (“DOR”) plans, reducing prices to consumers. Analysts have drawn similar conclusions, predicting that the current consolidation will intensify competition among nationwide wireless providers.¹⁶

These cost-side forces in conjunction with consumers’ demand to roam without additional charges are pushing the industry to further consolidation.

24. In the past two years, there have been at least 10 major consolidations among U.S. wireless carriers. For example, SBC Communications’ acquired Radiofone and Cellular

15. For example, I have advised Access Spectrum, Burst Wireless, FirstMark Communication, Stream Intelligent Networks, Callino, and Sophia Communication.

16. FIFTH REPORT, *supra* note 13, at 10.

Communications of Puerto Rico in March 1999.¹⁷ ALLTEL Corp. merged with Aliant Communications and Liberty Cellular in the summer of 1999.¹⁸ In October 1999 AT&T and Dobson Communications formed a joint venture to purchase American Cellular.¹⁹ Rural Cellular acquired Triton Cellular in November 1999.²⁰ In April 2000, Bell Atlantic and Vodafone merged the assets of Bell Atlantic Mobile, AirTouch Communications, and PrimeCo Personal Communications to create Verizon Wireless.²¹ In the same month, SBC and BellSouth announced they would combine their U.S. wireless operations into a joint venture.²² AT&T acquired Wireless One in February 2000.²³ VoiceStream merged with Omnipoint and Aerial Communications in the spring of 2000.²⁴ VoiceStream acquired Powertel in August 2000.²⁵ Verizon acquired Price Communications in November 2000.²⁶ In February 2001, Verizon completed the purchase of 20 wireless PCS licenses from Alltel in Alabama, Georgia, Missouri,

17. *SBC Communications Completes Acquisition of Radiofone, Inc.*, News Release, SBC Communications, Inc., Mar. 2, 1999.

18. *ALLTEL, Aliant Complete \$1.8 Billion Merger*, News Release, ALLTEL Corp., July 2, 1999; *ALLTEL, Liberty Cellular Complete \$600 Million Merger*, News Release, ALLTEL Corp., Sept. 30, 1999.

19. *AT&T and Dobson Communications Form Joint Venture To Purchase American Cellular*, News Release, AT&T Corp., Oct. 6, 1999.

20. *Rural Cellular Corporation Agrees to Acquire Assets of Triton Cellular*, News Release, Rural Cellular Corp., Nov. 8, 1999.

21. *Bell Atlantic and Vodafone AirTouch Launch Verizon Wireless*, News Release, Verizon Wireless, Apr. 4, 2000.

22. *BellSouth, SBC Create 2nd Largest Wireless Company With \$10.2 Billion in Revenues*, News Release, BellSouth Corp., Apr. 5, 2000

23. *AT&T Announces Acquisition of Wireless One*, News Release, AT&T, Corp., Feb. 7, 2000.

24. *VoiceStream Wireless Closes Omnipoint Merger*, News Release, VoiceStream Wireless Corporation, Feb. 28, 2000; *VoiceStream Wireless Closes Aerial Merger*, News Release, VoiceStream Wireless Corporation, May 5, 2000.

25. *Powertel to Be Acquired*, News Release, VoiceStream, Aug. 27, 2000 (downloaded at http://www.voicestream.com/about/press/press_20000828.asp).

26. *Verizon Communications Posts Strong Results For Fourth Quarter and 2000*, News Release, Verizon Communications, Feb. 1, 2001 (downloaded at <http://newscenter.verizon.com/proactive/newsroom/release.vtml?id=48888>).

Oklahoma and Tennessee areas.²⁷ The trend is unmistakable—this process will likely lead to only a handful of nationwide wireless carriers.

