

THE FCC REPORT TO CONGRESS ON SPECTRUM AUCTIONS



**Federal Communications Commission
Wireless Telecommunications Bureau**



Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of)
)
FCC Report to Congress) WT Docket No. 97-150
on Spectrum Auctions)

REPORT

Adopted: September 30, 1997 Released: October 9, 1997

By the Commission:

Table of Contents

| | <u>Page no.</u> |
|--|-----------------|
| I. INTRODUCTION | 1 |
| II. OVERVIEW | 2 |
| III. A HISTORY OF COMPARATIVE HEARINGS, LOTTERIES, AND AUCTIONS | 6 |
| IV. THE FCC SPECTRUM AUCTIONS: AUCTION THEORY, DESIGN, AND PRACTICE | 13 |
| A. Auction Theory | 13 |
| B. Designing the FCC Spectrum Auctions | 14 |
| 1. FCC Spectrum Auction Design Challenges | 14 |
| 2. The Simultaneous Multiple-Round Bid Auction Design | 16 |
| 3. Implementing Spectrum Auction Theory and Design | 19 |

| | | |
|--------------------|---|-----------|
| V. | EVALUATION OF THE AUCTIONS | 21 |
| A. | Spectrum Auctions Compared to Alternative Methods | 21 |
| B. | The Simultaneous Multiple-Round Bidding Compared to Conventional Auctions | 22 |
| C. | Fostering Innovative Spectrum Use and Encouraging New Companies to Enter the Telecommunications Market | 23 |
| D. | Getting Telecom Service to Rural and Underserved Areas | 25 |
| E. | Facilitating Designated Entities' Participation in the Competitive Bidding Process | 27 |
| F. | Auction Results and Projections | 32 |
| VI. | LOOKING AHEAD | 35 |
| A. | Proposed Auction Changes | 36 |
| B. | Future Auction Activity | 38 |
| VII. | RECOMMENDED STATUTORY CHANGES | 39 |
| VIII. | CONCLUSION | 42 |
| APPENDIX A: | Comments filed in WT Docket No. 97-150 | |
| APPENDIX B: | Recent Supreme Court Cases on Programs Which Take Race and Gender into Account | |
| APPENDIX C: | Auctions Summary Data | |
| APPENDIX D: | Maps of License Schemes Used in FCC Auctions | |
| APPENDIX E: | FCC Licensing Speed: Comparative Hearings, Lotteries and Auctions | |

I. Introduction

In 1993, Congress authorized the Federal Communications Commission to use auctions to award licenses for the rights to use the radio spectrum.¹ This Congressional act helped usher in a new era of telecommunication history. The FCC auctions have dramatically changed the way spectrum licenses are valued, distributed, and aggregated. These changes have fostered the entry of new companies into the market and encouraged the development of innovative wireless technologies.

In only four years, FCC spectrum auctions have awarded more than 4,300 licenses to auction winners who are either offering or preparing to offer service to the public in nine different wireless and satellite categories. Winning net bids in FCC spectrum auctions have totaled \$23 billion, with about \$12 billion of this amount collected for the U.S. Treasury to date.² Consistent with Congress' mandate under Section 309(j), about 53 percent of the licenses awarded thus far have been to small businesses, although the larger licensees tend to control geographic areas with greater populations. Given this success, Congress has extended the Commission's auction authority to the year 2007, and has expanded the FCC auctions program to encompass more radio spectrum to be auctioned in the future.³

The 1993 Budget Act requires the Commission to submit a report to Congress by September 30, 1997, generally evaluating the first four years of implementing auction authority. Under Section 309(j)(12) of the Communications Act, the report is to consist of the following elements:

- o a statement of the revenues obtained, and a projection of future revenues, from the use of competitive bidding systems;
- o a description of the methodologies and regulations established by the Commission in designing systems of competitive bidding;
- o a comparison of the relative advantages and disadvantages of such methodologies in terms of attaining the 1993 Budget Act's statutory objectives;

"The new auction paradigm has drawn entry and new financing into telecommunications markets and has spurred the marketing of new technologies and the building of transmission capacity to meet growing demand."

Source: Thomas J. Duesterberg & Peter K. Pitsch, *Wireless Services, Spectrum Auctions, and Competition in Modern Telecommunications*, Outlook (May 1997), p. 7 (Duesterberg & Pitsch).

¹ As part of the Omnibus Budget Reconciliation Act of 1993, Pub. L. No. 103-66, § 6002, 107 Stat. 312, 387-392 (the "1993 Budget Act"), Congress added Section 309(j) to the Communications Act of 1934, as amended (the "Communications Act"), authorizing the Federal Communications Commission (the "FCC" or "Commission") to award licenses for rights to use the radio spectrum through competitive bidding.

² This figure represents monies received from auction winners as of August 31, 1997, many of whom are paying installments over the term of their licenses (generally 10 years).

³ See Balanced Budget Act of 1997, Pub. L. No. 105-33, §§ 3002-3004, 111 Stat. 251, 258-268 (1997).

- o an evaluation of whether and to what extent —
 - (i) competitive bidding significantly improved the efficiency and effectiveness of the process for granting radio spectrum licenses;
 - (ii) competitive bidding facilitated the introduction of new spectrum-based technologies and the entry of new companies into the telecommunications market;
 - (iii) competitive bidding methodologies have secured prompt delivery of service to rural areas and have adequately addressed the needs of rural spectrum users; and
 - (iv) small businesses, rural telephone companies, and businesses owned by members of minority groups and women were able to participate successfully in the competitive bidding process; and
- o recommendations of statutory changes that are needed to improve the competitive bidding process.

The FCC respectfully submits this report in fulfillment of Section 309(j)(12) of the Communications Act⁴

II. Overview

Section 309(j) of the Communications Act authorizes the Commission to use auctions to promote efficient and intensive spectrum use as well as to promote the development and rapid deployment of new technologies, products and services for the benefit of the public, including those residing in rural areas, without administrative or judicial delays. This subsection also requires the Commission to administer the auctions so as to promote economic opportunity and competition, avoid excessive concentration of licenses, and disseminate licenses among a wide variety of applicants, including small businesses, rural telephone companies, and businesses owned by members of minority groups and women.

This report explains how the Commission's auctions have achieved each of these goals. Evidence from the Commission's past license assignment methods and recent experience with auctions indicate that the auction approach has provided significant improvements over past methods, such as comparative hearings and lotteries, that were used by the Commission to award spectrum licenses. The Commission's auctions program has demonstrated the ability to award licenses to productive users, to encourage the emergence of innovative firms and technologies, to generate valuable market information, and to raise revenues for the public. In addition, small businesses have successfully participated in the FCC auctions. Auctions have achieved all of this more rapidly and at a lower administrative cost than comparative hearings or lotteries, the FCC's previous methods of distributing licenses.

There are many reasons why auctions are an improvement over other license assignment mechanisms. By

⁴ This Report draws upon the work of Dr. Daniel Vincent, Associate Professor of Economics at the University of Western Ontario, who has published numerous academic articles on auctions and auction theory. Professor Vincent was retained by the FCC to contribute to this Report.

One auction participant observed that the Commission's competitive bidding process is *"an efficient and effective procedure for awarding wireless licenses to those carriers that can make the best use of the spectrum."*

Source: Bell Atlantic/NYNEX Comments filed in response to *Public Notice* FCC 97-232, at 1 (August 1, 1997).

requiring firms to use their own resources to compete for valuable spectrum, auctions encourage firms who value the spectrum the most to use it productively and in innovative ways. Auctions also provide valuable information about the opportunity cost of spectrum because they reflect the value that the next most efficient firm places on the spectrum license. This information allows both the private marketplace and policy makers to manage spectrum more effectively.

Congress' mandate presented the Commission with multiple objectives. For example, the statute requires the FCC to promote efficient and intensive spectrum use. Congress also sought to encourage the entry of small businesses and previously under-represented groups (*e.g.*, women and minorities) into the wireless telecommunications industry. After reviewing conventional auction designs, such as sequential or sealed bid auctions, the FCC developed an innovative methodology for auctioning a large number of licenses at one time, dubbed the "simultaneous multiple-round auction." In addition to its auction design, the FCC added a combination of incentives and set-asides to encourage participation by a variety of new entrants.

The simultaneous multiple-round bidding methodology successfully met the multiple goals for which it was designed. This auction format was economically efficient, flexible and able to accommodate efficient license aggregation. Bidder preference programs and spectrum set-asides were also successful -- both in encouraging many small firms to participate in the bidding process, and in awarding licenses to a diverse group of small firms in spectrum-based services. Indeed, a wide variety of businesses won licenses, including rural telephone companies and small businesses owned by minorities and/or women.

To implement this new design, the FCC pioneered the creation of an electronic bidding system that could handle the complex needs of the simultaneous multiple-round bidding. This Automated Auction System ("AAS") is capable of processing tens of thousands of bids, placed through computer terminals located anywhere a telephone can reach. With this innovative auction bidding system and unique simultaneous multiple-round auction design in place, the first FCC auction commenced on July 25, 1994.

The Automated Auction System is a Winner

The FCC recently won an award from the Smithsonian Institution for its Automated Auction System. The 1997 Computer World-Smithsonian Award was granted for the system's cutting-edge contribution to the information technology revolution.

Another reason for the success of the Commission's auction program is its flexibility and responsiveness to bidders and the public. The FCC uses seminars, public notices, bidder information packages, the Internet, and messages transmitted over the bidding system itself, to communicate with bidders and other interested parties about its auctions. The resulting

dialogue has led to a dynamic and evolving auctions program.⁵ The Commission is continually improving its auction process, and in a pending rulemaking proceeding, as well as in this Report, a number of proposed changes to auction design and procedures are recommended.⁶ Moreover, the FCC has consistently taken steps to anticipate needed change -- especially where innovation and auction design are concerned. Even before the recent enactment of legislation in the Balanced Budget Act of 1997 ("BBA of 1997"), which calls for experimentation with "combinatorial bidding," the Commission had initiated a contract to evaluate the use of this bidding methodology. A description of combinatorial bidding is found in Box 1.

Box 1: Combinatorial Bidding

Combinatorial bidding, also known as "package bidding," allows bidders to place single bids for groups of licenses. For example, in one type of combinatorial auction, bidder A could place a bid of \$100,000 for licenses 1, 2 and 4, while bidder B places a bid of \$500,000 for licenses 2, 3 and 5. The computer system then calculates the revenue maximizing solution and awards the high bids for that round to the appropriate package(s).

Combinatorial bidding has advantages over other auction designs when there are strong synergies among items being auctioned and strong and divergent preferences among bidders. In the FCC auctions, strong synergies exist when licenses are worth more to some bidders as a package than individually. Strong and divergent preferences occur, for example, when a large company's business plan is not viable unless it is awarded a nationwide service area, whereas smaller users may desire the same spectrum for local service and need only a smaller service area.

As described below in more detail, the Commission has also developed recommendations for legislative action that could significantly improve the auction process. Specifically, the Commission recommends that Congress:

- (1) **Clarify that FCC licensees who default on their installment payments may not use bankruptcy litigation to refuse to relinquish their spectrum licenses for reauction.** Legislation to this effect would ensure that the Commission could reclaim a license without delay when a licensee files for bankruptcy.
- (2) **Give the Commission explicit statutory authority to manage its installment payment**

⁵ Most recently, the Commission conducted a public inquiry on the auctions program in conjunction with this Report to Congress, pursuant to Section 309(j)(12) of the Communications Act. See *Public Notice*, "Inquiry on Competitive Bidding Process for Report to Congress," WT Docket No. 97-150, FCC 97-232 (rel. July 2, 1997). Eighteen parties filed comments. A list of those who submitted comments is attached to this Report in Appendix A. Unless specified otherwise, the citations to comments throughout this Report refer to those comments filed in response to *Public Notice* FCC 97-232.

⁶ See Amendment of Part 1 of the Commission's Rules – Competitive Bidding Proceeding, WT Docket No. 97-82, *Order, Memorandum Opinion and Order, and Notice of Proposed Rule Making*, FCC 97-60 (rel. February 28, 1997) (*Part 1 Order*).

portfolio flexibly, in a manner comparable to other government agencies that lend funds to regulated entities. Other agencies have explicit statutory authority to flexibly service their payment programs outside the purview of the Federal Claims Collection Standards, and the FCC would like this greater flexibility for the auctions program.

- (3) **Exempt all auction rulemakings from the regulatory requirements of the Contract With America Advancement Act.** Congress exempted the 2.3 GHz auction (Wireless Communications Services) from these requirements because it recognized the negative impact on auction timing. The FCC would benefit from applying the same exemption to all auction rulemakings.
- (4) **Exempt auctions contracts from certain provisions of the Federal Acquisitions Regulations.** Auction staffing requirements vary from auction to auction. Thus, additional flexibility in hiring and retaining the services of contractors would assist the auctions program.
- (5) **Modify the statute of limitations for forfeiture proceedings against non-broadcast licensees from one to three years.** This modification would allow the Commission to more effectively enforce its rules and help ensure the integrity of the auctions and other Commission processes.

The FCC auction program has been widely recognized as a success. The FCC has not only met the goals mandated by Congress but also met its primary responsibilities to adopt fair rules, run fair auctions, and rapidly issue licenses to successful bidders. Moreover, FCC auctions have benefitted the American public by recovering at least a portion of the value of the spectrum resource.⁷

⁷ See 47 U.S.C. § 309(j)(3)-(4).

III. A History of Comparative Hearings, Lotteries, and Auctions

The radio spectrum is a resource that is limited in supply and able to sustain only a certain number of users at any one time, despite the technological advances that have dramatically improved the ability to use spectrum more efficiently over time. A variety of mechanisms can be used to distribute such scarce resources among users.

Historically, the FCC has used auctions, lotteries, and assignment by comparative hearing to award licenses for the use of radio spectrum.

Comparative Hearings

Initially, the Commission was largely limited to the use of comparative hearings as a means to distribute spectrum licenses.⁸ The Commission granted licenses on a first-come, first-served basis, unless more than one party applied for the same license, a situation called mutual exclusivity. For much of this century, when such cases occurred, spectrum licenses were granted using the "public interest, convenience, or necessity" standard to decide among competing, mutually exclusive applicants, in what became known as comparative hearings. Comparative hearings gave competing applicants a quasi-judicial forum in which to argue why they should be awarded a license over competitors, and allowed other interested parties to argue for or against an applicant.

Comparative hearings were often time consuming and resource intensive from the perspective of both the applicants and the Commission. For example, grants of the initial licenses for cellular service were made based on comparative hearings. The strong demand for this scarce resource resulted in over 200 requests for the first 30 licenses, many of them consisting of well over 1,000 pages of detailed argument and

What is Spectrum?

"Spectrum" is a conceptual tool used to organize and map a set of physical phenomena. Electric and magnetic fields produce waves that move through space at different frequencies (defined as the number of times that a wave's peak passes a fixed point in a specific period of time), and the set of all possible frequencies is called the "electromagnetic spectrum." The subset of frequencies from 3,000 cycles per second (3 kilohertz (kHz)) to 300 billion cycles per second (300 gigahertz (GHz)) is known as the "radio spectrum." Familiar radio spectrum services are AM radio (535 kHz to 1,705 kHz), FM radio (88 MHz to 108 MHz), television (various allocations between 54 MHz to 806 MHz), and cellular phones (806 MHz to 890 MHz). Frequencies in the radio spectrum are divided between federal and nonfederal use. The National Telecommunications and Information Administration manages the federal spectrum, allocating and assigning licenses to federal users. The FCC manages the nonfederal portion of the spectrum.

Source: *Where Do We Go From Here? The FCC Auctions and the Future of Radio Spectrum Management*, Congressional Budget Office, Congress of the United States (April 1997) pp. 2-4 (*CBO Study*).

⁸ In *Ashbacker Radio Corp. v. FCC*, 326 U.S. 327 (1945), the United States Supreme Court held that if two *bona fide* license applications are mutually exclusive, the applicants are entitled to a comparative hearing. This applies to applicants, not potential applicants.

documentation. The next two rounds of licensing attracted 344 and 567 applicants, respectively.⁹ The task of evaluating and then awarding the licenses in an informed and equitable manner put a strain on Commission resources. In addition to the cost of evaluating licensees, the opportunity costs caused by delays using this method were high. The selection of licensees from a pool of applicants often took up to two years or longer to complete. Ultimately, the huge volume of applications for new licenses driven by the developing cellular telephone industry, led the FCC to seek authority to assign licenses by lottery.

Lotteries

In 1981, Congress added Section 309(i) to the Communications Act to give the Commission the authority to assign a broad range of licenses by lottery.¹⁰ In theory, lottery-based licensing would expedite service to the public and lower the cost of entry by applicants. Initially, the Commission screened applicants and allowed only qualified providers to participate in the lottery. Even this minimal degree of screening proved to be extremely burdensome on the Commission's resources. For example, it took twenty months for the first set of cellular applications to be screened before the lottery.¹¹

By 1987, the FCC was forced to abandon pre-lottery screening and open the process to all potential applicants. "Application mills" sprang up to assist almost 400,000 different firms claiming to be spectrum "providers" in their efforts to win a cellular license,¹² and a broad range of spectrum speculators participated in and won lotteries in cellular, Specialized Mobile Radio ("SMR") and other services. Many license winners, with no intention of providing service to the public, were now eager to trade their license rights for windfall profits, and a secondary market in FCC licenses emerged. Even when lotteries themselves could be conducted quickly, it took years for secondary markets to reassign licenses to the parties that valued them the most and to aggregate these licenses efficiently. Delay in service to the public was often the result.

Costs

The history of comparative hearings and lotteries highlights their flaws in efficiently and fairly awarding rights to use the radio spectrum. Both approaches, especially the lotteries, failed to ensure that licenses would quickly go to the most efficient firms. On average, it took about two years to award cellular licenses in comparative hearings and over one year by lotteries.¹³ The time to award a license does not

⁹ See *In the Matter of Amendment of the Commission's Rules to Allow the Selection from Among Mutually Exclusive Competing Cellular Applications Using Random Selection or Lotteries Instead of Comparative Hearings*, CC Docket No. 83-1096, *Report and Order*, 98 F.C.C. 2d 175 (1984).

¹⁰ Omnibus Budget Reconciliation Act of 1981, Pub. L. No. 97-35, 95 Stat. 736-737, *amended*, Communications Amendment Act of 1982, Pub. L. No. 97-259, § 115, 96 Stat. 1087.

¹¹ See Thomas W. Hazlett and Robert J. Michaels, *Rent Dissipation in Competition for the Monopoly*, paper presented at the Western Economic Association Meetings, South Lake Tahoe, Nevada (June 1989) (*Hazlett and Michaels*), p. 15.

¹² See Thomas W. Hazlett, *Assigning Property Rights to Radio Spectrum Users: Why Did FCC License Auctions Take 67 Years?* (July 11, 1995), p. 6.

¹³ See Appendix E: FCC Licensing Speed.

fully measure delays to market, especially for lotteries, because licenses were often reassigned in secondary markets before service to the consumer commenced. The social costs of these delays in mobile telephony have been estimated by some to be substantial. It has been estimated that the ten year delay in cellular licensing cost the U.S. economy the equivalent of two percent of Gross National Product.¹⁴

Another significant expenditure was the total cost of producing applications under the lottery system. Hazlett and Michaels estimate it cost a potential participant \$800 to file an application for a cellular lottery.¹⁵ This cost per application may not be much different from the cost per application for auctions but the number of applications filed under the lottery system was inflated by speculation. Since the FCC did not charge lottery participants for the license or a significant sum to participate in a lottery, the number of speculative applications under lotteries was higher and in turn, the total cost of producing applications has been estimated to be high. Given almost 400,000 cellular license applications, this number suggests that nearly \$300 million in total was spent on producing cellular applications for the lotteries.¹⁶ In addition to the total application costs, the transaction costs associated with license resales after lotteries have been quite significant. For example, for the year 1991, these costs have been estimated at \$190 million.¹⁷

Both methods also encouraged wasteful use of resources, not only by the firms seeking to acquire licenses but also by the Commission. The demands associated with comparative hearings and lotteries overburdened the Commission's resources, which were not prepared for the deluge of applications. These methods also failed to capture for the public any of the monetary benefits that spectrum licenses garnered for the fortunate few who acquired them.

Auctions

In the 1993 Budget Act, Congress added Section 309(j) to the Communications Act, authorizing the FCC to use competitive bidding to resolve mutual exclusivity among spectrum license applicants. Auctions were intended to correct problems associated with prior licensing methodologies: the cost of winning an auction would dissuade speculators, the value of the spectrum would go to the federal Treasury rather than to speculators, and the auction winners who valued the spectrum most would implement services quickly.

The 1993 Budget Act required the Commission to experiment with multiple bidding methodologies and determine the applicability of competitive bidding for awarding spectrum licenses so as to:

¹⁴ See J. H. Rohlfs, C. L. Jackson & T. E. Kelley, *Estimate of the Loss to the United States Caused by the FCC's Delay in Licensing Cellular Telecommunications*, National Economic Associates, Inc. (November 1991).

¹⁵ See *Hazlett and Michaels*.

¹⁶ An earlier estimate placed the cost of an average application at over \$3,500, suggesting over \$1 billion dollars of social resources drawn into the essentially unproductive activity of lottery applications. See Evan R Kwerel & Alex Felker, *Using Auctions to Select FCC Licenses*, *OPP Working Paper No.16*, Office of Plans and Policy, FCC (May 1985). They also estimate the cost of a much more detailed application under the comparative review system was \$130,000 per application.

¹⁷ See Amendment of the Commission's Rules to Establish New Personal Communications Services, GEN Docket No. 90-314, ET Docket No. 92-100, *Notice of Proposed Rule Making and Tentative Decision*, 7 FCC Rcd 5676, 5699 n.41 (1992) (*PCS Tentative Decision*).

- o protect the public interest, and
- o promote specific objectives, including:
 - (a) speedy development and deployment of new technology and services to benefit the public, including rural areas;
 - (b) economic development and competition through broad distribution of licenses and diversity among license holders;
 - (c) recovery for the public of some of the commercial value of the spectrum and avoidance of unjust enrichment; and
 - (d) efficient and intensive spectrum usage.

Congress required the Commission to issue rules to implement its competitive bidding authority by March 8, 1994. The Commission issued a Notice of Proposed Rulemaking in October 1993, which invited comments from interested parties on a proposed auction format.¹⁸ In addition, academic and industry conferences provided a forum for discussing different ways to organize FCC auctions. The FCC adopted its initial regulations governing general auction structure on March 8, 1994.¹⁹

Since then, the Commission has adopted specific rules for competitive bidding tailored to distinct services, and conducted auctions for those services. As of September 30, 1997, the Commission has conducted fourteen auctions and has awarded over 4,300 licenses for spectrum-based services.²⁰

Table 1, below, highlights the results of the narrowband and broadband Personal Communications Service (“PCS”) auctions, as well as the auction of other services including Interactive Video and Data Service (“IVDS”) and Direct Broadcast Satellite (“DBS”) orbital slots. These services represent new uses of the spectrum, employ new technology, and will be broadly available to the public. Detailed information about broadband PCS auction results can be found in Appendix C. The Commission has also adopted specific rules for the future auction of licenses in the Local Multipoint Distribution Service (“LMDS”), 220 MHz, 800 MHz Specialized Mobile Radio (“800 MHz SMR”), and paging services. Additionally, auctions are proposed for many other wireless services in the future.