25. Regional carriers that have yet to find a complementary partner or have yet to sell out are experiencing difficulties in acquiring subscribers. For example, Qwest, a long-distance operator that acquired U S West, has struggled in the wireless industry largely on account of its failure to obtain a national footprint. By the end of 1999, Qwest ranked 18 out of 25 U.S. wireless carriers with subscribers.²⁸ When accounting for the fact that Qwest licenses cover only 20 million potential subscribers,²⁹ Qwest's average penetration rate (equal to 805,000 subscribers divided by 20 million total potential subscribers covered by its licenses) is 4.0 percent, which is much lower than the average penetration rate of Verizon (11.2 percent) or AT&T (7.1 percent). Because it only offers wireless services in eight states, Qwest is at a large disadvantage with respect to carriers who have nationwide footprints. In particular, Qwest customers who wish to roam outside of Qwest's home coverage area must pay roaming fees,³⁰ whereas Sprint PCS, AT&T, and Verizon waive such fees.

26. I advised U S West on spectrum matters shortly before it was acquired by Qwest in March 2000. In particular, the work involved developing U S West's regulatory strategy with respect to the 700 MHz auction. As part of this project, I presented my views on the 700 MHz auction to the FCC. During that period, I learned that U S West recognized that it would not be able to compete with the nationwide operators, even though it had substantial coverage

27. Kristy Bassuener, *Verizon Takes 20 Licenses Off Alltel's Hands*, WIRELESS WEEK, Feb. 21, 2001, at *1 (downloaded at www.wirelessweek.com/index.asp?layout=story&doc_id=16765&verticalID=34&vertical=Business+and+Finance).

28. FIFTH REPORT, *supra* note 13, at Table 3.

29. U S WEST COMMUNICATIONS INC., SEC FORM 10-K405, released Mar. 3, 2000, at *1.

30. Qwest warns its wireless customers that "service providers typically charge a higher per-minute fee for calls placed outside their home calling or coverage area" (downloaded from

throughout the West and in addition had substantial marketing economies because of its position as a wireline provider in the region.

3. The Levels of Market Share Necessary for Pacific Communications to Be Indifferent Between Deploying a Network in Honolulu and Selling the License to an Incumbent Are Not Achievable

27. When evaluating whether to use or sell the license, Pacific must compare the expected present discounted value of net cash flows from offering the service with the expected value of selling the license to an incumbent today. According to Pacific's own estimate by Mr. Redpath, the value of selling the Honolulu license today is \$154 million.³¹ After estimating the percent decrease due to a two-year delay in the present discounted value of offering the service *by an entrant*, Mr. Redpath incorrectly applies that discount rate to the willingness to pay for the license *by an incumbent* to estimate the extent of Pacific's loss. What Mr. Redpath ignores is the fact that the value of the license in the hands of Pacific is much less than the value of the license in the hands of an incumbent wireless carrier. Stated differently, Mr. Redpath failed to apply that discount rate to the present discounted value that *Pacific* would earn by offering service in Honolulu. To determine whether Pacific would in fact offer services in Honolulu, one must know (1) the share of the market that Pacific will ultimately capture and (2) the penetration rate of wireless services in Honolulu necessary to make Pacific better off compared to selling the licenses today for \$154 million for a profit of \$140.5 million (= \$154 million - \$13.5 million).

www.uswestwireless.com/learn/coverage/roaming.html).

31. Redpath Affidavit, *supra* note 14, at ¶ 15. Redpath concludes that the loss associated with forfeiture of the license to the FCC is greater than the loss associated with delayed operations. But there is no rational basis to hypothesize a forfeiture of the license to the government. According to a search of the FCC's Universal Licensing System database, the FCC has never revoked a broadband PCS license due to failure of the licensee to meet the construction requirement. See Universal Licensing System Information Center Glossary, Federal Communications Commission, available at <http://www.fcc.gov/wtb/uls/infoCenter/glossary.html>.