As described more fully in the next sections of this report, the Commission's experience in these fourteen auctions shows that competitive bidding is a more efficient mechanism to assign spectrum in cases of

¹⁸ See Implementation of Section 309(j) of the Communications Act – Competitive Bidding, PP Docket No. 93-253, *Notice of Proposed Rule Making*, 8 FCC Rcd 7635 (1993) (*Competitive Bidding NPRM*). The Commission received written comments from 222 parties and reply comments from 169 parties.

¹⁹ See Implementation of Section 309(j) of the Communications Act – Competitive Bidding, PP Docket No. 93-253, *Second Report and Order*, 9 FCC Rcd 2348 (1994) (*Competitive Bidding Second Report and Order*), on reconsideration, *Second Memorandum Opinion and Order*, 9 FCC Rcd 7245 (1994) (*Competitive Bidding Second Memorandum Opinion and Order*). In its ongoing effort to utilize experiences from prior auctions to continually improve the auction mechanism, the Commission has recently amended, and sought comment on further changes to, this generic set of rules. See *Part 1 Order*, *supra* fn 6.

²⁰ As of September 30, 1997, the FCC has completed auctions with a total of 4,368 spectrum licenses. After an auction is closed, the FCC must proceed through a regulatory process specified by the Communications Act to grant the actual license. See 47 U.S.C. § 309(a)-(c) (action upon applications); *id.* § 309(d) (petition to deny process). To date, 4,004 of the licenses awarded at auction have been granted.

mutual exclusivity than any previously employed methods. The Commission has also demonstrated a commitment to innovation in its development of unique auction formats. In contrast to comparative hearings and lotteries, the auction process rapidly awards licenses to productive users, encourages the emergence of innovative firms and technologies, generates valuable market information, and compensates the public for the use of the airwaves. The FCC auctions have also encouraged participation by small businesses. Finally, they have been able to achieve all of this more rapidly, and at a lower cost, than past licensing methods.

Table 1: FCC Auction Results

| Auction | Number of Licenses (1) | Geographic Service Areas (2) | Service Description | Total Spectrum (in megahertz) | Total Winning Bids (in millions) (3) | Bid Price: (dollars per person per MHz) |
|--|---------------------------|---------------------------------|-----------------------|-------------------------------|---|---|
| Narrowband PCS | | | | | | |
| Nationwide (Jul. 25-29, 1994) | 11 (4) | National | Advanced paging/data | 0.7875 MHz | \$650.3 | \$3.10 |
| Regional (Oct. 26 - Nov. 8, 1994) | 30 | Regional | Advanced paging/data | 0.45 MHz | \$392.7 | \$3.46 |
| Broadband PCS | | | | | | |
| A and B Blocks (Dec. 5, 1994 - Mar. 13, 1995) | 102 (5) | MTAs | Mobile voice and data | 60 MHz | \$7,721.2 | \$0.52 |
| C Block (two auctions) (6) (Dec. 18, 1995 - May 6, 1996 and Jul. 3-16, 1996) | 493 | BTAs | Mobile voice and data | 30 MHz | \$10,102.1 | \$1.33 |
| D, E, and F Blocks (6) (Aug. 26, 1996 - Jan. 14, 1997) | 1479 | BTAs | Mobile voice and data | 30 MHz | \$2,517.4 | \$0.33 |

(1) This is the total number of licenses in each service. Some of these licenses have not yet been granted.

(2) MTAs = Major Trading Areas, BTAs = Basic Trading Areas, MSAs = Metropolitan Statistical Areas, RSAs = Rural Service Areas, MEAs = Major Economic Areas, REAGs = Regional Economic Area Groups. See Appendix D for illustrative maps.

(3) Total Winning Bids includes high bids from the auction (net of any bidding credits) plus the price paid for any pioneer preference licenses.

(4) Includes one pioneer preference license.

(5) Includes three pioneer preference licenses.

(6) The Commission reserved the C and F blocks of broadband PCS for entrepreneurs and small businesses.

Table 1 cont'd: FCC Auction Results

| Auction | Number of Licenses (1) | Geographic Service Areas (2) | Service Description | Total Spectrum (in megahertz) | Total Winning Bids (in millions) (3) | Bid Price: (dollars per person per MHz) |
|---|------------------------|------------------------------|-----------------------|-------------------------------|--------------------------------------|---|
| Other Services | | | | | | |
| Interactive Video and Data Service (July 28-29, 1994) | 594 | MSAs | Interactive data | 1 MHz | \$213.9 | \$0.85 |
| Multipoint Distribution Service (Jan. 13, 1996 - Mar. 28 1996) | 493 | BTAs | Wireless cable | 78 MHz (7) | \$216.2 | \$0.067 (8) |
| 900 MHz Specialized Mobile Radio (Dec. 5, 1995-Apr. 5, 1996) | 1020 | MTAs | Mobile voice and data | 5 MHz | \$204.3 | \$0.24 (8) |
| Direct Broadcast Satellite (9) | | | | | | |
| - Orbital Slot at 110 degrees west (Jan. 24-25, 1996) | 1 | Full US coverage | Multichannel video | 437.5 MHz | \$682.5 | \$0.0062 |
| - Orbital slot at 148 degrees west (Jan. 25-26, 1996) | 1 | Partial US coverage | Multichannel video | 375 MHz | \$52.3 | \$0.0006 |
| Cellular Unserved (Jan. 13-21, 1997) | 14 | MSAs and RSAs | Mobile voice and data | 50 MHz | \$1.8 | n/a |
| Wireless Communications Service (Apr. 15-25, 1997) | 128 | MEAs and REAGs | (10) | 30 MHz | \$13.6 | \$0.0018 |
| Digital Audio Radio Service (Apr. 1-2, 1997) | 2 | Full US coverage | Multichannel audio | 25 MHz | \$173.2 | \$0.0274 |
| Total | 4,368 | | | | \$22,941.5 | |

(7) To be precise, Multipoint Distribution Service ("MDS") total spectrum should be 76 MHz because Channel 2 was originally 6 MHz only in the top 50 markets. In the rest of the markets, it was Channel 2A with 4 MHz. As noted in the MDS Auction Procedures, Terms, and Conditions: "In 1992, the 2160-2162 MHz frequency was reallocated to emerging technologies, and thus, any subsequent MDS use of these 2 MHz will be secondary."

(8) Estimated to adjust for encumbered spectrum

(9) There is a total of 500 MHz of DBS downlink spectrum available. The same spectrum can be reused at each of the eight U.S. DBS orbital slots. The figures in the table are (28/32) x500 and (24/32) x500, respectively, but they each refer to portions of the same 500 MHz of spectrum.

(10) WCS is permitted to implement a wide range of services, subject to FCC engineering requirements, including fixed, mobile, radio location, and broadcasting-satellite (sound) service.

Box 2: Behind the Scenes at an FCC Auction

Rules: For the auction of licenses in any particular service, the Commission establishes the requisite technical, service, and competitive bidding rules through notice and comment rulemaking in accordance with the Administrative Procedures Act. Once rules are promulgated, the Wireless Telecommunications Bureau initiates the following process.

Initial Public Notice: A Public Notice announces the date of the auction and the deadline for filing "short-form" applications to participate in the auction. The Public Notice specifies the licenses to be auctioned; the method of competitive bidding to be used in the event mutually exclusive applications are filed; the deadline for submitting the upfront payment and the amount of that payment for each license; and applicable bid requirements and other auction procedures.

Bidder Information Package: Soon after the release of the initial Public Notice, a Bidder Information Package is made available to prospective bidders. The Bidder Information Package generally contains detailed information about the auction and auction procedures, as well as information about incumbent licensees (if the spectrum has incumbents) based on the Commission's licensing records.

Status of Applications Public Notice: After reviewing the short-form applications, but prior to the upfront payment deadline, a Public Notice advises applicants of the status of their short-form applications. Applicants whose short-form applications are accepted or rejected are identified, and those applicants whose short-form applications are substantially complete, but contain minor errors or defects, are identified and provided a limited opportunity to correct their applications prior to the auction.

Qualified Bidders Public Notice: After the upfront payment deadline has passed, the Bureau issues a Public Notice identifying the applicants who are qualified to participate in the auction, *i.e.*, those applicants whose short-form applications were accepted for filing and who timely submitted upfront payments sufficient to make them eligible to bid on at least one of the licenses for which they applied.

Pre-Auction Assistance to Qualified Bidders: All qualified bidders are eligible to participate in a mock auction which enables them to become familiar with the software prior to the beginning of the auction. In some instances, the Commission also conducts a pre-auction seminar for qualified bidders. Registration materials are usually distributed by two overnight mailings, each containing part of a confidential identification code required for the bidder to place bids.

Auction: The auction is conducted and bids are accepted in each round of the auction. Round results and other related reports are provided during the course of the auction. Such reports compile results of all bids placed, current high bids, withdrawn bids, and the status of other auction procedures. During the auction, announcements are made directly to bidders via the automated bidding system. Round results and other important information are also posted to the Internet and the FCC electronic bulletin board.

Auction Closing Public Notice: After the close of the auction, a Public Notice announces the winning bidder for each license and establishes the deadline and procedures for winning bidders to make payment. The Public Notice will also include information about filing the "long-form" application necessary to obtain the license. Long-form applications are subject to review pursuant to the Communications Act. Under the statute, interested parties are given an opportunity to file petitions to deny against auction winners, and the Commission must determine whether such petitions have merit.

IV. The FCC Spectrum Auctions: Auction Theory, Design, and Practice

Unlike many items that traditionally are sold at auction, licenses for the right to use radio spectrum are often highly interdependent. In other words, a combination of these licenses could be worth more to a licensee than the sum of the individual licenses, due to factors like the benefit to consumers of seamless roaming over wide geographic areas, economies of scale in marketing, and efficiencies from better coordination of spectrum use.

Following the passage of legislation authorizing the FCC to use auctions to assign spectrum licenses, the FCC was faced with the monumental task of developing an auction methodology and an automated system to begin awarding spectrum licenses using competitive bidding. Because traditional auction designs posed significant challenges for bidders trying to aggregate multiple licenses, the Commission used a unique and pioneering auction methodology: the simultaneous multiple-round auction. This design has proven to be flexible enough to take into account the complexities associated with auctioning radio spectrum.

"The recently completed FCC auctions of narrowband and broadband licenses for spectrum have been a spectacular success. They have demonstrated the awesome ability of markets to allocate valuable public resources efficiently. History has been made by these auctions."

Source: Opinion, "The Auction Process Worked," Communications Week, April 24, 1995.

Since the simultaneous multiple-round auction methodology had never been used outside of "the laboratory" when the FCC adopted it, an auction system to implement this design had to be built from the ground up. The FCC's Automated Auction System was constructed to provide the necessary tools to process thousands of bids instantaneously and generate round results within a few minutes following the conclusion of each bidding round. This auction system accommodates the needs of bidders by allowing them to bid remotely using a personal computer and a modem via a private and secure wide area network.

A. Auction Theory

To adopt auction rules by the March 8, 1994 statutory deadline, the Commission hosted a series of rigorous discussions on auction theory. Academics, economists, and policy makers all gathered to discuss the best way to auction spectrum. Much of the debate centered on how to design auctions that appropriately take into account the interdependence of license values -- that provide bidders with information about the prices of complementary and substitute licenses, facilitate pursuit of backup strategies as more information becomes known, and promote aggregation of licenses into efficient bundles. Auction theory provided some useful general principles in developing a good auction design, including:

- o **Auctions perform better when private information is made broadly known.** If a seller has information that affects the future value of the good that is to be sold, then it is preferable to reveal that information whether it is good or bad. In the case of spectrum auctions, this includes future regulatory intentions of the government, plans to provide further spectrum rights, or information about future market conditions.
- o **Auctions perform better when it is difficult for bidders to keep their information private.**

Since bidders' private information affects their bids, a choice of open outcry or multiple-round auctions allows bidders to observe opponents' bids and draw inferences about the private information that is driving the bids. This ability can reduce the phenomenon known as the *winner's curse*, which arises when a high bidder fails to recognize that all the potentially well-informed rivals are more pessimistic about the future profitability of a license. If the high bidder does not downgrade estimates to take this fact into account, he risks paying more for the license than it is worth. If other bids cannot be observed, the concern raised by this possibility will induce bidders to reduce their bids by more than if other bidders' activity can be monitored.

B. Designing the FCC Spectrum Auctions

A well designed auction should produce a socially efficient distribution of scarce goods because it awards goods to those willing to pay the highest price. The auction price reflects what the winner thinks it can earn by using the goods. Thus, the competitive bidding process provides incentives for licensees of spectrum to compete vigorously with existing services, develop innovative technologies, and provide improved products to realize expected earnings. In this way, awarding spectrum using competitive bidding aligns the licensees' interests with the public interest in efficient utilization of the spectrum. As one commenter observes, "[s]uccessful bidders are those that not only place a high value on the property relative to other auction participants, but also have the financial capability to support their bids."²¹

FCC staff used the theoretical principles discussed above as guidelines for their auction plan. Designers also had to consider the desirability of the license, its independence/interdependence with other licenses at auction; and the number of licenses to be awarded in determining the choice of design most appropriate for a particular auction.

1. FCC Spectrum Auction Design Challenges

In the process of designing the optimal auction methodology for spectrum auctions, the Commission grappled with numerous complicated issues. The Commission has an obligation under Section 309(j) to promote the participation of small businesses, rural telephone companies, and women- and minority-owned businesses, and to achieve an economically efficient outcome. Designing an approach to balance multiple, complex objectives was a monumental task. In the pursuit of these general goals, the FCC auction designers faced two challenges specific to spectrum auctions.

Allowing for License Aggregation

First, the auction designers had to take into consideration that, in many services, the large number of licenses to be auctioned, and their interdependence, made aggregation of licenses attractive to bidders. Licenses can be aggregated by frequency band and by geographic area. For a given frequency band, a firm might wish to acquire a number of contiguous geographic areas in order to offer consumers seamless convenience, to pool marketing costs, and to coordinate band use on the borders of the areas. For a given geographic area, a firm might wish to obtain additional spectrum to increase its bandwidth.

Aggregation may also facilitate the adoption of new technologies and services. For example, if a company

²¹ AMTA Comments filed in response to *Public Notice* FCC 97-232, at 3 (August 1, 1997).

uses an innovative technical standard for its equipment that is not compatible with other standards, then aggregating licenses in adjacent geographic areas would allow the company to provide seamless service over a large area.

Preventing Collusion

The second issue the FCC had to resolve was the inherent conflict between using auctions that reveal information about other participants' bidding behavior and the possibility of unlawful collusion. Allowing more information to be revealed in the auction process reduces the chances of the winners curse and produces the most efficient auction results. However, some auction theorists argued that collusion was more likely to occur in a simultaneous multiple-round auction.²² To address this potential problem, the FCC created stringent rules (as discussed in Box 3) to counter the possibility of collusion.²³ For example, the FCC adopted explicit anti-collusion rules that prohibit firms that have applied for common markets from collaborating, discussing, or disclosing, in any manner, the substance of their bids or bidding strategies.²⁴ The FCC relied on these rules, along with existing Federal antitrust laws, to deter collusive behavior.

More recently, the FCC has made other bidding changes to address concerns about potential collusion in its auctions. For example, the FCC is considering changing its bidding system so that bidders will no longer have the flexibility to type a bid of any amount they choose. Instead, bidders will simply "click" on the appropriate box to place a bid at the minimum acceptable bid amount set by the Commission for a particular license. While this modification restricts bidders' flexibility, it is expected to address concerns about bid amounts that may be used to "signal" market intentions. The FCC is also considering limiting the number of bid withdrawals that can be made during an auction to ensure that firms do not engage in such behavior for strategic advantage.

²² Auction consultant Barry Nalebuff and game theorist Adam Brandenburger made this argument on the McNeil-Lehrer NewsHour (PBS television broadcast, February 3, 1993).

²³ See *Competitive Bidding Second Report and Order*, 9 FCC Rcd at 2386-88; Implementation of Section 309(j) of the Communications Act - Competitive Bidding, PP Docket No. 93-253, *Fourth Memorandum Opinion and Order*, 9 FCC Rcd 6858, 6866-69, *on recon.*, *Memorandum Opinion and Order*, 9 FCC Rcd 7684, 7687-89 (1994).

²⁴ See 47 C.F.R. § 1.2105(c). The FCC has also made use of other tools to address collusion or undesirable strategic behavior by bidders. For example, the FCC has limited the bidding information that is made available during an auction. See *Competitive Bidding Second Report and Order*, 9 FCC Rcd at 2375. See also *Competitive Bidding Second Memorandum Opinion and Order*, 9 FCC Rcd at 7251-52.

Box 3: Preventing Collusion in Spectrum Auctions

In the *Competitive Bidding Second Report and Order*, the Commission adopted rules designed to prevent and facilitate the detection of collusive conduct in order to enhance and ensure the competitiveness of both the auction process and the post-auction market structure.

The Commission's anti-collusion rule requires that auction applicants identify any parties with whom they have entered into any consortium arrangements, joint ventures, partnerships or other agreements or understandings which relate in any way to the competitive bidding process. Applicants are also required to certify that they have not entered into any explicit or implicit agreements, arrangements or understandings of any kind with any parties, other than those identified, regarding the amount of their bids, bidding strategies, or the particular markets on which they will or will not bid.

With certain limited exceptions, from the time auction applications are filed prior to auction until the time that the winning bidder has made its required down payment, all bidders are prohibited from cooperating, collaborating, discussing or disclosing in any manner the substance of their bids or bidding strategies with other bidders that have applied to bid in the same geographic license area, unless such bidders are members of a bidding consortium or other joint bidding arrangement identified on the bidder's short-form application.

The Commission has indicated that it will conduct a detailed investigation of any specific allegations that an auction participant has violated the anti-collusion rule. In addition, where allegations may give rise to violations of the federal antitrust laws, the Commission will investigate and/or refer such cases to the United States Department of Justice for investigation. Bidders who are found to have violated the Commission's anti-collusion rules in connection with their participation in the auction process may, among other sanctions, be subject to the loss of their down payment or their full bid amount, face the cancellation of their licenses, and be prohibited from participating in future auctions.

The Commission first became aware of allegations of "bid signaling" (*e.g.*, the use of particular trailing digits on a bid to signal other bidders) in late 1996, during the PCS D, E and F block auction, when it received a complaint from a bidder who believed that a competing bidder was using unusual bid amounts to "signal" its market intentions. The Commission has begun an investigation into the allegations and is also examining bidding records from previous auctions to determine whether this practice occurred in the past. In addition, the Commission has referred the allegations to the Department of Justice, which is conducting its own investigation.

2. The Simultaneous Multiple-Round Auction Design

Key auction design elements that had to be considered by the Commission included the number of auction rounds (single or multiple) and the order in which licenses are auctioned (sequentially or simultaneously). These design elements affect how much information about the bidding is available during the auction and the ability to pursue backup strategies. The advantages and disadvantages of different methods had to be evaluated, taking into account the degree of interdependence among particular licenses. A brief explanation of several auction methodologies is set forth below:

- o Single-round sealed-bid auctions. The bidder has only one chance to make an offer and can not increase the offer at a later time. In the case of spectrum auctions, a single bid would be submitted by each bidder and the license awarded to the high bidder.
- o Multiple-round open auctions. The bidders are allowed the opportunity to assess the bids at the end of each round and top the high bid in the next round. This is the format of the typical oral outcry auction. A bidder has the opportunity to keep increasing its bid until it obtains the license.

The multiple-round auction's main advantages are that it provides information to bidders regarding the value other bidders place on licenses and allows them to act on that information. This information increases the likelihood that licenses will be assigned to bidders that value them most highly, because bidders do not have to guess about the value that the second highest bidder places on the license, as they do in a single-round auction. In the next round bidders have the opportunity to raise their bid if they are willing to pay more than the previous round's high bidder. In a single sealed-bid auction, bidders who bid incorrectly could fail to obtain the license even though their actual valuation is the highest. In multiple round auctions, bidders are also less likely to succumb to the winner's curse, discussed above. Furthermore, multiple-round auctions have the additional advantage of enhancing the credibility of the auction process. That is, the result is more likely to be perceived as open and fair.

- o Pure sequential auction. Licenses are auctioned one at a time. The bidding stops on one license before it begins on the next license. Sequential bidding has the advantage of administrative simplicity and also permits bidders to know what they and other bidders have won. However, sequential bidding does not allow a bidder to reevaluate past bids and shift strategies. In a sequential format, a bidder cannot go back and reconsider an early license after observing later bidding activity.
- o Simultaneous auction. A number of licenses are open to competitive bidding at the same time and bidding continues on the whole group until no additional bids are received on any license. The chief advantage of a simultaneous auction is that it provides information to bidders about the values of other licenses up for bid and, in a multiple-round auction, the opportunity to use that information to aggregate licenses or to shift their bidding from one license to another.

If all bidders desire similar aggregations and if these combinations are known, then the best resolution would be to define the licenses reflecting these interests. However, applicants may be interested in very different groups of licenses. A simultaneous auction lets the market determine the most efficient bundling of spectrum rights. A disadvantage of the simultaneous auction is the more elaborate rules that must be developed for the auction to operate smoothly. For instance, given the simultaneous bidding format, it is important to decide when the auction is declared over. Therefore certain "stopping rules" come into play as discussed in more detail below.

The Commission considered a number of different proposals for the design of the auctions, including: (1) a typical oral outcry auction, involving sequential, multiple-round bidding; (2) a sequence of electronic, multiple-round, single license auctions; and (3) single-round bidding, *i.e.*, sealed bids.²⁵ The Commission determined that these methods were inadequate where strong interdependencies and license aggregation were an issue.

In those instances where license aggregation was not an important issue, however, the Commission used alternative auction designs. For example, the Commission utilized a sequential, oral outcry procedure for the IVDS auction in July 1994. At that time, the Commission reasoned that the small degree of interdependency among the IVDS licenses was not enough to justify the cost and administrative

²⁵ See *Competitive Bidding NPRM*, 8 FCC Rcd at 7641-43.

complexities associated with holding a simultaneous multiple-round auction.²⁶ Similarly, the Commission chose a sequential electronic design for the auction of two DBS licenses, due to the lack of significant interdependence between the satellite channels available at the two discrete orbital locations.²⁷

For the majority of the FCC auctions conducted since 1994, however, the Commission has used the simultaneous multiple-round auction. In every round, bidders can bid on any of the licenses being offered as long as they have applied for the licenses and have made an upfront payment sufficient for such licenses. Generally, the auction does not close until bidding has ceased on all licenses; that is, until a round goes by in which there are no new bids on any of the licenses. Use of this auction design took economic game theory from the laboratory to the marketplace.

The Commission chose a simultaneous auction with multiple-round bidding instead of sequential bidding because this method provides more information to bidders about the values of other licenses up for bid and the opportunity to use that information to aggregate licenses or to shift their bidding from one license to another. In addition, it reduces the impact of the winner's curse as described above. However, the simultaneous auction mechanism is effective only if appropriate rules such as stopping, withdrawal, and activity rules are utilized. The rules necessary for a simultaneous auction as developed by the FCC are shown in Box 5.

The Commission ultimately decided that simultaneous multiple-round bidding presented advantages of license aggregation and information disclosure that outweighed any disadvantages associated with administrative complexity.

Three full years of auctions experience has demonstrated that the features of the simultaneous multiple-round bidding auction, on balance, best meet the statutory objectives of efficient and intensive spectrum use, speedy implementation of new and improved services, and economic development and competition among service providers.