28. To make such a comparison, I use the Chase Manhattan spectrum-valuation model to compute the present discounted value of operating a license in Honolulu net of the license cost. Applied to the present case, the Chase Manhattan valuation model is based on several inputs, including (1) Pacific's WACC is 20 percent; (2) Pacific's average revenue per customer is \$55 per month; (3) Pacific begins with zero customers but eventually splits the market equally with its four rivals; (4) a terminal multiple of 12 times the cash flows in the tenth year of operation; (5) an initial monthly churn of 2.0 percent that grows to 3.5 percent over the ten-year period; (6) an initial market penetration (across *all* carriers) of 47 percent that grows to 75 percent over the ten-year period; and (7) the population of the Honolulu BTA is 836,000 (as of 1990) and its density is 1,440 persons per square mile.³²

29. Under the above assumptions, I estimate that Pacific would realize a net (free) cash flow over a ten-year period with present discounted value equal to \$4.2 million by operating the license. Stated differently, if Pacific were to sell the license to an incumbent carrier at the present time rather than construct and operate the license, it could multiply its earnings by a factor of 32 (= \$140.5 million, the difference between the sale price and purchase price, divided by \$4.2 million, the present discounted value for operating the license). Hence, Pacific has no incentive to operate the license. Note that I am *not* suggesting that Pacific could not operate a wireless system in Honolulu and earn a profit over time. Instead, I believe that, based on the present value of its future earnings, Pacific could not earn a *sufficient* profit by operating the license to offset the opportunity cost of selling the license to an incumbent today.

32. Population and density estimates of Honolulu County are from U.S. Census Bureau, *State and County Quick Facts* (downloaded from <http://quickfacts.census.gov/cgi-bin/county?cnty=15003>).

II. PACIFIC COMMUNICATIONS WILL NOT INCUR A COST IF THE SALE TO AN INCUMBENT IS DELAYED UNTIL THE OWNERSHIP ISSUES ARE RESOLVED

A. Because Pacific Communications Would Likely Sell the License to an Incumbent, the Cost of Delay Is the Cost of Delay for an Incumbent Carrier

30. Because Pacific has no incentive to construct and operate the license, the value of the license will be determined by some incumbent's willingness to pay for the license.³³ Hence, any theoretical loss that Pacific would incur by delaying its own deployment of a wireless network in Honolulu is irrelevant as far as calculating Pacific's cost of delay. Rather, one must focus on how the delay in resolving ownership of the license would affect the willingness to pay for the license by some incumbent carrier. As I demonstrate below, a delay of a few months or even a few years would not likely affect an incumbent's willingness to pay for the Honolulu license.

B. Because Bandwidth-Intensive Applications Will Take Several Years to Develop in the United States, U.S. Incumbent Providers Are Buying the Spectrum for Future Use

31. U.S. wireless carriers are just beginning to offer new, bandwidth-intensive applications, such as wireless Internet connections or two-way messaging on mobile phones and handheld devices.³⁴ Incumbent carriers have awaited the arrival of third-generation (3G) wireless applications since Nokia Corporation of Finland, the largest wireless network supplier in the

33. A fundamental principle of microeconomics is that voluntary negotiations between parties result in an efficient allocation of resources—that is, resources end up in the hands of those who value the resources the most. For an introductory treatment, see PAUL A. SAMUELSON & WILLIAM D. NORDHAUS, *ECONOMICS* 337 (Irwin McGraw-Hill 16th ed. 1998). For a detailed treatment, see Ronald H. Coase, *The Problem of Social Cost*, 3 J. LAW & ECON. 1 (1960).

34. Roger O. Crockett, *AT&T Tries Downloading Docomo's Magic: A deal brings cash and wizardry to AT&T Wireless*, BUS. WEEK, Dec. 11, 2000, at 48 (explaining how AT&T Wireless will “set up a wholly owned subsidiary, with DoCoMo staff, to create a mobile portal that gives cellular users easy access to the Web.”)

world, announced its plans to forge the “Wireless Web” in January 2000.³⁵ But according to a January 2001 survey in *Business Week*, the mobile Internet “barely exists today,” and the first attempt at mobile telephony, known as wireless application protocol (WAP), was a “disaster” that “limped from the beginning, hobbled by slow connections, high prices, lackluster services and, most embarrassingly, undependable phones.”³⁶ The financial markets are skeptical about the incumbent carriers’ investment in spectrum for 3G applications—the market capitalization of several carriers has fallen substantially since the summer of 2000.³⁷

32. The timing of 3G is critical to U.S. carriers’ need for additional bandwidth. In January 2001, Nokia was beginning to develop the software, security systems, and vast programs known as “middleware” that will support 3G wireless applications.³⁸ Microsoft, Sony, and Matsushita, the major equipment rivals of Nokia, planned to offer their next-generation mobile Internet devices in the spring of 2001.³⁹ NTT DoCoMo, a Japanese wireless provider, will offer its version of 3G to Japanese consumers in May 2001.⁴⁰ Some analysts expect the first 3G systems to open in Europe in the early part of 2002, and 3G systems in the United States are expected to open shortly thereafter.⁴¹

33. For U.S. wireless carriers, the first step in the transition process is to upgrade their existing circuit-switched networks (originally designed to support voice signals) so they can also support packet-switched data. According to *The Economist*, the network equipment and handsets

35. Stephen Baker, *Is Nokia’s Star Dimming? Antsy investors, 3G glitches-how the cell-phone giant plans to cope*, BUS. WEEK, Jan. 22, 2001, at 66.

36. *Id.* See also Stephen Baker, *Telecom Tremors: Oops! Something is going very wrong with Europe’s plan for the wireless Web. Who will pay?*, BUS. WEEK, Oct. 16, 2000, at 20.

37. *Id.* For example, the market capitalization of Deutsche Telekom and British Telecom has declined by 60 percent since the summer of 2000. The share price of AT&T Wireless fell from \$32 in April 2000 to \$18 in December 2000.

38. *Id.*

39. *Id.*

40. Crockett, *supra* note 34, at 48.

needed to allow the transition to 2.5G for some U.S. wireless systems may not be available until 2003.⁴² After that transition phase, carriers need to build new networks using newly allocated 3G spectrum frequencies. Some analysts predict that it will be 2005 before U.S. wireless providers can equip their networks with powerful new base stations and can acquire new handsets to support fully 3G applications.⁴³

34. Because bandwidth-intensive applications will take several years to develop in the United States, incumbent providers like AT&T, Verizon, and Sprint are buying spectrum for future use. This is not to say that incumbent carriers are warehousing spectrum for anticompetitive reasons. Rather, because such usable spectrum will not be available for a long time, incumbents must acquire those inputs *in anticipation* of their future spectrum needs. The operators recognize the rapid growth in the industry and are wisely acquiring spectrum for future use. Only in a small fraction of cells is the extra bandwidth needed today.

C. Because the Cost of Delay for an Incumbent Would Be Negligible, Pacific Communications Will Not Incur Any Cost If the Sale to an Incumbent Is Delayed

35. Recognizing that incumbent carriers cannot utilize the incremental spectrum in the short term, a delay of the transfer of this slice of spectrum in Honolulu until the ownership issues are resolved should not reduce the willingness to pay of some incumbent—even if the delay lasted until 2004. Applying this logic to the most recent FCC auction (Auction #35), it is easy to understand why the delays of Auction #35, which were postponed *twice* by nearly five months,⁴⁴ did not adversely affect the \$17 billion of revenues generated for the U.S. Treasury.

41. *Id.*

42. *Two stumbling steps to 3G: The migration to high-speed phone networks is not guaranteed*, THE ECONOMIST, Dec. 9, at *1

43. Crockett, *supra* note 34, at 48.

44. Auction #35 was originally scheduled to begin on July 26, 2000. See Auction of Licenses for C and F Block Broadband PCS Spectrum Postponed Until November 29, 2000, Public Notice DA 00-1246 (released June 7,

Additional delays likely would not have adversely affected the revenues generated for the U.S. Treasury—that is, the amount paid by carriers to the FCC. Similarly, delays in the sale of the 30 MHz Honolulu license even through 2004 would not adversely affect the revenues generated for a sale by Pacific or American Wireless to an incumbent carrier.