Major Features of the Simultaneous Multiple-Round Auction

- (1) Interdependent spectrum licenses with the potential for substantial aggregation or substitution are grouped and sold at the same time.
- (2) All bidders submit bids over a sequence of rounds.
- (3) At the end of each round, the high bid for each license determines who would be the winner of that license if no higher bids were later received, and also helps fix minimum acceptable bids for the next round.
- (4) Bidders that fail to submit bids in a round and do not have sufficient standing high bids risk losing eligibility to submit bids in later rounds.
- (5) All licenses remain open for bidding until bidding has ceased on all licenses.

²⁶ See Implementation of Section 309(j) of the Communications Act - Competitive Bidding, PP Docket No. 93-253, *Fourth Report and Order*, 9 FCC Rcd 2330, 2332 (1994), *on recon.*, *Sixth Memorandum Opinion and Order and Further Notice of Proposed Rulemaking*, 11 FCC Rcd 19341 (1996).

²⁷ See Revision of Rules and Policies for the Direct Broadcast Satellite Service, IB Docket No. 95-168, *Report and Order*, 11 FCC Rcd 9712, 9785 (1995), *aff'd sub nom.*, *DIRECTV, Inc. v. FCC*, 110 F.3d 816 (D.C. Cir. 1997).

3. Implementing Spectrum Auction Theory and Design

Translating auction theory and design into practice was an enormous challenge for the Commission. Because the simultaneous multiple-round auction methodology had never been used before outside an academic laboratory, an auction system had to be built from the ground up to implement this new design. The Commission created a unique, state-of-the-art bidding system called the Automated Auction System ("AAS"). This complex database management system has revolutionized the assignment of licenses with its innovative use of information technology.

Using the AAS, the FCC can process tens of thousands of bids by hundreds of bidders on thousands of licenses. The system can process these bids instantaneously and generate round results within a few minutes following the conclusion of each bidding round. Bidders then use the results to determine their bidding strategy for the next round of the auction. The system also accommodates bidders by allowing them to bid remotely using a personal computer and a modem through a private and secure user wide area network. It can also accommodate on-site bidders and telephonic bidding. The AAS can manage both the administrative and technical aspects of the auction process with day-to-day operations that are simple and straightforward. With the AAS, the FCC has the ability to track auction participants from their initial inquiry through the auction bidding process.

Box 4: Worldwide Interest in FCC Auctions

There has been worldwide interest in both the Commission's simultaneous multiple-round auction design and its automated bidding system. Mexico licensed the FCC's copyrighted system and has already used it successfully in an auction. Guatemala has expressed strong interest in licensing the system and the Commission has demonstrated it to representatives of Argentina, Australia, Brazil, Canada, Hungary, Peru, Russia, South Africa, and Vietnam.

The AAS was designed to operate using a small staff that monitors the fully automated processing of bids and results. This efficient system allows the FCC to do more with less and thus reduce administrative costs. The success of the system has not only been demonstrated in the FCC auctions but also recognized

by other countries, as shown in Box 4. The AAS has also received formal recognition by the Smithsonian Institution, which recently recognized the FCC for contributing to the information technology revolution.

Before the FCC could create an automated bidding system, however, it was necessary to develop operating procedures to ensure that the auctions ran effectively. Rules were developed to balance competing objectives. (See Box 5.) Some of the rules have been modified since the first auctions in 1994, reflecting the willingness by the FCC to adapt and improve its efforts. In some cases, the rules for particular auctions permitted discretionary adjustments to take into account circumstances that may develop during an auction.

With the implementation of these bidding rules, the overall operations of the auctions ran efficiently and smoothly. Whenever potential problems arose during the auctions, the FCC quickly addressed them with improvements to the auction mechanism. For example, when several bidders accidentally overbid by placing extra zeros in their bids in the broadband PCS C block auction and in the MDS auction, the FCC quickly modified its bidding system to make inadvertent erroneous bids less likely to occur.

Box 5:
**Some Procedural & Policy Rules for the
Simultaneous Multiple-Round Auction**

Upfront Payment: Upfront payments ensure that a bidder is sincere and financially prepared to win a license. It provides a bidder sufficient eligibility to bid upon licenses and entitles the bidder to a certain number of bidding units. These units determine a bidder's eligibility to bid on licenses in the auction, round by round. The upfront payment is not attributed to specific licenses, but instead, defines the maximum number of bidding units on which the bidder is permitted to bid in any single round. At the close of the auction, the Commission applies the upfront payment towards the winning bid amount, or other payments in the event of withdrawal or default. If a bidder does not win any licenses and has no withdrawal payments, then the upfront payment will be refunded.

Activity: To ensure that the auction closes within a reasonable period of time, an activity rule requires bidders to participate actively throughout the auction, rather than waiting until the end. A bidder's activity level in a given round is the sum of the bidding units associated with licenses (1) on which the bidder is the standing high bidder from the previous round; and (2) on which the bidder submits an acceptable bid in the current round. The minimum required activity level is expressed as a percentage of the bidder's maximum bidding eligibility (as determined by the upfront payment), and increases as the auction progresses through three bidding stages toward its conclusion. A bidder that does not satisfy the activity rule loses bidding eligibility. However, bidders generally are provided with five activity rule "waivers," which allow them a limited ability to maintain eligibility without violating the activity rules.

Withdrawals: In any given round, the firm which submits the highest bid on a license above the minimum acceptable bid becomes the standing high bidder for that license. If no higher bids are received for that license before the end of the auction, that firm acquires the right (as well as the commitment) to purchase the license at the price of the bid. However, firms also have the option of withdrawing high bids before the close of the auction. In such cases, the bidder generally will be subject to a withdrawal payment equal to the difference between the amount of the withdrawn bid and the license's final winning bid. No withdrawal payment is assessed if the subsequent winning bid exceeds the withdrawn bid.

Stopping Rule: Given the simultaneous bidding format, it is important to decide when the auction is over. In a sequential auction, where licenses are offered one at a time, bidding is over when no bidder raises the current high bid on the available license. In the simultaneous multiple-round auction, however, there are many different licenses for sale at the same time. The simultaneous multiple-round bid auctions conducted so far at the Commission have not closed until bidding activity stopped on all licenses.

Specifically, an additional safeguard was installed in the software that warns bidders if their bid amount is well in excess of the minimum bid for the round. This safeguard has worked effectively, and there have been no more inadvertent overbidding mistakes in auctions conducted since its implementation. The FCC continues to monitor each specific auction for further ideas to improve its auctions process.

Most recently, the Commission initiated a rulemaking that is designed to establish a common set of competitive bidding rules for all auctionable services. In the auction rewrite proceeding, the Commission sought comment on a range of design and implementation issues, including alternative bidding methodologies, electronic filing and bidding, as well as other matters. In this proceeding, the Commission proposes to create a common set of auction rules and procedures that are flexible and can be used for all services.²⁸

²⁸ See Part 1 Order, *supra* fn 6.

V. Evaluation of the Auctions

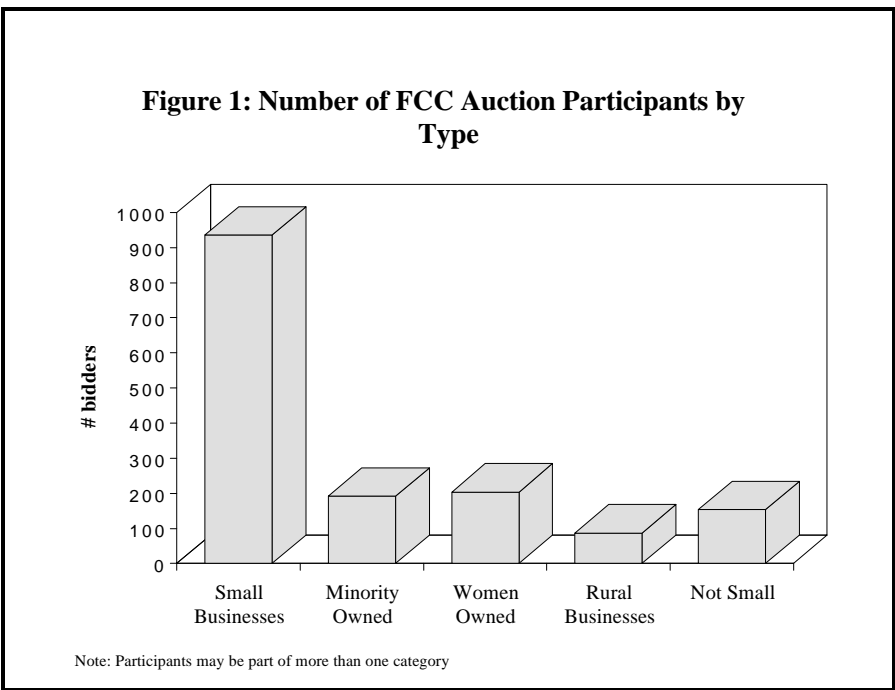
When Congress authorized the Commission to assign spectrum licenses using competitive bidding, it required the Commission to promote the development and rapid deployment of new technologies, products and services for the benefit of the public, including those residing in rural areas, without administrative or judicial delays. Congress also required the Commission to promote opportunity and competition by avoiding excessive concentration of licenses and by disseminating licenses among a wide variety of applicants, including small businesses, rural telephone companies, and businesses owned by members of minority groups and women (referred to as “designated entities”).

GTE observes that "the mechanisms established for registration, bid entry, and the downloading of the results of each round generally worked very well. The tools made available by the Commission's processes provided ample opportunity for monitoring and feedback to allow bidders to develop their strategies for subsequent rounds."

Source: GTE Comments filed in response to *Public Notice*, FCC 97-232, at 14-15 (August 1, 1997).

Overall, the Commission believes that its auctions have successfully met the goals mandated by Congress and in some instances may have exceeded expectations. As Figure 1 illustrates, auction participants were diverse.

A significant number of those who won spectrum licenses were designated entities. As shown in Figure 4, 484 out of a total of 608 license winners were designated entities.



A. Spectrum Auctions Compared to Alternative Methods

The FCC auctions operated smoothly and assigned spectrum licenses in an economically efficient way. The Commission believes that in most cases spectrum auctions more effectively assign licenses than past FCC license assignment methods. Although some critics complain that "[p]articipation in a

Commission auction imposes substantial costs on bidders, especially small rural telephone companies and small businesses,²⁹ past methods such as comparative hearings and lotteries have been more inefficient and

²⁹ RTG Comments filed in response to *Public Notice* FCC 97-232, at 24 (August 1, 1997).

resource intensive. Moreover, auctions have generally reduced the time to award licenses. For example, under comparative hearings, the average number of days, from application to grant of construction permit per cellular license, was 720 days. Similarly, under the lottery system, the average number of days per cellular license, from application to grant of construction permit, was 412 days. To date, the average number of days for FCC auctions, from the filing of an application to license grant, is 233 days. Appendix E provides more detailed information.

“[L]ooking at the big picture of spectrum auctions, one can only view the FCC’s auction program as a raging success.”

Source: John M. Bensch, *Hobson’s Choice*, Bensch-Marks Vol. 97-16, Equity Research - Wireless Services, Lehman Brothers, September 29, 1997.

Under the lottery system, the FCC sustained a flood of license applications because some lottery applicants submitted speculative entries with uncertain intent of building out a service. Many lottery winners resold their licenses in secondary markets. One speculator spent \$5 million on licenses to be resold in a year and a half for \$34 million without building so much as an antenna.³⁰ The costs associated with these resale transactions, such as those for cellular licenses in 1991, have been estimated at \$190 million.³¹

B. The Simultaneous Multiple-Round Bidding Compared to Conventional Auctions

The FCC also found that, for assigning licenses in most services, conventional auction mechanisms such as sequential multiple-round bidding or the sealed bid auctions were inadequate for assigning licenses to most services because they did not easily permit license aggregation or provide enough information to the bidder to achieve efficient results.

In contrast, simultaneous multiple-round bidding generates more information about license values during the course of the auction and provides bidders with the most flexibility to pursue spectrum aggregation strategies. Thus, this methodology effectively awards interdependent licenses to the bidders who value them most highly. Generally, the Commission has found that because of the superior information and flexibility simultaneous multiple-round bidding provides, it is likely to promote efficient spectrum use in several ways. First, simultaneous multiple-round auctions rapidly award licenses to those who value it the most. Second, the auctions facilitate efficient spectrum aggregation across geographic areas and spectrum blocks. For example, a bidder can bid with the goal of aggregating those licenses that best allow it to use the spectrum and shift its strategy as the auction progresses, if its first choice of licenses becomes too expensive. Third, these auctions generate information about the value of spectrum for alternative uses.

Auctions can be conducted at modest cost relative to license value. The total cost of all FCC auctions to date has been approximately \$74 million, which represents only about 0.62 percent of the total auction revenue raised to date.

³⁰ See Calhoun, p. 132.

³¹ See PCS Tentative Decision, 7 FCC Rcd at 5699 n.41.

Box 6: Number of Resales: A Good Indicator of Efficiency

Overall, the incidence of resales following spectrum auctions has been fairly low. For example, only one narrowband PCS license valued at 5 percent of the total narrowband revenues was transferred in the period between the auction and October 1996. Following the broadband PCS A and B block auction, 12 licenses worth 6.5 percent of total revenues and 6.6 percent of total population were resold in 1996. These 12 resales were small in number compared to the 75 resales in 1991 of cellular licenses distributed by lottery.

Evidence from both the narrowband PCS and the broadband PCS A and B block auctions suggests that the FCC efficiently distributed spectrum resources. If the distribution of licenses following an auction is efficient, there is little incentive for firms to resort to a secondary market to reallocate the licenses after the auction has concluded. In other words, the volume of license resales can be used as an indicator of economic efficiency. As Box 6 illustrates, resale of auctioned licenses has been low.³²

C. Fostering Innovative Spectrum Use and Encouraging New Companies to Enter the Telecommunications Market

FCC auctions, such as the broadband PCS spectrum auctions, resulted in the creation of many new wireless telecommunications companies.³³ Indeed, 53 percent of the licenses awarded thus far by auctions have gone to small businesses, many of which are new entrants in the telecommunications market. Also, several of the largest telecommunications enterprises, such as Sprint Telecommunications and the Bell Operating Companies, have formed alliances to establish nationwide PCS

Auctions Encourage Innovative New Entrants

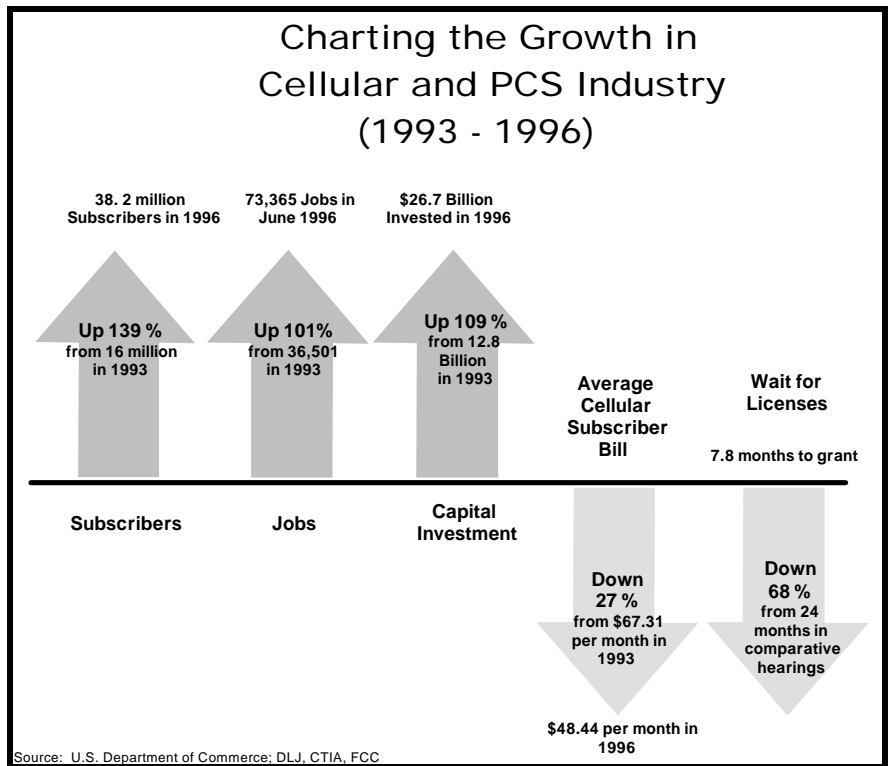
Airadigm Communications was the first broadband PCS C block licensee to launch service in Green Bay and Madison, Wisconsin. Airadigm has not only provided services to parts of rural America but it has also reached some of the most underserved Americans by joining into a partnership with the Chillicothe Native American tribe, which plans to provide cutting edge wireless local loop service on the tribe's reservation.

Other new entrants that have been able successfully to use their radio spectrum licenses to offer innovative new services nationwide include Mobile Telecommunications Technologies Corp., which has launched its two-way paging narrowband PCS-based "SkyTel" service in 262 cities across the nation.

³² FCC rules previously allowed no transfers or assignments of entrepreneurs' block licenses in the first three years after licensing, permitted transfers and assignments from entrepreneurs to entities qualified as entrepreneurs in years four and five, and allowed transfers and assignments with no restrictions after year five. The Commission later modified this rule -- for both the C and F block licenses -- to permit transfers and assignments of entrepreneurs' block licenses to other entrepreneurs during the first five years after license grant. See Amendment of Parts 20 and 24 of the Commission's Rules - Broadband PCS Competitive Bidding and the Commercial Mobile Radio Service Spectrum Cap, WT Docket No. 96-59, *Report and Order*, 11 FCC Rcd 7824, 7863 (1996).

³³ *Duesterberg & Pitsch*, p. 6.

networks.³⁴ For subscribers, these new firms represent new choices for improving wireless service at lower prices. GTE has observed that "despite some delays in the process, the broadband PCS auctions in general, and the A and B block auction in particular, have created new broadband PCS competition in an unprecedented short time frame."³⁵ A recent Yankee Group report identifies over 40 markets that now have three wireless competitors and 10 markets with four competitors. This report notes that pricing in competitive markets with at least one new PCS operator averages 18 percent lower than in markets with no PCS competitors.³⁶ Competition is also increasing consumers' choice of products by



advancing the development of three digital standards.³⁷ In monetary terms, the most important effect on the economy is not the auction revenues but that these firms are now investing in infrastructure that will permit them to offer services in competition with each other and with other existing telecommunications companies. Wireless investment in capital improvements is expected to be approximately \$44 billion over the next five years.³⁸

“Charting the Growth in the Cellular and PCS Industry,” graphically shows how subscribership and capital investment have all increased in the wireless industry since 1993, while at the same time, the average cellular subscriber bill and the wait for a license has decreased.

³⁴ CBO Study, p. 20.

³⁵ GTE Comments filed in response to *Public Notice FCC 97-232*, at 15 (August 1, 1997).

³⁶ See Yankee Group, *Yankee Watch Mobile Flash - Competition Begins to Have an Impact on Wireless Pricing* (April 18, 1997).

³⁷ These digital standards are Code Division Multiple Access ("CDMA"), Time Division Multiple Access ("TDMA") and Global System for Mobile Communications ("GSM"). CDMA is a multiplexing standard that supports many calls on the same carrier. Transmission signals are organized into coded packets of information which move among the four clearest available frequencies and then reassemble at the receiving end. TDMA is a multiplexing standard that divides each carrier into three time slots with one subscriber per slot. Transmission signals are broken up into tiny packets of information, sent in timed "bursts," and are reassembled at the receiving end. GSM is the European standard for digital cellular service using slow frequency-hopping and TDMA.

³⁸ Estimate by Northern Business Information, New York, NY, 1997.

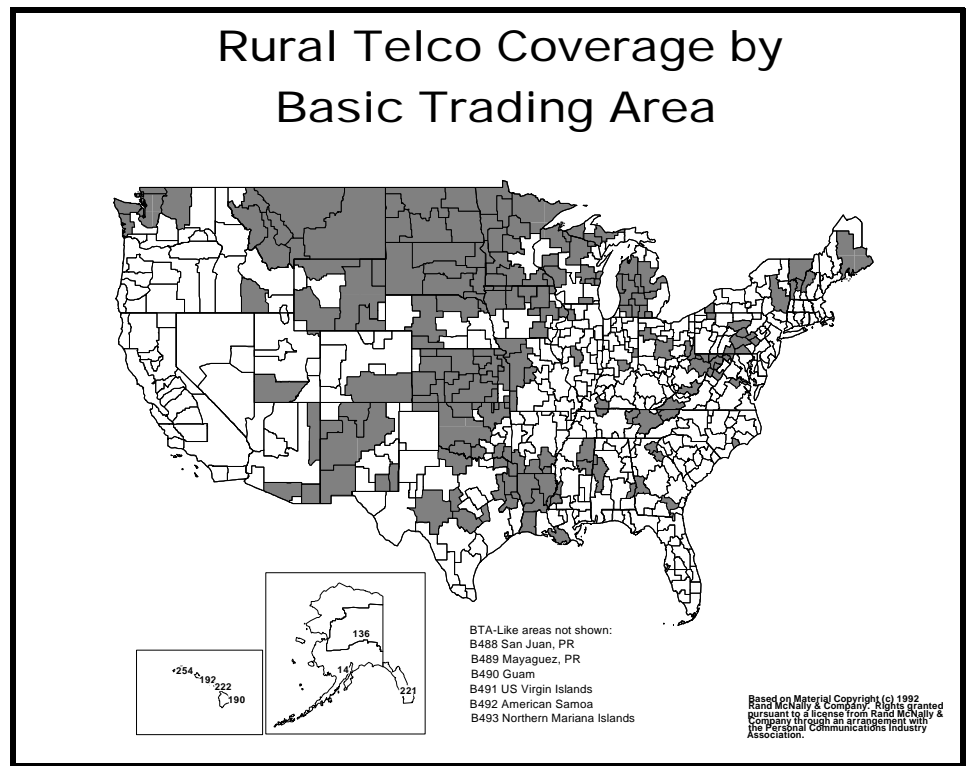
FCC auctions have also facilitated the entry of new technologies and services to the wireless marketplace by improving the licensing process and attracting investment in new companies. For example, the Commission recently completed the Digital Audio Radio Service (DARS) auction, which will bring a new digital radio service to American listeners nationwide. Other service offerings that have received a boost from the introduction of auctions include broadband and narrowband PCS, DBS, Multipoint Distribution Service (MDS), and SMR. These services will offer consumers a range of offerings that will include two-way paging, digital telephony, wireless cable, multichannel video, and more. Future services to be auctioned, such as LMDS, offer other opportunities for video programming, as well as voice and data applications.

D. Getting Telecom Service to Rural and Underserved Areas

The Commission also facilitated the delivery of new services to rural and underserved areas. Auctions have generally provided rural telephone companies with favorable opportunities. To date, rural telephone companies have won about 44 percent of the 123 rural Basic Trading Area (BTA) licenses in the United States.³⁹ The “Rural Telco Coverage” map illustrates this coverage. In the broadband PCS proceeding, the Commission adopted

measures allowing rural telephone companies and others to obtain broadband PCS licenses that are geographically "partitioned" from larger broadband PCS service areas. Partitioning is the reassignment of licenses by geographic areas other than those used by the Commission in the original assignment process.

Licensees do not need to meet specified criteria to define a new geographic area. Partitioning flexibility creates an opportunity for a rural telephone company, or any other small business, to obtain Commission licenses usually accessible only to larger companies. A rural telephone company may wish to provide service only in the small geographic area in and around the community it serves. Even though this area may be a small subset of the license area offered in an auction, the auction process normally requires that the company purchase a license for the entire area. This is difficult for small companies that may not possess the financial resources to purchase these larger licenses



³⁹ For the purpose of this report, the smallest BTAs by population are considered “rural.” Other markets may also include rural areas.

and may not wish to provide service in most of the service areas. Conversely, large operators may wish to provide service only in more densely populated areas where the return on the required investment is greater. This creates a natural market where the large operators who win licenses can sell off portions of their service areas to smaller companies.⁴⁰

Therefore, the flexibility to partition generates benefits for all parties concerned. The small operator companies, like rural telephone companies, have an opportunity to enter the market. The large operators can generate a return on their investment in a geographic area where they otherwise might not gain any returns. Finally, rural consumers have increased access to modern technologies and the benefits of competition.

In addition to partitioning, the Commission allows entities to "disaggregate" a portion of the spectrum assigned to a broadband PCS licensee.

Disaggregation is the assignment of discrete portions, or "blocks," of spectrum licenses to another qualifying entity. The FCC has also adopted or proposed partitioning and disaggregation rules for other auctionable services, such as narrowband PCS, 220 MHz, paging, and LMDS.⁴¹

These partitioning and disaggregation measures were adopted in part to respond to rural telephone companies' concerns that they effectively would be barred from entering the broadband PCS industry if

Rural Success Stories

Rural access to new telecommunication technologies often lags behind the rest of the United States because of higher infrastructure costs. The FCC auctions granted numerous rural companies licenses to provide innovative services in rural communities.

For example, CFW Communications, a rural telecommunications company providing local telephone service over 34,000 access lines and wireline and wireless cable service to 18,000 homes, has used the Commission's partitioning and disaggregation rules to enlarge its PCS coverage throughout Virginia and West Virginia, increasing its population coverage from 1.5 million to 5 million. CFW is planning to launch PCS service across "a substantial territory" in this area during the last quarter of 1997.

Wireless North is a consortium of rural telephone (and utility) companies from the upper Midwest which owns 16 broadband PCS C, D, E, and F block licenses in 13 BTAs (covering all of Minnesota and parts of North Dakota, Wisconsin, and Iowa). It plans to launch commercial service in several markets by fourth quarter 1997.

⁴⁰ One commenter suggests that to facilitate the delivery of service to rural areas, the Commission should use smaller license areas. According to RTG, "[i]ncreasing the number of license areas increases the diversity of licensees, as required by Section 309(j), and this in turn encourages the development of new and innovative technologies and service offerings and the creation of niche services and services targeted to rural areas." See RTG Comments filed in response to *Public Notice* FCC 97-232, at 11 (August 1, 1997).

⁴¹ See, e.g., Amendment of the Commission's Rules to Establish New Personal Communications Services, Narrowband PCS, GEN Docket No. 90-314, ET Docket No. 92-100, Implementation of Section 309(j) of the Communications Act - Competitive Bidding, Narrowband PCS, PP Docket No. 93-253, *Report and Order and Further Notice of Proposed Rule Making*, FCC 97-140, at ¶¶ 96-99 (rel. April 23, 1997).

they were required to bid on an entire BTA or MTA license to obtain the license which covered their wireline service areas.⁴² Rural telcos believed that partitioning would allow them to offer in-region service and would encourage them to take advantage of existing infrastructure, thereby speeding service to rural areas. Recently, the Commission extended its broadband PCS partitioning and disaggregation rules to allow entities other than rural telephone companies to obtain partitioned or disaggregated licenses in order to speed service to unserved or underserved areas.⁴³ See "Rural Success Stories."

E. Facilitating Designated Entities' Participation in the Competitive Bidding Process

Congress directed the Commission to give small businesses, rural telephone companies, and businesses owned by members of minority groups and women the chance to participate in the provision of spectrum-based services.⁴⁴ This mandate furthers Congressional objectives to expand economic opportunity, promote competition, and facilitate the development and delivery of new and improved telecommunications services to the public.

Section 309(j)(4) identifies a number of means by which the FCC can carry out this mandate, such as "alternative payment schedules and methods of calculation," and "the use of tax certificates, bidding preferences, and other procedures." The Commission has adopted a variety of such measures for different auctioned services. Thus, the Commission has employed installment payments, bidding credits, and, for the auctions of the broadband PCS service, "entrepreneurs' blocks" (*i.e.*, a set-aside of spectrum for bidders not exceeding certain financial thresholds), to facilitate designated entity participation in the provision of spectrum-based services.

In 1994, the FCC adopted provisions for women- and minority-owned businesses. Since 1995, the FCC has largely focused its efforts upon small businesses because, subsequent to the 1993 Budget Act, Congress eliminated the tax certificate program,⁴⁵ and the Supreme Court issued two landmark decisions, *Adarand Constructors, Inc. v. Peña* and *United States v. Virginia*. These decisions raised legal uncertainty as to whether the special auction provisions for minorities and women (as initially adopted) could withstand an equal protection constitutional challenge.⁴⁶ In the wake of these decisions, the Commission

⁴² See generally Implementation of Section 309(j) of the Communications Act - Competitive Bidding, PP Docket No. 93-253, *Fifth Report and Order*, 9 FCC Rcd 5532 (1994).

⁴³ See Geographic Partitioning and Spectrum Disaggregation by Commercial Mobile Radio Licensees, WT Docket No. 96-148, *Report and Order and Further Notice of Proposed Rule Making*, 11 FCC Rcd 21831 (1996).

⁴⁴ 47 U.S.C. §309(j)(4)(D).

⁴⁵ Under the tax certificate program, the Commission issued tax certificates pursuant to the Internal Revenue Code, 26 U.S.C. § 1071: (1) to initial non-controlling investors in minority- and women-owned applicants upon the sale of their interests; and (2) to licensees who assigned or transferred control of their licenses to minority- and/or women-owned entities. The certificates enabled the investors and licensees meeting the criteria to defer the gain realized upon the sale. In early 1995, Congress repealed 26 U.S.C. § 1071. See Pub. L. No. 104-7, § 2, 109 Stat. 93, 93-94 (1995).

⁴⁶ See *Adarand Constructors, Inc. v. Peña*, 115 S. Ct. 2097 (1995) (constitutionality of all government-imposed racial classifications determined under a "strict scrutiny" standard of review); *United States v. Virginia*, 116 S. Ct. 2264 (1996) (state-imposed gender classification violated constitution because state failed to show "exceedingly persuasive justification" for the program). See Appendix B for further analysis of these Supreme Court decisions and their effect on

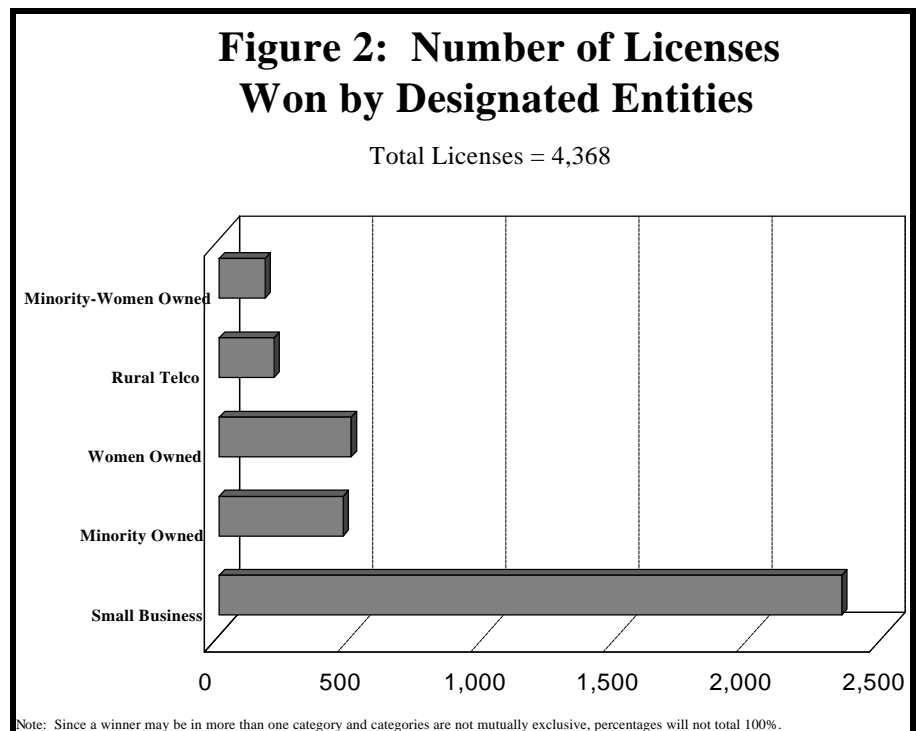
has been examining market barriers facing small businesses in the communications industry and unique barriers faced by minority- and women-owned businesses. This ongoing analysis will help the FCC to develop rules and practices to meet Congress’ intent of widespread dissemination of licenses.

The Commission has developed its small business incentives based on eligibility requirements tailored to each service, giving consideration to capital requirements and other characteristics of the particular service. For example, to date, the Commission has provided installment financing in six auctions, including regional narrowband PCS, IVDS, MDS, 900 MHz SMR, and the broadband PCS C and F blocks. In auctions with installment payments, the Commission has also provided favorable interest rates. For example, in the broadband PCS C block auction, all bidders who won licenses were assessed interest ranging from 6.5 to 7 percent.

Following the Congressional directive in Section 309(j) to experiment with different approaches, the Commission varied the level of bidding credits and installment financing terms according to the size of the business applicant to effectively provide opportunities for small businesses, encourage

competition, and deploy service to the public in a timely fashion. For instance, the competitive bidding rules for the 900 MHz SMR service provided bidding credits and installment payments for two tiers of small businesses: (1) entities that have average gross revenues of not more than \$3 million; and (2) entities that have average gross revenues of not more than \$15 million. Businesses with gross revenues of not more than \$3 million were entitled to a 15 percent bidding credit, and their installment payment terms included a five-year interest-only payment period, with interest accruing at the Treasury note rate. In contrast, businesses with gross revenues of not more than \$15 million were entitled to a 10 percent bidding credit and installment payment terms of two-years interest only, with interest accrued at the Treasury note rate plus an additional 2.5 percent.⁴⁷ Of the 1,020 SMR licenses that were auctioned, 250 were awarded to small businesses that elected to use the installment payment plan.

As shown in Figure 2, FCC auctions have assisted small businesses, including those owned by women and minorities, in gaining entry to the telecommunications arena. Detailed statistics for designated entity



the designated entity preferences.

⁴⁷ See 47 C.F.R. §§ 90.810(a), 90.812(a), 90.814(b).

participation are provided in Appendix C. By including special provisions for small business, the Commission has been able to increase opportunities not only for small businesses but also for minority- and women-owned businesses -- because many minority- and women-owned entities are also small businesses.⁴⁸

Throughout the auctions process, the FCC has made extensive efforts to inform small, rural telephone, women-owned, and minority-owned companies about the opportunity to comment on auction rulemakings and participate in auctions. The FCC's Office of Communications Business Opportunities ("OCBO"), in conjunction with the Wireless Telecommunications Bureau, sponsored two national seminars, *Auctions '96* and *Auctions '97*, to inform small businesses about auction opportunities. FCC staff members have spoken to numerous business and community groups, held bidders' seminars before most auctions, and conducted other seminars to provide training on the auction system and to answer questions. The Wireless Bureau's web site has also made auction information readily available.

Installment Payments

The installment payment program has enabled many businesses to pay for licenses who might otherwise not be able to acquire licenses through the auction process. Over 95 percent of the auction winners who were eligible for the installment payment program have participated in it. Installment payments have furthered the Congressional mandate to provide opportunities for designated entities. However, these payments seemingly placed the Commission in the role of being both a regulator and a lender to the wireless industry it licenses.

Unlike a "traditional" lender who has the resources and expertise to determine a borrower's credit worthiness, evaluate operating performance, and develop financial covenants to ensure compliance with loan agreements, the Commission relies on private markets to perform these traditional lending functions. Using upfront payments as a proxy for a bidders' financial viability, the Commission has assumed that if a bidder can raise the upfront payment in the financial markets, that the market recognizes the bidder as financially sound and able to provide services. Moreover, while a "traditional" lender can focus on a few goals such as increasing value for its shareholders, the Commission, as a regulator, has multiple policy goals that sometimes compete with its role as a "lender." The Commission decided not to offer an installment payment program to bidders in two upcoming auctions, 800 MHz SMR and LMDS.⁴⁹ The Commission is also reviewing whether to proceed with installment payments in other planned auctions.

Default and Bankruptcy Issues

⁴⁸ See generally *1992 Survey of Minority-Owned Business Enterprises*, Agriculture and Financial Statistics Division, Bureau of the Census, U.S. Department of Commerce (December 11, 1995); *1992 Survey of Women-Owned Businesses*, Agriculture and Financial Statistics Division, Bureau of the Census, U.S. Department of Commerce (January 29, 1996).

⁴⁹ See *Public Notice*, "Auction of 800 MHz Specialized Mobile Radio Service Licenses," DA 97-1672 (rel. August 6, 1997) and Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, To Reallocate the 29.5-30.0 GHz Frequency Band, To Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services, CC Docket No. 92-297, *Second Order on Reconsideration*, FCC 97-323 (rel. September 12, 1997).

Winning bidders may be found to be in default by either (1) failing to make the required down payments prior to the issuance of a license; or (2) for those eligible for the installment payment program, by failing to make installment payments.

If an auction winner fails to make one of its initial required down payments, it is in default and the Commission can either reacquire the licenses in question or offer them to the second highest bidder.⁵⁰ With respect to winning bidders who default on installment payments, the Commission's regulations and related financing documents provide for automatic cancellation of the licenses. The Commission has asked Congress to clarify its position vis-à-vis the bankruptcy laws to forestall any litigation that could delay implementation of service to the public and competition in the wireless marketplace.⁵¹

Overall, only a minimal number of licenses has been retained by the Commission for non-payment of auction downpayments, which are due after the close of an auction. Of the 4,368 licenses the Commission has offered in its fourteen auctions to date, only 3.3 percent have been unassigned due to non-payment. These defaults have primarily occurred in two services, IVDS and broadband PCS C block.

Broadband PCS C Block Installment Payment Issues

In early 1997, nine broadband PCS C block licensees participating in the installment payment program indicated that they were having difficulty making their installment payments and requested that the Commission amend the terms of the installment payment program for broadband PCS services.⁵² The licensees blamed increased competition and changing market conditions (*i.e.*, decline in financial markets, lower bid prices in the broadband PCS F block and WCS auctions) for their financial difficulties.

In order to fully consider the proposals, on March 31, 1997, the Wireless Bureau suspended installment payments.⁵³ The Bureau issued a public notice requesting comments on broadband PCS installment payments,⁵⁴ and hosted a public forum attended by over 150 licensees and representatives from the wireless

⁵⁰ See, *e.g.*, 47 C.F.R. § 1.2109(c) and § 1.2110(e)(4)(iii).

⁵¹ See, *e.g.*, Letters from the FCC Commissioners (1) to the Honorable Orrin G. Hatch and the Honorable Patrick J. Leahy; and (2) to the Honorable Henry J. Hyde and the Honorable John Coners, Jr., both dated September 17, 1997; Letter from FCC Chairman Reed E. Hundt to the Honorable Pete Domenici and the Honorable John R. Kasich, dated July 25, 1997; see also *infra* Section VII.

⁵² The net high bid for broadband PCS C block licenses roughly averaged \$40 per person in the U.S., compared to roughly \$15 per person in the U.S. for broadband PCS A and B block licenses.

⁵³ See *In the Matter of Installment Payments for PCS Licenses*, Order, DA 97-649 (rel. March 31, 1997), which suspended broadband PCS C block installment payments. Installment payment from broadband PCS F block licensees (10 MHz PCS entrepreneur block) were subsequently suspended. See *Public Notice*, "FCC Announces Grant of Broadband Personal Communications Services D, E, and F Block Licenses," DA 97-883 (rel. April 28, 1997) at p. 2.

⁵⁴ See *Public Notice*, "Wireless Telecommunications Bureau Seeks Comment on Broadband PCS C and F Block Installment Payment Issues," WT Docket 97-82, DA 97-679 (rel. June 2, 1997) (*Installment Payment Public Notice*).

industry and financial markets.⁵⁵ In response to the *Installment Payment Public Notice* over 100 comments and replies to comments were filed, as well as over 200 *ex parte* filings addressing the issues. The requests were varied and included a broad range of proposals such as: changing the installment payment schedule from quarterly to annual payments; allowing licensees to disaggregate spectrum in return for a comparable reduction in debt; prepaying debt based on a net present value formulation; restructuring the debt to reflect the market value of the licenses; and deferring payments.⁵⁶

On September 25, 1997, the Commission approved an option plan for broadband PCS C block licensees, and indicated it would reinstate the installment payment deadline for PCS C and F block licensees as of March 31, 1998.⁵⁷ On or before January 15, 1998, licensees must elect either to continue making payments under their original installment payment plan notes or one of the following three options:

(1) **Disaggregation.** Any C block licensee may elect to disaggregate one-half of its spectrum (15 MHz of its 30 MHz) for any or all of its licenses and return such spectrum to the Commission for reauction;

(2) **Amnesty.** Any C block licensee may return all of its licenses, and in return, have its outstanding C block debt forgiven; or

(3) **Prepayment.** Any C block licensee may prepay for as many of its licenses as it desires at face value using: (a) up to 70 percent of its down payment made on the licenses that it elects to return; (b) any installment payments made; and (c) any new monies raised.

Encouraging Diverse Participation

The Commission continues to encourage the participation of a variety of entrepreneurs in the provision of wireless services, believing that innovation by small businesses will result in a diversity of service offerings that will increase customer choice and promote competition. In that regard, pursuant to Section 257 of the Communications Act, the Commission has initiated a proceeding to consider other ways to improve the access of small businesses, rural telephone, women-, and minority-owned firms to the telecommunications market. The Commission recently issued a report that discusses the numerous measures implemented to benefit small businesses, such as the use of service-specific definitions of small businesses, the outreach

⁵⁵ See *Public Notice*, "Commission to Hold Public Forum Regarding Broadband PCS C and F Block Installment Payment Issues," WT Docket 97-82, DA 97-1267 (rel. June 17, 1997); and *Public Notice*, "Agenda for Public Forum Regarding Broadband PCS C and F Block Installment Payment Issues," WT Docket 97-82, DA 97-1356 (rel. June 27, 1997) (inviting parties to address the comments made in the Public Forum in their reply comments to the *Installment Payment Public Notice*).

⁵⁶ See Letter from Thomas Gutierrez, Esq., *et al.* to Michele C. Farquhar, Esq., Chief, Wireless Telecommunications Bureau (March 13, 1997) ("Gutierrez Letter"). Petitioners included Alpine PCS, Inc.; DCR PCS, Inc.; Eldorado Communications, L.L.C.; Indus, Inc.; KMTel L.L.C.; Mercury PCS, L.L.C.; Microcom Associates; NextWave Communications, Inc.; and R&S PCS, Inc.

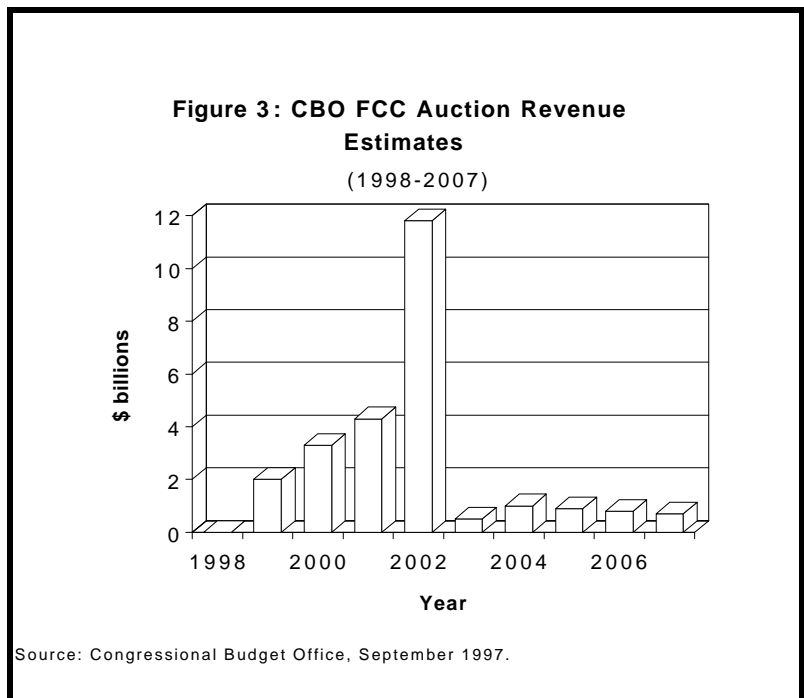
⁵⁷ Amendment of the Commission's Rules Regarding Installment Payment Financing for C Block Personal Communications Service (PCS) Licensees, WT Docket No. 97-82, *Second Report and Order and Further Notice of Proposed Rule Making* (adopted: September 25, 1997; not released as of the adoption date of this report) (Chairman Hundt affirming and dissenting in part).

efforts by the FCC Office of Public Affairs and OCBO, and the establishment of the Telecommunications Development Fund (“TDF”).⁵⁸ In 1996, Congress added Section 714 to the Communications Act, creating the TDF to: (1) promote access to capital for small businesses in the telecommunications industry; (2) stimulate new technology development, and promote employment and training; and (3) support universal service and promote delivery of telecommunications services to underserved areas. Auction revenues play a primary role in funding the TDF. Specifically, the TDF receives all interest accrued by upfront payments, from the date of deposit until up to 45 days following conclusion of the auction for which the upfront payment was submitted. The TDF’s current funding level is \$21.6 million.⁵⁹

The Commission is also planning a comprehensive study to further examine the role of small businesses and businesses owned by women and minorities in the telecommunications industry and the impact of the Commission’s current policies on access to the industry for such businesses. This study will assist the Commission in determining whether there are constitutionally sound bases for adopting licensing provisions to promote opportunities for women and minorities for future auctions.