36. Because the best use of the spectrum is supplemental spectrum for an incumbent operator to handle future growth, there is no cost of delay. The cost is not incurred until the future arrives. For the period through 2004, the price of spectrum is likely to rise with the interest rate. Hence, there is no cost of delay. Even if Pacific's damages expert, Mr. Redpath, had properly conducted the damage analysis—that is, had he applied the percent decline in value from a delay in operations to the stream of operating profits *for Pacific* as opposed to the value of the spectrum in the hands of an incumbent—such damage calculations would be significantly less than Mr. Redpath's estimate, but more importantly, such calculations are irrelevant given the fact that Pacific would not construct and operate the license.

D. The Trend in Spectrum Prices Suggests That the Price of the Honolulu License Could Rise During the Appeals Process

37. The FCC has sold spectrum for broadband (as opposed to narrowband) telecommunications services over the course of several years. The first broadband PCS auction (Auction # 4) opened in December 1994. The next broadband PCS auction (Auction #5) opened in December 1995. Four more broadband PCS auctions followed—Auctions #10, #11, #22, and #35—which began in July 1996, August 1996, March 1999, and December 2000, respectively. The amount of spectrum for sale, measured in terms of the amount of bandwidth and the number of persons covered, varied across the auctions. A common benchmark for comparing prices in

2000); C and F Block Broadband PCS Spectrum Auction Scheduled for November 29, 2000, Rescheduled for December 12, 2000, FCC Public Notice DA 00-2259 (released Oct. 5, 2000).

spectrum auctions is to divide the total revenues raised in the auction (net of any bidding credits) by the product of the bandwidth (denominated in MHz) and population covered (known as POP).

Table 4 shows the average price per MHzPOP in each of the FCC broadband PCS auctions.

TABLE 4: AVERAGE PRICE PER MHZPOP FOR FCC BROADBAND PCS AUCTIONS

Auction Number	Auction Name	Date Started	Net Revenues per MHzPOP
4	AB	Dec. 1994	\$0.52
5	C	Dec. 1995	\$1.33
10	C Reauction	Jul. 1996	\$1.94
11	D, E, F	Aug. 1996	\$0.33
22	C, D, E, F Reauction	Mar. 1999	\$0.10
35	C, F Reauction	Dec. 2000	\$4.19

Source: Auction data for Auctions #4, 5, 10, 11, and 22 from FCC Fifth Annual Report on the State of Wireless Competition, at Table 1B. Auction data for Auction #35 from Federal Communications Commission Public Notice, *C and F Block Broadband PCS Auction Closes; Winning Bidders Announced; Down Payments Due February 12, 2001, FCC Forms 601 and 602 Due February 12, 2001; Ten-Day Petition to Deny Period*, DA 01-211 (released Jan. 29, 2001) (downloaded at <http://www.fcc.gov/wtb/auctions/> on Jan. 30, 2001)

Table 4 shows that spectrum prices rose initially, then began to fall, and then rose dramatically in the past month.

38. The DEF auction (Auction #11) was marred by a general lack of competition. As a result, bidders were able to pursue bidding strategies that resulted in prices that were only a tiny fraction of values.⁴⁵ Setting aside the low prices in Auction #11, spectrum prices have been rising in the United States for the past six years. Clearly the demand for spectrum, which is derived from consumers' demand for wireless phones, is continually outpacing the supply of spectrum from the FCC. Hence, contrary to Pacific's claims of an imminent fall in spectrum prices, it is likely that the price of the Honolulu license will *rise* during the appeals process.

39. Forecasting spectrum prices is a difficult endeavor. Days before the FCC's last auction began, wireless analysts were confidently predicting low spectrum prices as a result of the pre-auction swaps of licenses between incumbent carriers. According to one senior

telecommunications analyst for Bank of America Capital Management who was quoted in the *Wall Street Journal*, the wireless incumbents “have realized that investors won’t tolerate an aggressive bidding war.”⁴⁶

40. Despite the inherent difficulty in predicting future spectrum prices, Pacific’s expert, Ms. Sharon Armbrust, a wireless analyst for Kagan Associates, suggests that a glut of spectrum coming on the market shortly that could drive spectrum prices down.⁴⁷ Ms. Armbrust is likely wrong for at least four reasons. *First*, the spectrum in the 700 MHz band that the FCC plans to auction poses special challenges for mobile communications. According to the chief executive officer of Verizon Wireless, such spectrum will not be available for advanced wireless applications like mobile Internet anytime soon: “The 1900 MHz spectrum, in [his] opinion, is much better for mobility and, furthermore, manufacturers have already developed systems [and] infrastructure for that spectrum.”⁴⁸