F. Auction Results and Projections

As discussed above, the auctions successfully met the statutory goals mandated in Section 309(j) of the Communications Act. To date, the FCC has collected in excess of \$12 billion in revenues.⁶⁰ Revenue derived from future auctions will likely be affected by various factors, including the nature and amount of spectrum auctioned, service-specific Commission rules, market conditions, and auction methodology. Determining the value of spectrum in advance of an auction is very difficult. The value of spectrum depends on a number of factors, including its location, technical characteristics, the amount of spectrum, the geographic area covered, the availability of technology suitable for a given band, the amount of spectrum already available for provision of similar services, the number of incumbents presently occupying the spectrum, and whether incumbents, if any, will remain licensed in that spectrum or will be relocated



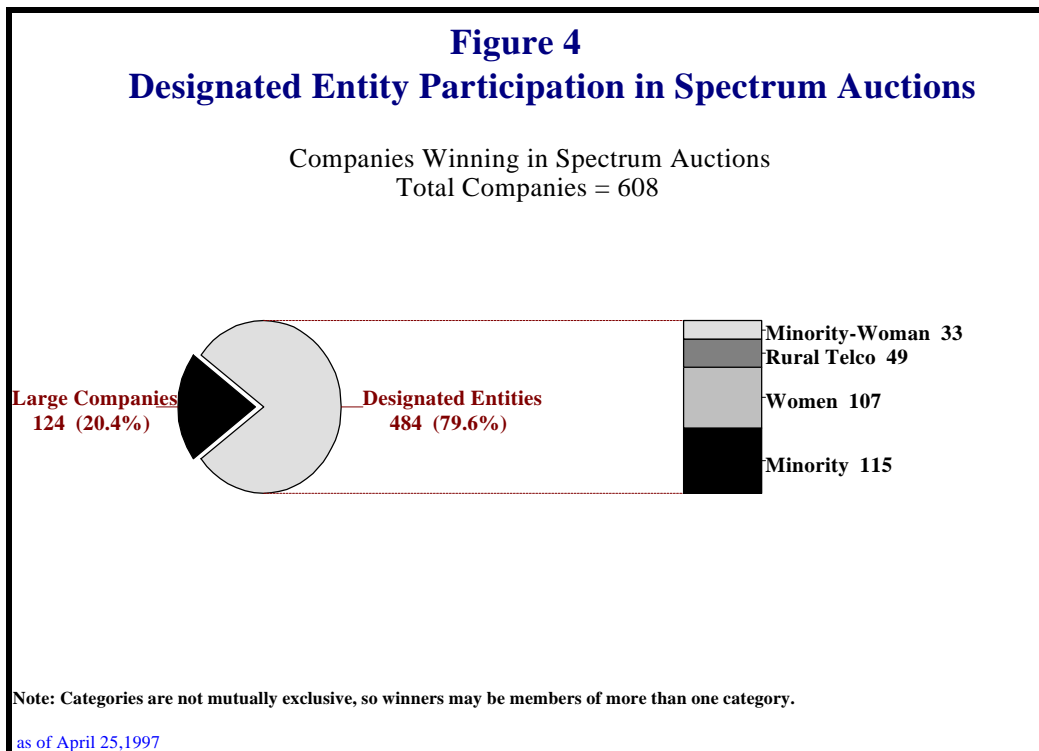
⁵⁸ See Section 257 Proceeding to Identify and Eliminate Market Entry Barriers for Small Businesses, GN Docket No. 96-113, Report, FCC 97-164 (rel. May 8, 1997).

⁵⁹ See 47 U.S.C. § 309(j)(8)(C) & 47 U.S.C. § 614.

⁶⁰ This figure represents monies received from auction winners as of August 31, 1997, many of whom are paying installments over the term of their licenses (generally 10 years).

to other spectrum.

The Commission has not made its own estimates of the value of auctionable spectrum in the past.⁶¹ Moreover, the Commission's statutory authority continues to instruct that the agency not base spectrum allocation decisions "solely or predominantly" on the expectation of revenues that auctions may generate.⁶² The Commission's primary mission in conducting auctions is promoting competition by awarding licenses rapidly to those who value them most highly.



Future auctions being planned include those for licenses to provide LMDS, paging, 800 MHz SMR, 220 MHz services, and additional narrowband PCS. The CBO estimates that auction of this spectrum alone could raise close to \$16 billion. Moreover, in the recent BBA of 1997, Congress has also identified additional spectrum for auction.⁶³ Revenues from these future auctions could be as high as \$25 billion between 1998 and

2007.⁶⁴ CBO projections for estimated future auctions revenues are shown in Figure 3.

When we examine the numerical results of the auction program, it is clear that the Congressional mandate to disseminate licenses among a wide variety of applicants including small businesses, rural telephone companies, and businesses owned by women and minorities has been successfully met. These licenses have

⁶¹ See Letters from FCC Chairman Reed E. Hundt to the Honorable John McCain, dated February 26, 1997 and the Honorable John D. Dingell, dated July 8, 1997. These letters point out that the FCC does not ordinarily determine the value of spectrum in advance of an auction.

⁶² See 47 U.S.C. § 309(j)(7).

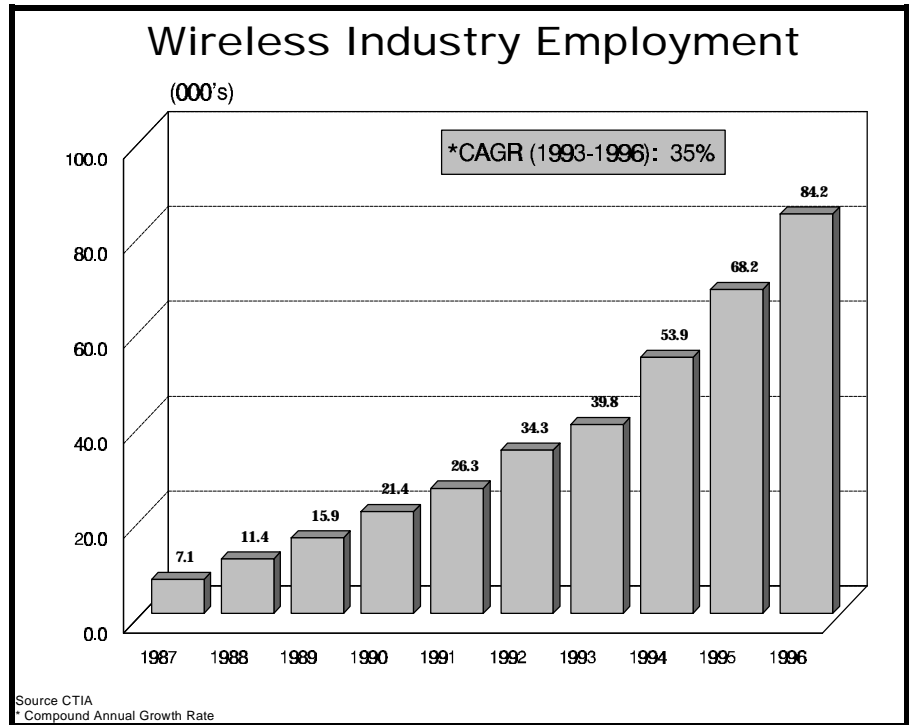
⁶³ See *infra* Table 2.

⁶⁴ See *The Economic and Budget Outlook: An Update*, Congressional Budget Office, Congress of the United States (September 1997), Table 11; letter from June E. O'Neill, Director, Congressional Budget Office, to the Honorable Franklin D. Raines, Director, Office of Management and Budget, dated August 12, 1997.

also been distributed across wide geographic areas.

The number of licenses won in the fourteen FCC auctions by designated entities was significant. Small businesses, rural, as well as minority- and women-owned businesses, have benefited from the FCC competitive bidding procedures. Of the 4,368 licenses awarded thus far by auctions, 53 percent were awarded to small businesses; 11 percent to minority-owned businesses; 11 percent to women-owned businesses; 4 percent to minority women-owned businesses; and 5 percent to rural telephone companies. (Note that a licensee may fall into more than one category.)

Similarly, if we examine the total number of companies who won spectrum licenses, we find that almost 80 percent of the 608 winners qualified as designated entities, as shown in Figure 4.



Finally, the success of the auction program has had both national and global impact. These auctions have increased competition, which in turn may have contributed to growth in wireless industry employment in U.S. markets. As shown in the accompanying chart entitled “Wireless Industry Employment,” the compound annual growth in wireless industry employment has increased by 35 percent between 1993 and 1996. The success of FCC auctions have encouraged other countries to employ electronic competitive bidding methodologies to assign licenses. These global competitive markets could potentially reduce rates on wireless communications worldwide.

VI. Looking Ahead

While the use of competitive bidding represents a significant improvement over past licensing approaches, the Commission is committed to making continual improvements to the overall auction program. For example, the Commission recommends a number of possible changes in its auction design and procedures that could improve its operations in a pending rulemaking proceeding that examines its general auction rules set forth in Part 1 of Chapter 47 of the Code of Federal Regulations.⁶⁵ The Commission is also evaluating the recently enacted BBA of 1997 to determine that legislation's effect on the auctions process and on the implementation of its requirements.

The auction program has been evolutionary in nature. The Commission has gained valuable experience with each auction and continually uses this experience to improve the auction process. We expect to continue improving and refining our auction process as we conduct more auctions in the future. One area where we believe that past experience has demonstrated a need for modifications is in the area of installment payments. While the FCC's installment payment program has been successful in addressing barriers to capital faced by small businesses seeking to provide wireless services, it has also placed the FCC in the difficult role of being both a lender and a regulator. Administration of the installment payment program has also placed an overwhelming burden on the FCC's staff and resources. The Commission is dedicated to resolving the complicated issues that accompany the installment program, without jeopardizing the ability of small businesses to participate meaningfully in the auction program.

Another issue facing the FCC is the inherent tension between use of the spectrum auction as a revenue-raising measure and its use as an efficient means of assigning licenses. For example, Congress recently required the auction of 30 MHz of WCS spectrum in a short time frame for the purpose of raising revenue for the Federal budget.⁶⁶ The short statutory time limits forced the FCC to truncate its processes in a manner that led to some uncertainty about the spectrum and may have deterred bidders from participating in the auction. Further, technical limitations on the use of the WCS spectrum sharply curtailed interest in this band. Ultimately, the auction raised far less than was "scored" for budget purposes.⁶⁷ Nevertheless, WCS spectrum can be used for many promising applications (*e.g.*, Internet access, wireless cable, low power telephony). As a result, consumers will soon benefit from the deployment of this new service -- regardless of the amount of revenue raised by any auction. In fact, winning bidders from WCS licenses are already investing in the development of new technologies and formulating ideas for the efficient use of this spectrum band.⁶⁸

⁶⁵ See *Part 1 Order*, *supra* fn. 6.

⁶⁶ See Omnibus Consolidated Appropriations Act, Pub. L. No. 104-208, § 3001, 110 Stat. 3009 (1996).

⁶⁷ See letter from Michele C. Farquhar, Chief, Wireless Telecommunications Bureau, to the Honorable Thomas J. Bliley, Jr., dated February 5, 1997 (predicting this outcome).

⁶⁸ See *Wireless Companies With New WCS Licenses Set Coordinating Effort*, *Communications Daily*, August 13, 1997, p. 4.

In addition, a total of 234 MHz of spectrum may be subject to auction pursuant to the BBA of 1997.⁶⁹ The Commission will be moving ahead to allocate and assign much of this spectrum by the year 2002. Congress also acted to extend the Commission's auction authority and broaden its application.⁷⁰ In addition, the Commission has a number of other recommended changes in the auction program which are discussed below.

A. Proposed Auction Changes

In the BBA of 1997, Congress calls for the FCC to experiment with "combinatorial bidding." A brief explanation of this type of auction bidding methodology is outlined below.

Combinatorial Bidding

Combinatorial bidding, also known as "packaged bidding," allows bidders to place single bids for groups of licenses. For example, in one type of combinatorial auction, bidder A could place a bid of \$100,000 for licenses 1, 2 and 4, while bidder B places a bid of \$500,000 for licenses 2, 3 and 5. The computer system then calculates the revenue maximizing solution and awards the high bids for that round to the appropriate package(s).

Combinatorial bidding may have advantages over other auction designs when two characteristics are present in the goods being auctioned. First, there must be strong synergies among items. In the FCC auctions, strong synergies exist when licenses are worth more to some bidders as a package than individually. Second, bidders must have strong and divergent preferences about how best to use the spectrum. For example, a large company's business plan may not be viable unless awarded a nationwide service area, whereas other users may desire the same spectrum for local land mobile or fixed services but need only a smaller service area.

In its *Second Report and Order* on competitive bidding procedures, the Commission recognized that there may be benefits associated with the use of combinatorial bidding.⁷¹ Since that time, the Commission has continued to look for an appropriate opportunity to implement this methodology.

The Commission recently awarded a research and development contract to a consultant to provide theoretical and applied combinatorial bidding approaches where licenses exhibit strong synergies and bidders have overlapping preferences (*i.e.*, prefer different packages of licenses). The FCC goal is to address concerns and investigate ways to limit any negative effects on the auction process, including the Commission's fulfillment of the objectives of Section 309(j) of the Communications Act. The Commission must also decide upon the right spectrum for this assignment method.

⁶⁹ See *infra* Table 2.

⁷⁰ See *BBA of 1997* § 3002(a)(1)(E), 111 Stat. at 259 (extending the Commission's auction authority through September 30, 2007).

⁷¹ See *Competitive Bidding Second Report and Order*, 9 FCC Rcd 2365-2366.

Minimum Opening Bids and Reserve Prices

In the BBA of 1997, Congress specifically requires the Commission to establish minimum opening bids and reasonable reserve prices in all future auctions, unless the Commission determines that such an assessment is not in the public interest. Since the statute's enactment, the Commission has taken immediate steps to prescribe minimum opening bid and reserve price methodology for the 800 MHz SMR auction scheduled to begin October 28, 1997, and is currently working on similar methodology for subsequent auctions. To date, the Commission has used minimum opening bids in two services: DARS and DBS. Both of these auctions were for satellite services, where valuations were fairly straightforward to establish. Valuations normally entails some speculation, which the Commission generally tries to avoid. The challenge in the future will be to establish minimum opening bids or reserve prices at levels sufficient to ensure that the public receive compensation while not deterring participation in the auction.

Other Changes

In addition to legislative changes and initiatives, given the Commission's interest in improving its bidding process, it is presently seeking comment on a number of competitive bidding issues.⁷² Some of these proposals include:

- o **Creation of a Centralized Ownership Database:** Currently, the Commission's ownership disclosure rules require the following: (1) auction applicants to file specific ownership information prior to each auction; and (2) auction winners to file specific ownership information when applying for the license. To streamline these application procedures at both stages, the Commission is considering creation of a central database of licensee and bidder data, which would allow auction participants to file ownership information only once and update that information as necessary for subsequent auctions.
- o **Implementing "Real Time" Bidding:** To speed our auctions without sacrificing the economic efficiency of assignment, the Commission is considering "real time" bidding changes to its auction format. An open, continuous bidding round, in which bidders would know when their bid has been exceeded and would be free to bid again, may improve upon our current design by giving bidders immediate information during the round. The current design only allows a bidder to make a single bid per license in each round and requires bidders to wait until the end of each round to determine their status.
- o **Permitting Pre-grant Construction:** To further the statutory objective of the rapid deployment of new technologies, products, and services for the benefit of the public, the Commission is considering permitting all auction winners to begin construction of their systems, at their own risk, upon issuance of a public notice announcing auction winners before they are officially licensed to provide service.

The FCC is also considering other options to further increase the speed and efficiency of the auction system, including market specific bid increments and simplified bidding techniques. Market specific bid

⁷² See Part 1 Order, *supra* fn 6.

increments tailor the bid increment for each license individually, and can decrease the time it takes for licenses to reach their final value. Simplified bidding techniques are also being explored as a way to speed the auction process. Bidding formats such as a "yes/no" systems, where bidders simply "click" on the appropriate box to place a bid at the minimum acceptable bid amount, may help to reduce the time it takes to place bids.

B. Future Auction Activity

In the BBA of 1997, Congress not only extended the FCC's auction authority but also identified radio spectrum for future auctions. Table 2 provides a concise overview of these future auctions.

**Table 2
AUCTIONS TO BE SCHEDULED
PER BALANCED BUDGET ACT OF 1997**

| BAND | RANGE (MHz) | AMOUNT (MHz) | BBA of 1997 § | AUCTION ACTION |
|--|--|---------------------|----------------------|--|
| Gov't Fixed (& Mobile) | 1710-1755 | 45 | §3002(b) | Begin auction after 1/1/01 |
| Emerging Technology Band | 2110-2150 | 40 | §3002(c)1D | Complete actions to assign by 9/30/02 |
| Broadcast Auxiliary; MSS | 1990-2110 | 15 | §3002(c)1E | Complete actions to assign by 9/30/02 |
| Gov't Spectrum | To Be Determined | 20 | §3002(e)3A | Complete actions to assign by 9/30/02 |
| Recaptured Broadcast Channels (from 2-59) | 698-746 AND (54-72,76-88 OR 668-698) | 78 | §3003 | Complete assignment & report revenues by 9/30/02 |
| Broadcast Channels 60-69 | 746-806 | 36 | §3004 | Allocate by 1/1/98; begin auction after 1/1/01 |
| TOTAL | | 234 | | |

VII. Recommended Statutory Changes

The FCC has gained valuable experience in the fourteen auctions it has conducted to date. While the auctions program has been a success, the auctions process would benefit in a number of areas from legislative action that would assist the Commission in overcoming the problems it has encountered. In particular, the Commission desires legislation to ensure the Commission's ability to rapidly reclaim licenses for reauction once a licensee has filed for bankruptcy. Other areas for legislative action include changes to eliminate regulatory "red tape" that impairs the program or results in unwanted administrative or legal uncertainty. These legislative changes are outlined below.

- (1) **The Commission recommends that Congress clarify that FCC licensees who default on their installment payments may not use bankruptcy litigation to refuse to relinquish their spectrum licenses for reauction.**

A number of FCC licensees have argued that, even if they default on their installment payments, the licenses do not automatically cancel and the Commission cannot reauction them while bankruptcy litigation is ongoing. The Commission believes this is an incorrect reading of the statutory scheme. Specifically, the Commission believes that FCC licenses are not "property" subject to the bankruptcy code. Moreover, it is the Commission's view that FCC licenses are granted subject to conditions such as full payment of net winning bids and, should those conditions not be met, the licenses automatically revert to the FCC. However, in the absence of clarifying legislation, there is a risk that valuable spectrum licenses will be tied up in litigation, delaying the return and reauction of the licenses, the introduction of new services and competition, and the collection of revenues.

The Commission does not believe that Congress intended to allow licensees to use Chapter 11 or Chapter 7 bankruptcy litigation as a haven to hoard valuable FCC licenses. Therefore, to assist the Commission in rapidly reassigning spectrum licenses to parties that will put them to the most efficient use, the Commission strongly urges Congress to adopt legislation that would clarify that provisions of the bankruptcy code (1) are not applicable to any FCC license for which a payment obligation is owed; (2) do not relieve any licensee from payment obligations; and (3) do not affect the Commission's authority to revoke, cancel, transfer or assign such licenses.

- (2) **The Commission recommends that Congress grant the Commission explicit statutory authority to manage its installment payment portfolio in a flexible manner comparable to other government agencies that lend funds to regulated entities.**

The installment payment program implemented pursuant to Section 309(j)(4)(A) places the Commission in the conflicting roles as both "lender" and "regulator," presumably subject to the Federal Claims Collections Standards ("FCCS").⁷³ Under these provisions, it is not clear whether the Commission may compromise, modify, settle, or waive claims for license payment in whole or in part, privatize auction debt, or transfer the banking functions to another agency or entity. Government agencies that perform similar "lending" functions to regulated entities, such as the Department of Agriculture and the Small Business Administration, have explicit statutory authority to flexibly service their payment programs outside the

⁷³ 4 C.F.R. §§ 101-105.

purview of the FCCS, and the Commission suggests that comparable provisions be added to Section 309(j)(8).

(3) The Commission recommends that Congress exempt all auction rulemakings from the regulatory requirements of the Contract With American Advancement Act (“CWAAA”).

The CWAAA amended the Administrative Procedures Act to include certain administrative requirements that create difficulties in timely auction deployment, and provide parties a means of frivolously disrupting the timing of specific auctions. For example, the CWAAA (1) allots a 60-day Congressional review period before “major” rules are allowed to become effective;⁷⁴ (2) requires a detailed final regulatory flexibility analyses for promulgated rules; and (3) affords immediate judicial review of FCC compliance with the regulatory flexibility requirements. Congress recently granted some flexibility to the FCC with these provisions in the Telecommunications Act of 1996, due to the time sensitive nature of the rules promulgated thereunder.⁷⁵ Congress also exempted the auction of 2.3 GHz (WCS) from these requirements because it was recognized that these provisions do unduly delay our process.⁷⁶ Auctions are highly time sensitive. Auction rules must be effective before application for an auction may be accepted; a reduction in the time period required before rules become effective is important when the industry believes that it is critical that a particular auction be conducted quickly, when Congressionally mandated deadlines must be met, or when the Commission revises auction rules just before an auction. Therefore, the Commission suggests that Congress grant a global exemption from the CWAAA requirement for the auctions program.

(4) The Commission recommends that Congress exempt auction contracts from certain provisions of the Federal Acquisitions Regulations (“FAR”).

Given the objective of Section 309(j)(3)(A) to ensure rapid deployment of service to the public through the auction program, the FCC often finds itself understaffed for operations during any given auction, particularly since the need for extra staffing varies with the auction schedule. Some flexibility in hiring and retaining contractors under the FAR would greatly increase the efficiency of the auctions program. For example, the FAR prohibits the Commission from entering into so-called “personal services contracts,” unless otherwise specifically authorized by statute to do so.⁷⁷ The purpose of this regulation is to avoid the use of contract personnel in a manner that undermines government personnel caps. Unfortunately, this regulation results in layers of supervisory “red tape” that are often inefficient, considering the tight deadlines associated with the auction process. Some government agencies such as the Federal Aviation

⁷⁴ “Major” rules are those that result in, or are likely to result in: (1) an annual effect on the economy of \$100,000,000 or more; (2) a major increase in costs or prices for consumers, industries, government agencies, or geographic regions; or (3) significant adverse affects on competition, employment, investment, productivity, innovation, or on the ability of the United States-based enterprises to compete with foreign-based enterprises in domestic and export markets. *See* 5 U.S.C. § 804(2). All other rules are classified as “non-major,” which require only a 30 day review period prior to going into effect.

⁷⁵ *See* Pub. L. No. 104-121, § 251, 110 Stat. 847, 873 (1996) (codifying 5 U.S.C. § 804).

⁷⁶ *See* Omnibus Consolidated Appropriations Act § 3001(c).

⁷⁷ *See* 48 C.F.R. § 37.104(b).

Administration are authorized to implement an acquisition management system that addresses the unique needs of that agency, notwithstanding the provisions of Federal acquisition law such as the FAR.⁷⁸ This greater flexibility would benefit the FCC for the auctions program as well.

(5) The Commission recommends that the statute of limitations for forfeiture proceedings against non-broadcast licensees be modified from one to three years.

The Communications Act gives the Commission broad authority to impose monetary forfeitures of up to one million dollars upon non-broadcast licensees for willful or repeated violations of the Communications Act or a Commission rule or order. Specifically, the Commission must initiate a proceeding for the imposition of a forfeiture penalty by a written "Notice of Apparent Liability for Forfeiture" ("NALF") within one year from the date the act or omission that forms the basis of the alleged violation occurs. Forfeiture actions outside the one year statute of limitations are expressly prohibited.⁷⁹ This statute of limitations with regard to non-broadcast licensees can hamper the Commission's ability to preserve the integrity of the auctions process, or to effectively enforce the Communications Act and its implementing regulations, and in many instances, if a forfeiture cannot be imposed, the Commission does not have an appropriate remedy for violations of the Communications Act or the Commission's rules.

For example, Section 1.2105(c) of the Commission's rules prohibits collusion between auction bidders. When such collusion consists of private communications between bidders, it is difficult for the Commission or for other bidders to learn of the collusion. Once the collusive conduct is revealed, the Commission must investigate the matter and prepare and release a NALF within one year after the collusion act occurs. Because of delays inherent in this process, which may also include further correspondence with the alleged colluders, FCC staff often find that the one-year statute of limitations for issuing a NALF has elapsed before it can make a final decision as to whether and to what extent enforcement action is warranted. The Commission therefore recommends that the statute of limitations be modified from one to three years, which will provide additional time for the Commission to make that decision.

⁷⁸ See, e.g., Department of Transportation and Related Agencies Appropriations Act, Pub. L. No. 104-50, § 348, 109 Stat. 436 (1995).

⁷⁹ See 47 U.S.C. § 503(b)(6)(B); see also 47 C.F.R. § 1.80(c).

VIII. Conclusion

By adding Section 309(j) to the Communications Act of 1934, Congress ushered the telecommunications industry into a new era -- an era in which competition, economic efficiency and innovation have become the “watch” words for both the public and private telecommunications sectors.

The FCC auctions program has been a success for the American people. The FCC’s new auction design and automated system have won awards at home, and have been studied, licensed or copied worldwide. In most cases, experience has shown that FCC auctions have increased competition, provided opportunities for new entrants and benefited consumers.

When Congress authorized the FCC to use competitive bidding, it not only charged the Commission to promote the development and rapid deployment of new technologies, products and services for the benefit of the public but also required the Commission to facilitate opportunity and competition by avoiding excessive concentration of licenses and by disseminating licenses among a wide variety of applicants, including small businesses, rural telephone companies, and businesses owned by members of women and minority groups. Clearly, all evidence shows that the FCC has succeeded in disseminating licenses to a wide variety of recipients.

The FCC can attribute its overall auction success in meeting these goals, in part, to its willingness to improve and change auction mechanisms on an ongoing basis. As with any new program, there are issues that need to be refined. Ultimately, however, the benefits of FCC auctions outweigh any pitfalls. For the future, the Commission will continue to address problems, improve its process where necessary, and implement new auctions.

APPENDIX A

Comments filed in WT Docket No. 97-150

1. American Mobile Telecommunications Association, Inc. (AMTA)
2. Automated Credit Exchange (ACE)
3. Bell Atlantic and NYNEX
4. East Ascension Telephone Company, Inc. (Eatel)
5. GE American Communications, Inc. (GE American)
6. GTE Service Corporation (GTE)
7. Industrial Telecommunications Association, Inc. (ITA)
8. Iridium, LLC
9. Millimeter Wave Carrier Association, Inc. (Millimeter)
10. Motorola, Inc.
11. Nextel Communications, Inc. (Nextel)
12. Northeast Florida Telephone Company and Ringgold Telephone Company (NFTC/RTC)
13. The Rural Telecommunications Group (RTG)
14. Satellite Industry Association (SIA)
15. Small Business in Telecommunications (SBT)
16. Southern Communications Services, Inc. (Southern)
17. Telecommunications Industry Association (TIA)
18. UTC, The Telecommunications Association (UTC)

APPENDIX B

Recent Supreme Court Cases on Programs Which Take Race or Gender into Account

The Commission's designated entity rules for the first three services scheduled for auction included provisions specifically tailored to businesses owned by members of minority groups and women. For example, bidding credits were made available only to businesses owned by minorities and women in auctions held for narrowband PCS and IVDS licenses, and enhanced bidding credits were proposed for the use of businesses owned by minorities and women otherwise eligible to participate in the broadband PCS C and F block auctions. The Commission promulgated these initial designated entity rules in 1994 with the expectation that the provisions for minorities and women would withstand an equal protection constitutional challenge under the "intermediate scrutiny" standard of review articulated in *Metro Broadcasting, Inc. v. FCC*, 497 U.S. 547 (1990). See *Competitive Bidding Second Report and Order*, 9 FCC Rcd at 2398-400. Under intermediate scrutiny, such measures are constitutionally permissible to the extent that they serve important governmental objectives and are substantially related to the achievement of those objectives.

In June 1995, the Supreme Court decided *Adarand Constructors, Inc. v. Peña*, 115 S. Ct. 2097 (1995). In *Adarand*, the Supreme Court specifically overruled the *Metro Broadcasting* case to the extent that it was inconsistent with *Adarand's* holding that any federal program that makes distinctions on the basis of race must satisfy the "strict scrutiny" standard of judicial review. Under strict scrutiny, measures must serve a compelling governmental interest and must be narrowly tailored to serve that interest. The Commission is therefore examining the evidence to determine whether it would meet the Court's standard under *Adarand*.

Subsequent to *Adarand*, the Supreme Court decided *United States v. Virginia*, 116 S. Ct. 2264 (1996) (*VMI*), which sharpened the intermediate scrutiny standard for classifications regarding gender. In *VMI*, the Supreme Court held that a state program containing gender classification must demonstrate an "exceedingly persuasive justification" in order to withstand constitutional scrutiny. There is uncertainty as to whether the exceedingly persuasive justification test is a form of intermediate scrutiny that is heightened from the standard the Supreme Court used in cases such as *Metro Broadcasting*, see, e.g., *VMI*, 116 S. Ct. at 2293-96 (Scalia, J., dissenting), and whether the exceedingly persuasive justification test would apply to Federal as well as state gender-based programs. See, e.g., Implementation of Section 309(j) of the Communications Act – Competitive Bidding, *Tenth Report and Order*, 11 FCC Rcd 19974, 19977-78 (1996). The Commission is examining the evidence in the industry to determine whether provisions taking gender into account would meet the Court's *VMI* standard.

In light of the Supreme Court's decisions, the Commission considered the statutory obligations imposed by Section 309(j)(3): (1) to award spectrum licenses expeditiously and to promote the rapid deployment of new services to the public without judicial delays; as well as (2) to disseminate licenses among a wide variety of applicants, including designated entities. Bearing these factors in mind, the Commission balanced these goals in favor of avoiding uncertainty and delay that would likely result from legal challenges to the special provisions for minority- and women-owned businesses, and amended its rules then in effect to eliminate provisions for minority- and women-owned businesses. Furthermore, for auctions held since *Adarand* and *VMI*, all of the Commission's designated entity provisions have been race- and gender-neutral, specifically targeting various tiers of small businesses.

APPENDIX C:

AUCTIONS SUMMARY DATA

Statistics on Designated Entity Winners C-2

Broadband PCS Auction Winners C-3

Statistics on Designated Entity Winners

| | Total | | Small | | Not Small | | Minority (1) | | Women (1) | | Rural (1) | | Minority & Women (1) | |
|---------------------------|-------------------|--------------|-----------------|-------------|-----------------|-------------|-----------------|------------|-----------------|------------|-----------------|------------|----------------------|------------|
| | Qualified Bidders | Total Lic. | Winning Bidders | Lic. Won | Winning Bidders | Lic. Won | Winning Bidders | Lic. Won | Winning Bidders | Lic. Won | Winning Bidders | Lic. Won | Winning Bidders | Lic. Won |
| Nationwide Narrowband PCS | 7 | 11 | 0 | 0 | 7 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| IVDS | 178 | 594 | 164 | 557 | 14 | 37 | 63 | 195 | 70 | 282 | 0 | 0 | 16 | 55 |
| Regional Narrowband PCS | 9 | 30 | 4 | 11 | 5 | 19 | 2 | 6 | 3 | 10 | 0 | 0 | 1 | 5 |
| A/B Block PCS | 21 | 102 | 0 | 0 | 21 | 102 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| C Block PCS (2) | 90 | 493 | 90 | 493 | 0 | 0 | 24 | 151 | 15 | 97 | 11 | 28 | 8 | 62 |
| MDS | 67 | 493 | 61 | 381 | 6 | 112 | 5 | 10 | 4 | 19 | 3 | 5 | 2 | 4 |
| SMR | 80 | 1,020 | 60 | 263 | 20 | 757 | 4 | 31 | 5 | 35 | 0 | 0 | 2 | 27 |
| 110 DBS | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 148 DBS | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| D, E, F Block PCS (3) | 125 | 1,479 | 93 | 598 | 32 | 874 | 16 | 70 | 8 | 50 | 32 | 167 | 4 | 19 |
| Cellular Unserved | 10 | 14 | 4 | 5 | 6 | 9 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| WCS | 17 | 128 | 8 | 32 | 9 | 94 | 1 | 3 | 0 | 0 | 3 | 5 | 0 | 0 |
| DARS | 2 | 2 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total (4) | 608 | 4,368 | 484 | 2340 | 124 | 2019 | 115 | 466 | 107 | 495 | 49 | 205 | 33 | 172 |

- (1) Totals for Minority, Women, Rural, and Minority-Women are not mutually exclusive.
- (2) The C Block PCS totals includes two separate auctions.
- (3) D, E, & F Block Auction had "Small" and "Very Small" Bidding Credits (Both were combined into the "Small" category).
- (4) At the end of the D, E, F Block PCS and WCS auctions, the FCC owned 9 combined licenses

Broadband PCS Auction Winners

| | | Geographic Lic. Scheme Spectrum per License Block | | MTA 30 A | | MTA 30 B | | BTA 30 C | | BTA 10 D | | BTA 10 E | | BTA 10 F | |
|-----|-----|---|------------|-------------------|---------------------|----------------------|---------------------|----------------------|---------------------|----------------------|---------------------|----------------------|---------------------|-----------------------|---------------------|
| MTA | BTA | Market Name | Population | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) |
| 1 | 7 | Albany, NY | 1,028,615 | | | | | NextWave Personal | \$34,022 | AT&T Wireless PCS | \$1,134 | ACC-PCS, Inc. | \$3,948 | Vtel Wireless, Inc. | \$3,809 |
| 1 | 10 | Allentown, PA | 686,688 | | | | | NextWave Personal | \$18,209 | Comcast PCS Com | \$2,010 | AT&T Wireless PCS | \$1,933 | Northcoast Operatin | \$529 |
| 1 | 43 | Binghamton, NY | 356,645 | | | | | 21st Century Televis | \$6,902 | AT&T Wireless PCS | \$109 | AT&T Wireless PCS | \$75 | Northcoast Operatin | \$60 |
| 1 | 63 | Burlington, VT | 369,128 | | | | | Personal Communic | \$8,721 | Devon Mobile Comr | \$1,462 | AT&T Wireless PCS | \$1,421 | Vtel Wireless, Inc. | \$2,308 |
| 1 | 127 | Elmira, NY | 315,038 | | | | | Personal Communic | \$4,163 | AT&T Wireless PCS | \$67 | AT&T Wireless PCS | \$32 | Devon Mobile Comr | \$74 |
| 1 | 164 | Glens Falls, NY | 118,539 | | | | | WIRELESS VENTU | \$1,650 | AT&T Wireless PCS | \$85 | ACC-PCS, Inc. | \$257 | 21st Century Bidding | \$522 |
| 1 | 184 | Hartford, CT | 1,123,678 | | | | | Fortunet Wireless C | \$51,322 | AT&T Wireless PCS | \$2,674 | AT&T Wireless PCS | \$2,361 | Northcoast Operatin | \$6,996 |
| 1 | 208 | Ithaca, NY | 94,097 | | | | | 21st Century Televis | \$2,325 | Leong, Harvey | \$108 | AT&T Wireless PCS | \$119 | Devon Mobile Comr | \$132 |
| 1 | 318 | New Haven, CT | 978,311 | | | | | NextWave Personal | \$41,888 | AT&T Wireless PCS | \$1,186 | AT&T Wireless PCS | \$1,089 | Northcoast Operatin | \$1,835 |
| 1 | 319 | New London, CT | 357,482 | | | | | NextWave Personal | \$11,273 | AT&T Wireless PCS | \$215 | AT&T Wireless PCS | \$2,887 | Northcoast Operatin | \$701 |
| 1 | 321 | New York, NY | 18,050,615 | | | | | NextWave Personal | \$994,135 | OPCSE-Galloway C | \$50,700 | AT&T Wireless PCS | \$58,800 | Northcoast Operatin | \$75,240 |
| 1 | 333 | Oneonta, NY | 107,742 | | | | | 21st Century Televis | \$1,955 | AT&T Wireless PCS | \$23 | AT&T Wireless PCS | \$55 | Delaware PCS Limit | \$86 |
| 1 | 352 | Plattsburgh, NY | 123,121 | | | | | WIRELESS VENTU | \$1,283 | AT&T Wireless PCS | \$73 | AT&T Wireless PCS | \$85 | 21st Century Bidding | \$114 |
| 1 | 361 | Poughkeepsie, NY | 424,766 | | | | | NextWave Personal | \$13,583 | AT&T Wireless PCS | \$1,084 | AT&T Wireless PCS | \$1,021 | Northcoast Operatin | \$1,477 |
| 1 | 388 | Rutland, VT | 97,987 | | | | | Personal Communic | \$2,850 | Devon Mobile Comr | \$338 | AT&T Wireless PCS | \$255 | Vtel Wireless, Inc. | \$506 |
| 1 | 412 | Scranton, PA | 678,410 | | | | | NextWave Personal | \$15,911 | AT&T Wireless PCS | \$354 | AT&T Wireless PCS | \$347 | 21st Century Bidding | \$561 |
| 1 | 435 | Stroudsburg, PA | 95,709 | | | | | MFRI Inc. | \$1,629 | Northcoast Operatin | \$81 | AT&T Wireless PCS | \$80 | MFRI Inc. | \$140 |
| 1 | 438 | Syracuse, NY | 791,140 | | | | | 21st Century Televis | \$16,914 | AT&T Wireless PCS | \$264 | AT&T Wireless PCS | \$245 | Northcoast Operatin | \$359 |
| 1 | 453 | Utica, NY | 316,633 | | | | | 21st Century Televis | \$6,750 | AT&T Wireless PCS | \$131 | AT&T Wireless PCS | \$96 | Holland Wireless, L. | \$97 |
| 1 | 463 | Watertown, NY | 296,253 | | | | | 21st Century Televis | \$3,647 | AT&T Wireless PCS | \$63 | AT&T Wireless PCS | \$30 | Sea Breeze Partner | \$23 |
| 1 | | New York | 26,410,597 | Omnipoint PCS Ent | \$347,518 | WirelessCo, L.P. | \$442,712 | | | | | | | | |
| 2 | 28 | Bakersfield, CA | 543,477 | | | | | PCS 2000, L.P. | \$26,942 | AT&T Wireless PCS | \$4,302 | Rivgam Communica | \$3,730 | Alpine PCS, Inc. | \$5,321 |
| 2 | 124 | El Centro, CA | 109,303 | | | | | CH PCS, Inc. | \$5,363 | NextWave Power P | \$88 | AT&T Wireless PCS | \$88 | Integrated Commun | \$127 |
| 2 | 245 | Las Vegas, NV | 857,856 | | | | | DCR PCS, Inc. | \$57,119 | AT&T Wireless PCS | \$215 | Rivgam Communica | \$4,846 | NextWave Power P | \$5,512 |
| 2 | 262 | Los Angeles, CA | 14,549,810 | | | | | NextWave Personal | \$663,548 | AT&T Wireless PCS | \$37,510 | Rivgam Communica | \$31,910 | Aer Force Communi | \$4,474 |
| 2 | 402 | San Diego, CA | 2,498,016 | | | | | NextWave Personal | \$123,084 | AT&T Wireless PCS | \$8,635 | Rivgam Communica | \$8,687 | Central Oregon Cell | \$11,462 |
| 2 | 405 | San Luis Obispo, C | 217,162 | | | | | Alpine PCS, Inc. | \$9,891 | Entertainment Unlir | \$838 | AT&T Wireless PCS | \$811 | Entertainment Unlir | \$858 |
| 2 | 406 | Santa Barbara, CA | 369,608 | | | | | Alpine PCS, Inc. | \$19,201 | Entertainment Unlir | \$2,210 | AT&T Wireless PCS | \$2,214 | Aer Force Communi | \$2,209 |
| 2 | | Los Angeles-San D | 19,145,232 | Cox Cable Commur | \$251,919 | Pacific Telesis Mobi | \$493,500 | | | | | | | | |
| 3 | 39 | Benton Harbor, MI | 161,378 | | | | | R & S PCS, Inc. | \$4,206 | SprintCom, Inc. | \$329 | AT&T Wireless PCS | \$260 | OPCSE-Galloway C | \$160 |
| 3 | 46 | Bloomington, IL | 215,795 | | | | | DCR PCS, Inc. | \$5,391 | SprintCom, Inc. | \$183 | McLeod, Inc. | \$274 | BRK Wireless Comp | \$668 |
| 3 | 71 | Champaign, IL | 222,312 | | | | | DCR PCS, Inc. | \$6,065 | SprintCom, Inc. | \$205 | McLeod, Inc. | \$305 | BRK Wireless Comp | \$455 |
| 3 | 78 | Chicago, IL | 8,182,076 | | | | | DCR PCS, Inc. | \$461,009 | SprintCom, Inc. | \$59,976 | SprintCom, Inc. | \$62,741 | NextWave Power P | \$23,065 |
| 3 | 103 | Danville, IL | 114,241 | | | | | 21st Century Televis | \$1,894 | SprintCom, Inc. | \$105 | SprintCom, Inc. | \$91 | OPCSE-Galloway C | \$10 |
| 3 | 109 | Decatur, IL | 247,608 | | | | | DCR PCS, Inc. | \$6,143 | SprintCom, Inc. | \$178 | McLeod, Inc. | \$205 | BRK Wireless Comp | \$75 |
| 3 | 126 | Elkhart, IN | 235,152 | | | | | R & S PCS, Inc. | \$6,620 | SprintCom, Inc. | \$702 | OPCSE-Galloway C | \$552 | 21st Century Bidding | \$304 |
| 3 | 155 | Ft Wayne, IN | 646,736 | | | | | Communications Ve | \$19,630 | SprintCom, Inc. | \$1,913 | FCC | \$552 | OPCSE-Galloway C | \$1,395 |
| 3 | 161 | Galesburg, IL | 75,574 | | | | | BRK WIRELESS CO | \$467 | SprintCom, Inc. | \$49 | OPCSE-Galloway C | \$63 | CM-PCS Partners | \$66 |
| 3 | 213 | Jacksonville, IL | 70,795 | | | | | Quantum Communik | \$300 | SprintCom, Inc. | \$58 | Western PCS BTA I | \$57 | BRK Wireless Comp | \$82 |
| 3 | 225 | Kankakee, IL | 127,042 | | | | | DCR PCS, Inc. | \$912 | SprintCom, Inc. | \$114 | SprintCom, Inc. | \$101 | NextWave Power P | \$88 |
| 3 | 243 | Las Salle, IL | 148,331 | | | | | DCR PCS, Inc. | \$1,931 | SprintCom, Inc. | \$140 | SprintCom, Inc. | \$124 | BRK Wireless Comp | \$58 |
| 3 | 286 | Mattoon, IL | 62,314 | | | | | Quantum Communik | \$434 | SprintCom, Inc. | \$145 | Consolidated Comm | \$77 | BRK Wireless Comp | \$55 |
| 3 | 294 | Michigan City, IN | 107,066 | | | | | DCR PCS, Inc. | \$887 | SprintCom, Inc. | \$200 | AT&T Wireless PCS | \$191 | 21st Century Bidding | \$160 |
| 3 | 344 | Peoria, IL | 455,643 | | | | | R & S PCS, Inc. | \$13,511 | SprintCom, Inc. | \$1,370 | McLeod, Inc. | \$1,704 | OPCSE-Galloway C | \$2,021 |
| 3 | 380 | Rockford, IL | 412,120 | | | | | DCR PCS, Inc. | \$14,433 | SprintCom, Inc. | \$1,569 | McLeod, Inc. | \$1,948 | Northcoast Operatin | \$3,020 |
| 3 | 424 | South Bend, IN | 330,821 | | | | | 21st Century Televis | \$13,227 | SprintCom, Inc. | \$982 | AT&T Wireless PCS | \$1,020 | OPCSE-Galloway C | \$1,318 |
| 3 | 426 | Springfield, IL | 254,696 | | | | | DCR PCS, Inc. | \$7,651 | SprintCom, Inc. | \$550 | McLeod, Inc. | \$567 | BRK Wireless Comp | \$968 |
| 3 | | Chicago | 12,069,700 | AT&T Wireless PCS | \$372,750 | PCS PRIMECO, L.P. | \$385,051 | | | | | | | | |
| 4 | 79 | Chico, CA | 206,918 | | | | | GWl PCS, Inc. | \$5,510 | AT&T Wireless PCS | \$106 | AT&T Wireless PCS | \$178 | Point Enterprises, Ir | \$161 |
| 4 | 134 | Eureka, CA | 142,578 | | | | | PCS 2000, L.P. | \$1,181 | Triad Cellular Corpo | \$42 | AT&T Wireless PCS | \$33 | Polycell Communica | \$23 |
| 4 | 157 | Fresno, CA | 755,580 | | | | | PCS 2000, L.P. | \$47,027 | AT&T Wireless PCS | \$1,011 | AT&T Wireless PCS | \$1,172 | Central Wireless Pa | \$2,724 |
| 4 | 291 | Merced, CA | 192,705 | | | | | PCS 2000, L.P. | \$3,533 | AT&T Wireless PCS | \$283 | AT&T Wireless PCS | \$337 | Central Wireless Pa | \$358 |
| 4 | 303 | Modesto, CA | 418,978 | | | | | PCS 2000, L.P. | \$12,320 | AT&T Wireless PCS | \$759 | West Coast PCS LL | \$755 | Central Wireless Pa | \$1,030 |
| 4 | 371 | Redding, CA | 253,255 | | | | | PCS 2000, L.P. | \$4,501 | AT&T Wireless PCS | \$102 | Triad Cellular Corpo | \$151 | Point Enterprises, Ir | \$96 |
| 4 | 372 | Reno, NV | 439,279 | | | | | PCS 2000, L.P. | \$27,803 | AT&T Wireless PCS | \$835 | Rivgam Communica | \$1,704 | Aer Force Communi | \$1,787 |
| 4 | 389 | Sacramento, CA | 1,656,581 | | | | | GWl PCS, Inc. | \$108,833 | AT&T Wireless PCS | \$5,361 | West Coast PCS LL | \$5,642 | NextWave Power P | \$7,187 |
| 4 | 397 | Salinas, CA | 355,660 | | | | | GWl PCS, Inc. | \$16,472 | Entertainment Unlir | \$1,348 | AT&T Wireless PCS | \$1,317 | Alpine PCS, Inc. | \$1,507 |
| 4 | 404 | San Francisco, CA | 6,420,984 | | | | | GWl PCS, Inc. | \$403,256 | AT&T Wireless PCS | \$13,655 | Western PCS BTA I | \$10,737 | NextWave Power P | \$4,334 |
| 4 | 434 | Stockton, CA | 512,626 | | | | | GWl PCS, Inc. | \$24,903 | AT&T Wireless PCS | \$1,859 | West Coast PCS LL | \$2,446 | Central Wireless Pa | \$4,659 |

Licenses holders are based upon the winning bidder at the end of the auction.
This list does not reflect any change in winners' name or ownership. (i.e. transfers and/or sales)