41. *Second*, even if the 700 MHz band were suitable for mobile applications, the spectrum is currently occupied by television broadcasters who do not need to give up the airwaves for digital signals until 2006.⁴⁹ Because of the FCC’s must-carry rules for cable operators, each of the broadcasters in 60-69 channel range is guaranteed a coveted slot on all cable networks.⁵⁰ The television broadcasting lobby is a formidable force in Washington and is not likely to give up this entitlement.⁵¹

45. See, e.g., Peter Cramton and Jesse Schwartz, *Collusive Bidding: Lessons from the FCC Spectrum Auctions*, 17 J. REG. ECON 229-252 (2000).

46. Nicole Harris and Jill Carroll, *Little Rumbling Ahead of FCC Auction*, WALL ST. J., Dec. 4, 2000, at B14 (quoting Rick Franklin).

47. Affidavit of Sharon B. Armbrust on behalf of Pacific Communications, Jan. 19, 2001, at ¶ 16.

48. Jeremy Pelofsky, *Verizon Wireless CEO questions spectrum availability*, REUTERS ENGLISH NEWS SERVICE, Feb. 1, 2001, at *1 (quoting Dennis Strigl).

49. *Id.*

50. *Id.*

51. *Id.*

42. *Third*, even if such spectrum were suitable for mobile applications and the broadcasters would abandon the spectrum immediately, prices would only fall if the aggregate supply for spectrum increased *faster than* the aggregate demand for spectrum. Stated differently, prices adjust when there is excess supply or excess demand—that is, only when the supply curve shifts holding the demand curve constant or when the demand curve shifts holding the supply curve constant. The demand for bandwidth-intensive applications (such as mobile Internet applications and mobile video) is shifting the aggregate demand for spectrum outward at a rate that is presumably faster than the FCC can supply spectrum. Recognizing that spectrum limitations could hamper the development of wireless Internet services and other innovative applications that make heavy demands on airwaves, the FCC is considering whether to relax the current spectrum cap, which limits wireless carriers to holding 45 MHz of spectrum in any given license area.⁵²

43. *Fourth*, the recent action of incumbent wireless firms undermines Ms. Armbrust's claim that usable, substitutable spectrum is about to flood the market. Why would a rational firm, such as Verizon, pay \$8 billion for spectrum today if it believes that the FCC would release massive amounts of spectrum into the market tomorrow? Clearly, if Verizon and other incumbents expected the government to increase the supply in the near-term, then at least some of those firms would have held back their demand (that is—their participation in the auction) in anticipation of a future auction. Auction theory predicts that strategic adjustments by bidders in anticipation of future sales results in uniform—not falling—prices over time. I believe that incumbent carriers were acting rationally in the last auction, and that Ms. Armbrust's prediction

52. Mark Wigfield, *FCC To Consider Eliminating Cap On Wireless Holdings*, DOW JONES NEWS SERVICE, Jan. 24, 2001, at *1.

about possible falling prices is wrong.⁵³ Because the forces behind the upward trend in spectrum prices are very powerful, it is likely that spectrum prices will continue to climb over the next three years.

CONCLUSION

44. Pacific will not incur a cost if the sale of the license to an incumbent is delayed until the ownership issues are resolved. Because Pacific would likely sell the license to an incumbent wireless carrier, the cost of delay is the cost of delay for an incumbent carrier. To the extent that the spectrum is stored for future use by an incumbent, then the expected price of spectrum increases with the interest rate, implying that there is no cost of delay. Through its expert affidavits, Pacific creates a false impression of potential downside market risks that are irrational and improbable. Such “sky-is-falling” scenarios apparently are intended to preserve Pacific’s arbitrage play—that is, to preserve the opportunity to flip the license to an incumbent for a net gain of \$140 million.