Broadband PCS Auction Winners

| | | Geographic Lic. Scheme Spectrum per License Block | | MTA 30 A | | MTA 30 B | | BTA 30 C | | BTA 10 D | | BTA 10 E | | BTA 10 F | |
|-----|-----|---|------------|------------------|------------------|-----------------------|------------------|----------------|------------------|-------------------|------------------|---------------------|------------------|---------------------|------------------|
| MTA | BTA | Market Name | Population | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) |
| 4 | 458 | Visalia, CA | 413,390 | | | | | PCS 2000, L.P. | \$9,371 | AT&T Wireless PCS | \$664 | Entertainment Unlim | \$608 | Central Wireless Pa | \$710 |
| 4 | 485 | Yuba City, CA | 122,643 | | | | | GWI PCS, Inc. | \$2,568 | AT&T Wireless PCS | \$61 | West Coast PCS LL | \$139 | Integrated Commun | \$55 |
| 4 | | San Francisco-Oak | 11,891,177 | WirelessCo, L.P. | \$206,500 | Pacific Telesis Mobil | \$202,150 | | | | | | | | |

| | | | | | | | | | | | | | | | |
|---|-----|----------------------|------------|-------------------|----------|------------------|----------|---------------------|-----------|---------------------|---------|---------------------|---------|---------------------|---------|
| 5 | 5 | Adrian, MI | 91,476 | | | | | DCR PCS, Inc. | \$701 | Century Personal Av | \$28 | OPCSE-Galloway C | \$36 | OPCSE-Galloway C | \$15 |
| 5 | 11 | Alpena, MI | 63,429 | | | | | Northern Michigan F | \$476 | AT&T Wireless PCS | \$13 | Lite-Wave Commun | \$13 | Alpine PCS, Inc. | \$23 |
| 5 | 33 | Battle Creek, MI | 227,541 | | | | | DCR PCS, Inc. | \$6,284 | Century Personal Av | \$232 | Message Express C | \$253 | OPCSE-Galloway C | \$254 |
| 5 | 112 | Detroit, MI | 4,705,164 | | | | | DCR PCS, Inc. | \$172,739 | NextWave Power P | \$3,815 | OPCSE-Galloway C | \$3,856 | OPCSE-Galloway C | \$6,375 |
| 5 | 143 | Findlay, OH | 147,523 | | | | | Micom Associates. | \$1,996 | OPCSE-Galloway C | \$33 | OPCSE-Galloway C | \$32 | Northcoast Operatin | \$23 |
| 5 | 145 | Flint, MI | 500,229 | | | | | DCR PCS, Inc. | \$8,615 | Century Personal Av | \$305 | OPCSE-Galloway C | \$202 | OPCSE-Galloway C | \$378 |
| 5 | 169 | Grand Rapids, MI | 916,060 | | | | | DCR PCS, Inc. | \$30,268 | Century Personal Av | \$925 | OPCSE-Galloway C | \$860 | OPCSE-Galloway C | \$848 |
| 5 | 209 | Jackson, MI | 193,187 | | | | | DCR PCS, Inc. | \$1,974 | Century Personal Av | \$60 | OPCSE-Galloway C | \$96 | OPCSE-Galloway C | \$29 |
| 5 | 223 | Kalamazoo, MI | 352,384 | | | | | DCR PCS, Inc. | \$8,403 | Century Personal Av | \$1,481 | Message Express C | \$1,411 | Northcoast Operatin | \$1,372 |
| 5 | 241 | Lansing, MI | 489,698 | | | | | Anishnabe Commur | \$16,703 | Century Personal Av | \$348 | OPCSE-Galloway C | \$152 | OPCSE-Galloway C | \$446 |
| 5 | 255 | Lima, OH | 249,734 | | | | | DCR PCS, Inc. | \$3,426 | OPCSE-Galloway C | \$143 | OPCSE-Galloway C | \$103 | Telephone Service C | \$146 |
| 5 | 307 | Mt Pleasant, MI | 118,558 | | | | | Anishnabe Commur | \$919 | Century Personal Av | \$85 | OPCSE-Galloway C | \$72 | Lite-Wave Commun | \$77 |
| 5 | 310 | Muskegon, MI | 206,974 | | | | | DCR PCS, Inc. | \$2,659 | Century Personal Av | \$65 | OPCSE-Galloway C | \$44 | Lite-Wave Commun | \$63 |
| 5 | 345 | Petoskey, MI | 85,863 | | | | | NOVERR PUBLISH | \$528 | ACC-PCS, Inc. | \$63 | Lite-Wave Commun | \$63 | Alpine PCS, Inc. | \$67 |
| 5 | 390 | Saginaw, MI | 615,364 | | | | | Anishnabe Commur | \$12,139 | Century Personal Av | \$439 | OPCSE-Galloway C | \$250 | Alpine PCS, Inc. | \$372 |
| 5 | 409 | Sault Ste. Marie, MI | 51,041 | | | | | Northern Michigan F | \$929 | MVI Corp. | \$22 | MVI Corp. | \$27 | Alpine PCS, Inc. | \$26 |
| 5 | 444 | Toledo, OH | 782,184 | | | | | DCR PCS, Inc. | \$18,307 | OPCSE-Galloway C | \$370 | Northcoast Operatin | \$476 | OPCSE-Galloway C | \$1,136 |
| 5 | 446 | Traverse City, MI | 204,600 | | | | | NOVERR PUBLISH | \$3,650 | Century Personal Av | \$473 | Alpine PCS, Inc. | \$358 | Lite-Wave Commun | \$224 |
| 5 | | Detroit | 10,001,009 | AT&T Wireless PCS | \$81,177 | WirelessCo, L.P. | \$86,107 | | | | | | | | |

| | | | | | | | | | | | | | | | |
|---|-----|----------------------|-----------|-------------------|----------|--------------------|----------|----------------------|----------|-----------------|---------|-------------------|---------|----------------------|---------|
| 6 | 16 | Anderson, SC | 305,120 | | | | | Carolina PCS I Limit | \$8,696 | SprintCom, Inc. | \$1,295 | ALLTEL Mobile Cor | \$1,362 | Public Service PCS | \$291 |
| 6 | 20 | Asheville, NC | 510,055 | | | | | NextWave Personal | \$7,727 | SprintCom, Inc. | \$971 | ALLTEL Mobile Cor | \$930 | Urban Communicat | \$560 |
| 6 | 62 | Burlington, NC | 108,213 | | | | | Urban Communicat | \$1,670 | SprintCom, Inc. | \$66 | ALLTEL Mobile Cor | \$68 | The Phoenix Wireles | \$94 |
| 6 | 72 | Charleston, SC | 624,369 | | | | | Carolina PCS I Limit | \$25,025 | SprintCom, Inc. | \$3,374 | ALLTEL Mobile Cor | \$3,573 | Urban Communicat | \$617 |
| 6 | 74 | Charlotte, NC | 1,671,037 | | | | | NextWave Personal | \$83,651 | SprintCom, Inc. | \$5,729 | ALLTEL Mobile Cor | \$5,514 | AirGate Wireless, L. | \$7,587 |
| 6 | 91 | Columbia, SC | 568,754 | | | | | Carolina PCS I Limit | \$22,112 | SprintCom, Inc. | \$2,842 | ALLTEL Mobile Cor | \$3,054 | NextWave Power P | \$1,485 |
| 6 | 141 | Fayetteville, NC | 571,328 | | | | | Urban Communicat | \$9,845 | SprintCom, Inc. | \$1,048 | ALLTEL Mobile Cor | \$1,137 | Northcoast Operatin | \$385 |
| 6 | 147 | Florence, SC | 239,208 | | | | | Carolina PCS I Limit | \$3,295 | SprintCom, Inc. | \$991 | ALLTEL Mobile Cor | \$1,000 | Urban Communicat | \$162 |
| 6 | 165 | Goldsboro, NC | 217,319 | | | | | Urban Communicat | \$1,820 | SprintCom, Inc. | \$197 | ALLTEL Mobile Cor | \$200 | OPCSE-Galloway C | \$50 |
| 6 | 174 | Greensboro, NC | 1,241,349 | | | | | NextWave Personal | \$49,679 | SprintCom, Inc. | \$6,828 | ALLTEL Mobile Cor | \$6,827 | AirGate Wireless, L. | \$6,908 |
| 6 | 176 | Greenville, NC | 218,937 | | | | | Urban Communicat | \$1,925 | SprintCom, Inc. | \$269 | ALLTEL Mobile Cor | \$251 | The Phoenix Wireles | \$75 |
| 6 | 177 | Greenville, SC | 788,212 | | | | | Carolina PCS I Limit | \$24,800 | SprintCom, Inc. | \$3,708 | ALLTEL Mobile Cor | \$4,003 | NextWave Power P | \$1,825 |
| 6 | 178 | Greenwood, SC | 68,435 | | | | | Carolina PCS I Limit | \$566 | SprintCom, Inc. | \$156 | ALLTEL Mobile Cor | \$157 | AirGate Wireless, L. | \$77 |
| 6 | 189 | Hickory, NC | 292,409 | | | | | NextWave Personal | \$3,529 | SprintCom, Inc. | \$383 | ALLTEL Mobile Cor | \$391 | AirGate Wireless, L. | \$109 |
| 6 | 214 | Jacksonville, NC | 149,838 | | | | | Urban Communicat | \$2,288 | SprintCom, Inc. | \$136 | ALLTEL Mobile Cor | \$171 | ComScape Telecomm | \$23 |
| 6 | 312 | Myrtle Beach, SC | 144,053 | | | | | Carolina PCS I Limit | \$5,528 | SprintCom, Inc. | \$498 | ALLTEL Mobile Cor | \$486 | Urban Communicat | \$656 |
| 6 | 316 | New Bern, NC | 154,955 | | | | | Urban Communicat | \$2,183 | SprintCom, Inc. | \$158 | ALLTEL Mobile Cor | \$141 | ComScape Telecomm | \$25 |
| 6 | 335 | Orangeburg, SC | 114,458 | | | | | Carolina PCS I Limit | \$1,144 | SprintCom, Inc. | \$198 | ALLTEL Mobile Cor | \$208 | Urban Communicat | \$100 |
| 6 | 368 | Raleigh, NC | 1,089,423 | | | | | Urban Communicat | \$46,949 | SprintCom, Inc. | \$2,887 | ALLTEL Mobile Cor | \$2,913 | ComScape Telecomm | \$3,020 |
| 6 | 377 | Roanoke Rapids, N | 76,314 | | | | | Urban Communicat | \$642 | SprintCom, Inc. | \$106 | ALLTEL Mobile Cor | \$117 | The Phoenix Wireles | \$172 |
| 6 | 382 | Rocky Mount, NC | 199,296 | | | | | Urban Communicat | \$1,644 | SprintCom, Inc. | \$181 | ALLTEL Mobile Cor | \$166 | The Phoenix Wireles | \$119 |
| 6 | 436 | Sumter, SC | 149,524 | | | | | Carolina PCS I Limit | \$1,495 | SprintCom, Inc. | \$374 | ALLTEL Mobile Cor | \$389 | Urban Communicat | \$101 |
| 6 | 478 | Wilmington, NC | 249,711 | | | | | Urban Communicat | \$5,657 | SprintCom, Inc. | \$353 | ALLTEL Mobile Cor | \$361 | ComScape Telecomm | \$188 |
| 6 | | Charlotte-Greensboro | 9,752,317 | AT&T Wireless PCS | \$66,616 | BellSouth Personal | \$70,907 | | | | | | | | |

| | | | | | | | | | | | | | | | |
|---|-----|----------------|-----------|--|--|--|--|---------------------|-----------|----------------------|----------|----------------------|----------|----------------------|----------|
| 7 | 3 | Abilene, TX | 253,174 | | | | | Poka Lambro PCS, | \$4,025 | Western PCS BTA II | \$536 | Triad Cellular Corpo | \$450 | Mercury PCS II, LLC | \$134 |
| 7 | 13 | Amarillo, TX | 380,341 | | | | | Omnipoint PCS Ent | \$7,253 | Western PCS BTA II | \$1,308 | Triad Cellular Corpo | \$1,464 | High Plains Wireles | \$1,863 |
| 7 | 27 | Austin, TX | 899,361 | | | | | NextWave Personal | \$49,193 | Western PCS BTA II | \$2,114 | AT&T Wireless PCS | \$2,536 | Poka Lambro PCS, | \$1,739 |
| 7 | 40 | Big Spring, TX | 34,589 | | | | | Poka Lambro PCS, | \$651 | Western PCS BTA II | \$59 | AT&T Wireless PCS | \$62 | Mercury PCS II, LLC | \$57 |
| 7 | 57 | Brownwood, TX | 57,684 | | | | | Rosas, Inc. | \$977 | Western PCS BTA II | \$194 | AT&T Wireless PCS | \$192 | Poka Lambro PCS, | \$211 |
| 7 | 87 | Clovis, NM | 71,024 | | | | | Poka Lambro/PVT V | \$375 | Triad Cellular Corpo | \$108 | Western PCS BTA II | \$121 | Mercury PCS II, LLC | \$113 |
| 7 | 101 | Dallas, TX | 4,329,924 | | | | | DCR PCS, Inc. | \$291,023 | AT&T Wireless PCS | \$25,895 | AT&T Wireless PCS | \$27,060 | NextWave Power P | \$16,005 |
| 7 | 191 | Hobbs, NM | 55,765 | | | | | Poka Lambro/PVT V | \$446 | Western PCS BTA II | \$70 | Mercury PCS II, LLC | \$73 | Poka Lambro PCS, | \$76 |
| 7 | 260 | Longview, TX | 292,659 | | | | | DCR PCS, Inc. | \$4,059 | Southwestern Bell M | \$582 | AT&T Wireless PCS | \$517 | Mercury Mobility, L. | \$448 |
| 7 | 264 | Lubbock, TX | 392,901 | | | | | Poka Lambro PCS, | \$4,385 | High Plains Wireles | \$2,167 | Triad Cellular Corpo | \$2,443 | Mercury PCS II, LLC | \$1,745 |
| 7 | 296 | Midland, TX | 111,567 | | | | | Poka Lambro PCS, | \$2,328 | Western PCS BTA II | \$237 | Western PCS BTA II | \$219 | Mercury PCS II, LLC | \$405 |
| 7 | 304 | Monroe, LA | 324,397 | | | | | Wireless 2000, Inc. | \$6,592 | BellSouth Wireless, | \$1,283 | BellSouth Wireless, | \$1,539 | Mercury Mobility, L. | \$517 |

Licenses holders are based upon the winning bidder at the end of the auction.
 This list does not reflect any change in winners' name or ownership. (i.e. transfers and/or sales)

Broadband PCS Auction Winners

| | | Geographic Lic. Scheme Spectrum per License Block | | MTA 30 A | | MTA 30 B | | BTA 30 C | | BTA 10 D | | BTA 10 E | | BTA 10 F | |
|-----|-----|--|------------|-------------------|------------------|-------------------|------------------|----------------------|------------------|----------------------|------------------|----------------------|------------------|-----------------------|------------------|
| MTA | BTA | Market Name | Population | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) |
| 7 | 327 | Odessa, TX | 213,420 | | | | | Poka Lambro PCS, | \$3,659 | Western PCS BTA I | \$373 | Western PCS BTA I | \$458 | Mercury PCS II, LLC | \$191 |
| 7 | 341 | Paris, TX | 89,422 | | | | | OnQue Communica | \$2,293 | Western PCS BTA I | \$76 | AT&T Wireless PCS | \$82 | Mercury Mobility, L. | \$93 |
| 7 | 400 | San Angelo, TX | 155,845 | | | | | Poka Lambro PCS, | \$2,972 | Western PCS BTA I | \$273 | AT&T Wireless PCS | \$275 | Mercury PCS II, LLC | \$378 |
| 7 | 418 | Sherman, TX | 151,914 | | | | | Cook Inlet Western | \$5,996 | ALLTEL Mobile Con | \$155 | AT&T Wireless PCS | \$135 | OnQue Communica | \$68 |
| 7 | 419 | Shreveport, LA | 583,266 | | | | | DCR PCS, Inc. | \$12,926 | BellSouth Wireless, | \$2,019 | AT&T Wireless PCS | \$2,265 | Mercury Mobility, L. | \$2,750 |
| 7 | 441 | Temple, TX | 291,768 | | | | | NextWave Personal | \$4,523 | Southwestern Bell M | \$496 | AT&T Wireless PCS | \$386 | Cook Inlet Western | \$205 |
| 7 | 443 | Texarkana, TX | 255,983 | | | | | DCR PCS, Inc. | \$2,761 | ALLTEL Mobile Con | \$159 | AT&T Wireless PCS | \$156 | Mercury Mobility, L. | \$214 |
| 7 | 452 | Tyler, TX | 269,762 | | | | | DCR PCS, Inc. | \$9,651 | Southwestern Bell M | \$529 | AT&T Wireless PCS | \$436 | NextWave Power P | \$497 |
| 7 | 459 | Waco, TX | 270,052 | | | | | Aer Force Commun | \$5,890 | Southwestern Bell M | \$660 | AT&T Wireless PCS | \$529 | OPCSE-Galloway C | \$212 |
| 7 | 473 | Wichita Falls, TX | 209,339 | | | | | Cook Inlet Western | \$4,292 | Triad Cellular Corpo | \$397 | AT&T Wireless PCS | \$376 | Poka Lambro PCS, | \$112 |
| 7 | | Dallas-Ft. Worth | 9,694,157 | PCS PRIMECO, L.P. | \$87,501 | WirelessCo, L.P. | \$88,444 | | | | | | | | |
| 8 | 30 | Bangor, ME | 316,838 | | | | | Personal Commun | \$4,130 | Mid-Maine Wireless | \$141 | OPCSE-Galloway C | \$135 | Northcoast Operatin | \$136 |
| 8 | 51 | Boston, MA | 4,133,895 | | | | | NextWave Personal | \$231,174 | OPCSE-Galloway C | \$6,515 | OPCSE-Galloway C | \$7,515 | Northcoast Operatin | \$6,682 |
| 8 | 201 | Hyannis, MA | 204,256 | | | | | Alpine PCS, Inc. | \$9,000 | OPCSE-Galloway C | \$204 | Northcoast Operatin | \$279 | Alpine PCS, Inc. | \$801 |
| 8 | 227 | Keene, NH | 111,709 | | | | | New England Wirele | \$3,795 | OPCSE-Galloway C | \$217 | OPCSE-Galloway C | \$195 | Devon Mobile Comr | \$273 |
| 8 | 249 | Lebanon, NH | 167,576 | | | | | Omnipoint PCS Ent | \$4,451 | Vtel Wireless, Inc. | \$189 | GST Wireless Comr | \$208 | Devon Mobile Comr | \$296 |
| 8 | 251 | Lewiston, ME | 221,697 | | | | | Personal Commun | \$4,626 | Mid-Maine Wireless | \$90 | OPCSE-Galloway C | \$70 | Northcoast Operatin | \$161 |
| 8 | 274 | Manchester, NH | 540,704 | | | | | NextWave Personal | \$19,103 | OPCSE-Galloway C | \$715 | ACC-PCS, Inc. | \$770 | New Hampshire Wir | \$1,484 |
| 8 | 351 | Pittsfield, MA | 139,352 | | | | | Omnipoint PCS Ent | \$3,002 | NextWave Power P | \$52 | ACC-PCS, Inc. | \$70 | Northcoast Operatin | \$86 |
| 8 | 357 | Portland, ME | 471,614 | | | | | NextWave Personal | \$13,524 | OPCSE-Galloway C | \$208 | Northcoast Operatin | \$222 | New Hampshire Wir | \$685 |
| 8 | 363 | Presque Isle, ME | 86,936 | | | | | Quantum Commun | \$563 | OPCSE-Galloway C | \$27 | OPCSE-Galloway C | \$18 | OPCSE-Galloway C | \$14 |
| 8 | 364 | Providence, RI | 1,509,789 | | | | | NextWave Personal | \$64,132 | ACC-PCS, Inc. | \$3,801 | Northcoast Operatin | \$3,574 | OPCSE-Galloway C | \$1,315 |
| 8 | 427 | Springfield, MA | 672,970 | | | | | Omnipoint PCS Ent | \$22,496 | ACC-PCS, Inc. | \$328 | NextWave Power P | \$411 | Northcoast Operatin | \$903 |
| 8 | 465 | Waterville, ME | 165,671 | | | | | Personal Commun | \$1,961 | ACC-PCS, Inc. | \$28 | OPCSE-Galloway C | \$2 | Northcoast Operatin | \$14 |
| 8 | 480 | Worcester, MA | 709,705 | | | | | NextWave Personal | \$28,714 | OPCSE-Galloway C | \$504 | ACC-PCS, Inc. | \$477 | Northcoast Operatin | \$534 |
| 8 | | Boston-Providence | 9,452,712 | AT&T Wireless PCS | \$121,660 | WirelessCo, L.P. | \$127,066 | | | | | | | | |
| 9 | 25 | Atlantic City, NJ | 319,416 | | | | | Omnipoint PCS Ent | \$14,625 | Rivgam Communica | \$967 | Comcast PCS Com | \$641 | NextWave Power P | \$1,105 |
| 9 | 116 | Dover, DE | 251,257 | | | | | Omnipoint PCS Ent | \$8,798 | AT&T Wireless PCS | \$129 | Comcast PCS Com | \$145 | NextWave Power P | \$157 |
| 9 | 181 | Harrisburg, PA | 654,808 | | | | | Omnipoint PCS Ent | \$17,458 | Denver and Ephrata | \$960 | Comcast PCS Com | \$981 | NextWave Power P | \$1,105 |
| 9 | 240 | Lancaster, PA | 422,822 | | | | | PCS One, Inc. | \$13,198 | Comcast PCS Com | \$437 | OPCSE-Galloway C | \$436 | NextWave Power P | \$386 |
| 9 | 346 | Philadelphia, PA | 5,899,345 | | | | | Omnipoint PCS Ent | \$320,239 | Comcast PCS Com | \$12,169 | Rivgam Communica | \$12,761 | NextWave Power P | \$22,055 |
| 9 | 360 | Pottsville, PA | 152,585 | | | | | Omnipoint PCS Ent | \$4,562 | Conestoga Wireless | \$92 | Comcast PCS Com | \$82 | MFRI Inc. | \$153 |
| 9 | 370 | Reading, PA | 336,523 | | | | | Omnipoint PCS Ent | \$15,031 | Conestoga Wireless | \$277 | Comcast PCS Com | \$286 | NextWave Power P | \$559 |
| 9 | 429 | State College, PA | 123,786 | | | | | Omnipoint PCS Ent | \$2,597 | Comcast PCS Com | \$74 | PCSouth, Inc. | \$87 | Devon Mobile Comr | \$118 |
| 9 | 437 | Sunbury, PA | 187,362 | | | | | Omnipoint PCS Ent | \$4,592 | MFRI Inc. | \$59 | Comcast PCS Com | \$51 | Conestoga Wireless | \$174 |
| 9 | 475 | Williamsport, PA | 161,996 | | | | | Omnipoint PCS Ent | \$2,242 | Conestoga Wireless | \$66 | Comcast PCS Com | \$83 | Northcoast Operatin | \$86 |
| 9 | 483 | York, PA | 417,848 | | | | | Omnipoint PCS Ent | \$9,045 | Comcast PCS Com | \$525 | Denver and Ephrata | \$576 | NextWave Power P | \$422 |
| 9 | | Philadelphia | 8,927,748 | AT&T Wireless PCS | \$80,951 | PhillieCo, L.P. | \$84,995 | | | | | | | | |
| 10 | 29 | Baltimore, MD | 2,430,563 | | | | | NextWave Personal | \$94,134 | Rivgam Communica | \$5,917 | Rivgam Communica | \$4,994 | OPCSE-Galloway C | \$2,723 |
| 10 | 75 | Charlottesville, VA | 190,128 | | | | | Virginia PCS Allianc | \$7,415 | Devon Mobile Comr | \$388 | OPCSE-Galloway C | \$306 | Urban Communicat | \$584 |
| 10 | 100 | Cumberland, MD | 156,707 | | | | | Aer Force Communi | \$2,516 | Virginia PCS Allianc | \$64 | OPCSE-Galloway C | \$81 | Polycell Communica | \$83 |
| 10 | 156 | Fredericksburg, VA | 124,654 | | | | | Aer Force Communi | \$6,122 | OPCSE-Galloway C | \$113 | Virginia PCS Allianc | \$110 | Urban Communicat | \$148 |
| 10 | 179 | Hagerstown, MD | 327,693 | | | | | NextWave Personal | \$5,635 | OPCSE-Galloway C | \$1,140 | Virginia PCS Allianc | \$1,261 | Virginia PCS Allianc | \$1,488 |
| 10 | 183 | Harrisonburg, VA | 128,910 | | | | | Devon Mobile Comr | \$1,812 | Virginia PCS Allianc | \$650 | Virginia PCS Allianc | \$601 | Urban Communicat | \$633 |
| 10 | 398 | Salisbury, MD | 163,043 | | | | | Aer Force Communi | \$4,879 | OPCSE-Galloway C | \$50 | OPCSE-Galloway C | \$35 | NextWave Power P | \$51 |
| 10 | 461 | Washington, DC | 4,118,628 | | | | | NextWave Personal | \$260,095 | Rivgam Communica | \$6,820 | OPCSE-Galloway C | \$6,071 | Aer Force Communi | \$8,835 |
| 10 | 479 | Winchester, VA | 137,549 | | | | | Virginia PCS Allianc | \$4,979 | Shenandoah Mobile | \$349 | Shenandoah Mobile | \$384 | Devon Mobile Comr | \$407 |
| 10 | | Washington-Baltim | 7,777,875 | American Personal | \$102,344 | AT&T Wireless PCS | \$211,771 | | | | | | | | |
| 11 | 6 | Albany, GA | 324,899 | | | | | Enterprise Commun | \$4,840 | SprintCom, Inc. | \$6,122 | BellSouth Wireless, | \$4,772 | OPCSE-Galloway C | \$1,095 |
| 11 | 22 | Athens, GA | 166,030 | | | | | GW PCS, Inc. | \$5,954 | SprintCom, Inc. | \$485 | ALLTEL Mobile Con | \$481 | Wireless Telecom, I | \$508 |
| 11 | 24 | Atlanta, GA | 3,197,171 | | | | | GW PCS, Inc. | \$199,152 | SprintCom, Inc. | \$36,075 | ALLTEL Mobile Con | \$34,030 | NextWave Power P | \$25,261 |
| 11 | 26 | Augusta, GA | 521,822 | | | | | Savannah Independ | \$13,067 | BellSouth Wireless, | \$12,770 | SprintCom, Inc. | \$14,786 | OPCSE-Galloway C | \$1,575 |
| 11 | 76 | Chattanooga, TN | 510,860 | | | | | Chase Telecommun | \$15,966 | SprintCom, Inc. | \$967 | ALLTEL Mobile Con | \$989 | BTA Ventures II, Inc. | \$438 |
| 11 | 85 | Cleveland, TN | 87,355 | | | | | SOUTHERN COMM | \$506 | SprintCom, Inc. | \$125 | ALLTEL Mobile Con | \$134 | Troup EMC Commu | \$38 |
| 11 | 92 | Columbus, GA | 342,333 | | | | | R & S PCS, Inc. | \$5,265 | BellSouth Wireless, | \$16,635 | SprintCom, Inc. | \$17,470 | Public Service PCS | \$3,155 |
| 11 | 102 | Dalton, GA | 98,609 | | | | | Southeast Wireless | \$1,221 | SprintCom, Inc. | \$239 | ALLTEL Mobile Con | \$252 | Troup EMC Commu | \$68 |
| 11 | 160 | Gainesville, GA | 170,365 | | | | | GW PCS, Inc. | \$4,127 | SprintCom, Inc. | \$177 | ALLTEL Mobile Con | \$197 | Wireless Telecom, I | \$148 |
| 11 | 237 | La Grange, GA | 64,164 | | | | | Enterprise Commun | \$865 | BellSouth Wireless, | \$2,266 | SprintCom, Inc. | \$2,060 | Technicom, L.L.C. | \$476 |