53. For a detailed explanation of revenue equalization across sequential auctions, *see, e.g.*, Robert Webber, *Auctions and Competitive Bidding*, 33 PROCEEDINGS OF SYMPOSIA IN APPLIED MATHEMATICS 143-169 (1985).

CERTIFICATION

45. To the best of my knowledge and belief, my affidavit contains statements that are true and correct and contains my independent, impartial, unbiased professional judgment, opinions, analyses and conclusions, subject only to the assumptions or limiting conditions referenced herein. I have no present or prospective interest in the property interests that are the subject of this affidavit or this litigation, and I have no personal interest with respect to the parties involved. I have no bias with respect to either the property interests or the parties involved in this litigation or the matters addressed in my affidavit. My compensation is not contingent on an action, an outcome, or an event resulting from the opinions, analyses or conclusions in, or the use of, my affidavit.

Peter Cramton

Sworn to and subscribed to before me
This 23day of February 2001

Notary Public

My commission expires:

APPENDIX

A. Materials Relied Upon that Were Provided by Counsel

Final Order and Judgment, *Pacific Communications v. American Wireless License Group*, No. 2000CV20099 (Superior Court of Fulton County, GA., filed Dec. 29, 2000).

Affidavit of Sharon B. Armbrust on behalf of Pacific Communications, Jan. 19, 2001.

Affidavit of William Redpath on behalf of Pacific Communications, Jan. 16, 2001.

Plaintiff's Brief in Support of its Motion for Supersedeas Bond, *Pacific Communications v. American Wireless License Group*, No. 2000CV20099 (Superior Court of Fulton County, GA., filed Jan. 26, 2001).

FCC License to American Wireless L.L.C. for Call Sign WPOK568, BTA192, C Block, 30 MHz, Honolulu, Hawaii.

B. Materials Relied Upon That Were Self-Provisioned

Separate Statement of Commissioner Harold W. Furchtgott-Roth, In the Matter of Principles for Promoting the Efficient Use of Spectrum by Encouraging the Development of Secondary Markets, Federal Communications Commission 2000 FCC Lexis 6337, Release-Number: FCC 00-401 (released Dec. 1, 2000) at 54.

Federal Communications Commission Public Notice, *C and F Block Broadband PCS Spectrum Auction Scheduled for November 29, 2000, Rescheduled for December 12, 2000*, DA 00-2259 (released Oct. 5, 2000) (downloaded at <http://www.fcc.gov/wtb/auctions/> on Jan. 30, 2001).

Jill Carroll, *Airwaves Auction in U.S. Pulls In Record \$16.86 Billion*, WALL ST. J. EUR., Jan. 30, 2001, at 34.

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Nicole Harris, *Cingular Wireless, VoiceStream Plan to Swap Spectrum*, WALL ST. J., Nov. 3, 2000, at B6.

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ALLTEL, Aliant Complete \$1.8 Billion Merger, News Release, ALLTEL Corp., July 2, 1999; *ALLTEL, Liberty Cellular Complete \$600 Million Merger*, News Release, ALLTEL Corp., Sept. 30, 1999.

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Bell Atlantic and Vodafone AirTouch Launch Verizon Wireless, News Release, Verizon Wireless, Apr. 4, 2000.

BellSouth, SBC Create 2nd Largest Wireless Company With \$10.2 Billion in Revenues, News Release, BellSouth Corp., Apr. 5, 2000

AT&T Announces Acquisition of Wireless One, News Release, AT&T, Corp., Feb. 7, 2000.

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Kristy Bassuener, *Verizon Takes 20 Licenses Off Alltel's Hands*, WIRELESS WEEK, Feb. 21, 2001, at *1 (downloaded at www.wirelessweek.com/index.asp?layout=story&doc_id=16765&verticalID=34&vertical=Business+and+Finance).

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Jeremy Pelofsky, *Verizon Wireless CEO questions spectrum availability*, REUTERS ENGLISH NEWS SERVICE, Feb. 1, 2001, at *1 (quoting Dennis Strigl).

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