Licenses holders are based upon the winning bidder at the end of the auction.

This list does not reflect any change in winners' name or ownership. (i.e. transfers and/or sales)

Broadband PCS Auction Winners

| | | Geographic Lic. Scheme Spectrum per License Block | | MTA 30 A | | MTA 30 B | | BTA 30 C | | BTA 10 D | | BTA 10 E | | BTA 10 F | |
|-----|-----|---|------------|---------------------|------------------|---------------------|------------------|----------------------|------------------|----------------------|------------------|----------------------|------------------|----------------------|------------------|
| MTA | BTA | Market Name | Population | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) |
| 11 | 271 | Macon, GA | 589,208 | | | | | Georgia Independent | \$11,700 | SprintCom, Inc. | \$5,126 | ALLTEL Mobile Cor | \$6,445 | OPCSE-Galloway C | \$952 |
| 11 | 334 | Opelika, AL | 124,022 | | | | | Enterprise Commun | \$892 | SprintCom, Inc. | \$5,200 | BellSouth Wireless, | \$5,720 | Technicom, L.L.C. | \$945 |
| 11 | 384 | Rome, GA | 115,066 | | | | | Southeast Wireless | \$1,584 | SprintCom, Inc. | \$297 | ALLTEL Mobile Cor | \$235 | Troup EMC Commu | \$93 |
| 11 | 410 | Savannah, GA | 630,180 | | | | | Southern Wireless, | \$19,875 | SprintCom, Inc. | \$13,622 | BellSouth Wireless, | \$11,552 | OPCSE-Galloway C | \$2,632 |
| 11 | | Atlanta | 6,942,084 | AT&T Wireless PCS | \$198,411 | GTE Macro Commu | \$184,660 | | | | | | | | |
| 12 | 1 | Aberdeen, SD | 88,891 | | | | | MCG PCS, Inc. | \$412 | Western PCS BTA I | \$111 | AT&T Wireless PCS | \$60 | Montana PCS Allian | \$23 |
| 12 | 37 | Bemidji, MN | 57,632 | | | | | Integrated Commun | \$270 | Western PCS BTA I | \$72 | MVI Corp. | \$50 | Minnesota PCS Lim | \$142 |
| 12 | 45 | Bismark, ND | 123,682 | | | | | MCG PCS, Inc. | \$557 | Touch America, Inc. | \$238 | Western PCS BTA I | \$243 | North Dakota Netwc | \$48 |
| 12 | 54 | Brainerd, MN | 78,465 | | | | | Western Minnesota | \$333 | Minnesota PCS Lim | \$88 | MVI Corp. | \$50 | Redwood Wireless C | \$100 |
| 12 | 113 | Dickinson, ND | 38,001 | | | | | MCG PCS, Inc. | \$206 | Consolidated Teleph | \$83 | Consolidated Teleph | \$88 | Consolidated Teleph | \$10 |
| 12 | 119 | Duluth, MN | 400,771 | | | | | RLV-PCS I PARTN | \$4,033 | AT&T Wireless PCS | \$271 | MVI Corp. | \$565 | Minnesota PCS Lim | \$535 |
| 12 | 123 | Eau Claire, WI | 180,559 | | | | | Wireless PCS, Inc. | \$3,149 | AT&T Wireless PCS | \$127 | MVI Corp. | \$167 | Minnesota PCS Lim | \$182 |
| 12 | 138 | Fargo, ND | 298,015 | | | | | North Dakota PCS L | \$6,776 | Touch America, Inc. | \$551 | Western PCS BTA I | \$556 | North Dakota Netwc | \$393 |
| 12 | 142 | Fergus Falls, MN | 120,167 | | | | | Western Minnesota | \$527 | AT&T Wireless PCS | \$180 | Touch America, Inc. | \$156 | Minnesota PCS Lim | \$175 |
| 12 | 166 | Grand Forks, ND | 213,932 | | | | | North Dakota PCS L | \$1,899 | Western PCS BTA I | \$374 | FCC | | Redwood Wireless C | \$83 |
| 12 | 199 | Huron, SD | 53,189 | | | | | MCG PCS, Inc. | \$384 | Western PCS BTA I | \$66 | FCC | | Redwood Wireless C | \$47 |
| 12 | 207 | Ironwood, MI | 33,059 | | | | | Northern Michigan F | \$198 | MVI Corp. | \$26 | MVI Corp. | \$23 | Metro Southwest PC | \$27 |
| 12 | 277 | Mankato, MN | 245,144 | | | | | Fortunet Wireless C | \$4,217 | AT&T Wireless PCS | \$1,357 | McLeod, Inc. | \$1,738 | Minnesota PCS Lim | \$879 |
| 12 | 298 | Minneapolis, MN | 2,840,561 | | | | | NextWave Personal | \$110,782 | U S WEST Commu | \$7,200 | AT&T Wireless PCS | \$6,646 | Northcoast Operatin | \$1,499 |
| 12 | 299 | Minot, ND | 122,687 | | | | | MCG PCS, Inc. | \$252 | North Dakota Netwc | \$169 | North Dakota Netwc | \$190 | North Dakota Netwc | \$55 |
| 12 | 301 | Mitchell, SD | 84,095 | | | | | MCG PCS, Inc. | \$399 | Western PCS BTA I | \$105 | FCC | | Redwood Wireless C | \$74 |
| 12 | 378 | Rochester, MN | 233,167 | | | | | Fortunet Wireless C | \$4,389 | U S WEST Commu | \$1,059 | McLeod, Inc. | \$1,009 | Minnesota PCS Lim | \$659 |
| 12 | 391 | St Cloud, MN | 243,888 | | | | | Redwood Wireless C | \$6,826 | AT&T Wireless PCS | \$837 | U S WEST Commu | \$836 | Wireless Communica | \$1,367 |
| 12 | 422 | Sioux Falls, SD | 207,716 | | | | | Brookings Municipal | \$5,147 | Western PCS BTA I | \$463 | McLeod, Inc. | \$400 | Northeast Nebraska | \$551 |
| 12 | 464 | Watertown, SD | 74,555 | | | | | Brookings Municipal | \$535 | Western PCS BTA I | \$93 | Minnesota PCS Lim | \$94 | Minnesota PCS Lim | \$33 |
| 12 | 476 | Williston, ND | 27,512 | | | | | Vincent D. McBride | \$463 | North Dakota PCS A | \$45 | North Dakota PCS A | \$45 | North Dakota PCS A | \$39 |
| 12 | 477 | Wilmar, MN | 123,749 | | | | | Southwest Minnesot | \$512 | U S WEST Commu | \$91 | Triad Cellular Corpo | \$86 | Redwood Wireless C | \$120 |
| 12 | 481 | Worthington, MN | 96,602 | | | | | Cook Inlet Western | \$341 | Triad Cellular Corpo | \$161 | McLeod, Inc. | \$174 | Minnesota PCS Lim | \$134 |
| 12 | | Minneapolis-St. Pa | 5,986,039 | WirelessCo, L.P. | \$39,675 | American Portable T | \$36,600 | | | | | | | | |
| 13 | 107 | Daytona Beach, FL | 399,413 | | | | | Aer Force Communi | \$18,351 | SprintCom, Inc. | \$446 | AT&T Wireless PCS | \$540 | NextWave Power P | \$740 |
| 13 | 239 | Lakeland, FL | 405,382 | | | | | NextWave Personal | \$18,841 | SprintCom, Inc. | \$6,100 | BellSouth Wireless, | \$6,123 | Eldorado Commun | \$2,329 |
| 13 | 289 | Melbourne, FL | 398,978 | | | | | NextWave Personal | \$14,042 | SprintCom, Inc. | \$950 | AT&T Wireless PCS | \$862 | Telecorp Holding C | \$1,103 |
| 13 | 326 | Ocala, FL | 194,833 | | | | | Aer Force Communi | \$5,765 | SprintCom, Inc. | \$2,435 | BellSouth Wireless, | \$2,665 | NextWave Power P | \$993 |
| 13 | 336 | Orlando, FL | 1,256,429 | | | | | NextWave Personal | \$69,889 | SprintCom, Inc. | \$5,660 | AT&T Wireless PCS | \$6,503 | Telecorp Holding C | \$3,536 |
| 13 | 408 | Sarasota, FL | 513,348 | | | | | NextWave Personal | \$25,528 | SprintCom, Inc. | \$6,995 | BellSouth Wireless, | \$6,361 | Aer Force Communi | \$1,653 |
| 13 | 440 | Tampa, FL | 2,249,405 | | | | | NextWave Personal | \$97,839 | SprintCom, Inc. | \$46,560 | BellSouth Wireless, | \$40,053 | Telecorp Holding C | \$5,971 |
| 13 | | Tampa-St. Petersb | 5,417,788 | American Portable T | \$89,787 | PCS PRIMECO, L.P. | \$99,328 | | | | | | | | |
| 14 | 34 | Beaumont, TX | 432,129 | | | | | Meretel Communica | \$15,083 | SprintCom, Inc. | \$605 | AT&T Wireless PCS | \$575 | Telecorp Holding C | \$586 |
| 14 | 59 | Bryan, TX | 150,998 | | | | | NextWave Personal | \$4,438 | SprintCom, Inc. | \$120 | AT&T Wireless PCS | \$136 | PCSouth, Inc. | \$136 |
| 14 | 196 | Houston, TX | 4,054,253 | | | | | NextWave Personal | \$198,475 | SprintCom, Inc. | \$13,259 | AT&T Wireless PCS | \$9,835 | Telecorp Holding C | \$7,613 |
| 14 | 238 | Lake Charles, LA | 259,425 | | | | | Wireless 2000, Inc. | \$5,257 | SprintCom, Inc. | \$3,750 | BellSouth Wireless, | \$3,964 | Mercury Mobility, L. | \$1,055 |
| 14 | 265 | Lufkin, TX | 144,081 | | | | | Meretel Communica | \$2,840 | SprintCom, Inc. | \$57 | AT&T Wireless PCS | \$56 | Poka Lambro PCS, | \$11 |
| 14 | 456 | Vicotria, TX | 149,963 | | | | | Integrated Commun | \$2,302 | SprintCom, Inc. | \$255 | AT&T Wireless PCS | \$308 | Americall Internatio | \$105 |
| 14 | | Huston | 5,190,849 | American Portable T | \$83,889 | PCS PRIMECO, L.P. | \$82,680 | | | | | | | | |
| 15 | 151 | Ft Myers, FL | 479,452 | | | | | GWI PCS, Inc. | \$20,049 | BellSouth Wireless, | \$9,034 | BellSouth Wireless, | \$8,626 | Wireless One Techn | \$4,004 |
| 15 | 152 | Ft Pierce, FL | 341,279 | | | | | GWI PCS, Inc. | \$10,790 | BellSouth Wireless, | \$4,444 | AT&T Wireless PCS | \$4,433 | Devon Mobile Comr | \$3,120 |
| 15 | 293 | Miami, FL | 3,270,606 | | | | | GWI PCS, Inc. | \$199,991 | ALLT Wireless PCS | \$17,617 | OPCSE-Galloway C | \$18,000 | OPCSE-Galloway C | \$27,761 |
| 15 | 313 | Naples, FL | 152,099 | | | | | GWI PCS, Inc. | \$7,443 | ALLTEL Mobile Cor | \$2,727 | BellSouth Wireless, | \$2,580 | Wireless One Techn | \$1,014 |
| 15 | 469 | W Palm Beach, FL | 893,145 | | | | | GWI PCS, Inc. | \$50,613 | AT&T Wireless PCS | \$1,730 | Devon Mobile Comr | \$1,900 | OPCSE-Galloway C | \$2,501 |
| 15 | | Miami-Ft. Lauderda | 5,136,581 | WirelessCo, L.P. | \$131,723 | PCS PRIMECO, L.P. | \$126,020 | | | | | | | | |
| 16 | 21 | Ashtabula, OH | 99,821 | | | | | WIRELESS VENTU | \$900 | SprintCom, Inc. | \$82 | Western PCS BTA I | \$91 | Northcoast Operatin | \$15 |
| 16 | 65 | Canton, OH | 513,623 | | | | | R & S PCS, Inc. | \$8,987 | SprintCom, Inc. | \$632 | Western PCS BTA I | \$472 | Northcoast Operatin | \$710 |
| 16 | 84 | Cleveland, OH | 2,894,133 | | | | | NextWave Personal | \$128,691 | SprintCom, Inc. | \$10,450 | Western PCS BTA I | \$8,634 | Northcoast Operatin | \$5,250 |
| 16 | 122 | East Liverpool, OH | 108,276 | | | | | Americall Internatio | \$585 | SprintCom, Inc. | \$89 | Western PCS BTA I | \$100 | Northcoast Operatin | \$50 |
| 16 | 131 | Erie, PA | 275,572 | | | | | R & S PCS, Inc. | \$6,871 | SprintCom, Inc. | \$256 | Western PCS BTA I | \$313 | Devon Mobile Comr | \$384 |
| 16 | 278 | Mansfield, OH | 221,514 | | | | | R & S PCS, Inc. | \$5,541 | SprintCom, Inc. | \$275 | Western PCS BTA I | \$187 | Northcoast Operatin | \$200 |
| 16 | 287 | Meadville, PA | 86,169 | | | | | Devon Mobile Comr | \$1,343 | SprintCom, Inc. | \$87 | Western PCS BTA I | \$113 | Northcoast Operatin | \$13 |
| 16 | 403 | Sandusky, OH | 133,019 | | | | | DCR PCS, Inc. | \$3,375 | SprintCom, Inc. | \$127 | Western PCS BTA I | \$146 | Northcoast Operatin | \$223 |

Licenses holders are based upon the winning bidder at the end of the auction.

This list does not reflect any change in winners' name or ownership. (i.e. transfers and/or sales)

Broadband PCS Auction Winners

| | | Geographic Lic. Scheme Spectrum per License Block | | MTA 30 A | | MTA 30 B | | BTA 30 C | | BTA 10 D | | BTA 10 E | | BTA 10 F | |
|-----|-----|---|------------|--------------------|------------------|-------------------|------------------|----------------------|------------------|---------------------|------------------|-----------------------|------------------|----------------------|------------------|
| MTA | BTA | Market Name | Population | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) |
| 16 | 416 | Sharon, PA | 121,003 | | | | | Devon Mobile Comr | \$1,784 | SprintCom, Inc. | \$109 | Western PCS BTA I | \$132 | CM-PCS Partners | \$57 |
| 16 | 484 | Youngstown, OH | 492,619 | | | | | R & S PCS, Inc. | \$12,059 | SprintCom, Inc. | \$602 | Western PCS BTA I | \$503 | Northcoast Operatin | \$230 |
| 16 | | Cleveland | 4,945,749 | Ameritech Wireless | \$87,000 | AT&T Wireless PCS | \$85,881 | | | | | | | | |
| 17 | 9 | Alexandria, LA | 280,133 | | | | | Wireless 2000, Inc. | \$5,231 | AT&T Wireless PCS | \$1,074 | BellSouth Wireless, | \$1,246 | Mercury Mobility, L. | \$1,056 |
| 17 | 32 | Baton Rouge, LA | 623,657 | | | | | Meretel Communica | \$25,515 | AT&T Wireless PCS | \$3,977 | AT&T Wireless PCS | \$3,685 | Mercury PCS II, LLC | \$3,292 |
| 17 | 42 | Biloxi, MS | 339,791 | | | | | Mobile Tri-States L. | \$12,785 | BellSouth Wireless, | \$4,928 | ALLTEL Mobile Cor | \$5,099 | Mercury PCS II, LLC | \$2,414 |
| 17 | 154 | Ft Walton Beach, F | 171,536 | | | | | Mobile Tri-States L. | \$5,309 | ALLTEL Mobile Cor | \$2,450 | BellSouth Wireless, | \$2,243 | Mercury PCS II, LLC | \$1,684 |
| 17 | 180 | Hammond, LA | 95,583 | | | | | Meretel Communica | \$2,466 | AT&T Wireless PCS | \$160 | Radiofone PCS, L.L | \$145 | Mercury PCS II, LLC | \$53 |
| 17 | 186 | Hattiesburg, MS | 161,894 | | | | | Mobile Tri-States L. | \$4,451 | Radiofone PCS, L.L | \$630 | BellSouth Wireless, | \$630 | Mercury PCS II, LLC | \$2,074 |
| 17 | 195 | Houma, LA | 263,681 | | | | | DCR PCS, Inc. | \$6,641 | SJI, Inc. | \$1,247 | BellSouth Wireless, | \$1,301 | Mercury PCS II, LLC | \$987 |
| 17 | 236 | Lafayette, LA | 496,579 | | | | | Meretel Communica | \$15,266 | AT&T Wireless PCS | \$1,286 | AT&T Wireless PCS | \$1,067 | Mercury PCS II, LLC | \$795 |
| 17 | 246 | Laurel, MS | 79,145 | | | | | Mobile Tri-States L. | \$1,134 | AT&T Wireless PCS | \$174 | Mercury PCS II, LLC | \$157 | Pine Belt PCS Partr | \$194 |
| 17 | 269 | McComb, MS | 107,298 | | | | | Reserve Telephone | \$2,424 | ALLTEL Mobile Cor | \$816 | BellSouth Wireless, | \$1,035 | Mercury PCS II, LLC | \$472 |
| 17 | 302 | Mobile, AL | 594,397 | | | | | Mobile Tri-States L. | \$27,118 | ALLTEL Mobile Cor | \$4,682 | AT&T Wireless PCS | \$3,717 | Mercury PCS II, LLC | \$1,939 |
| 17 | 320 | New Orleans, LA | 1,367,169 | | | | | DCR PCS, Inc. | \$52,815 | AT&T Wireless PCS | \$11,638 | AT&T Wireless PCS | \$13,139 | Telecorp Holding Cc | \$8,143 |
| 17 | 343 | Pensacola, FL | 344,406 | | | | | Mobile Tri-States L. | \$14,860 | ALLTEL Mobile Cor | \$7,164 | BellSouth Wireless, | \$6,778 | Mercury PCS II, LLC | \$4,167 |
| 17 | | New Orleans-Bator | 4,925,269 | WirelessCo, L.P. | \$93,949 | PCS PRIMECO, L.P. | \$89,475 | | | | | | | | |
| 18 | 35 | Beckley, WV | 167,112 | | | | | Devon Mobile Comr | \$731 | SprintCom, Inc. | \$154 | SprintCom, Inc. | \$171 | Virginia PCS Allianc | \$58 |
| 18 | 48 | Bluefield, WV | 184,020 | | | | | Devon Mobile Comr | \$1,459 | SprintCom, Inc. | \$246 | SprintCom, Inc. | \$208 | Northcoast Operatin | \$14 |
| 18 | 73 | Charleston, WV | 481,387 | | | | | PCS Mobile Americ | \$7,925 | SprintCom, Inc. | \$1,304 | SprintCom, Inc. | \$1,294 | MCG PCS, Inc. | \$397 |
| 18 | 81 | Cincinnati, OH | 1,990,451 | | | | | NextWave Personal | \$69,444 | SprintCom, Inc. | \$9,399 | Cincinnati Bell Telep | \$9,500 | Cook Inlet Western | \$7,908 |
| 18 | 106 | Dayton, OH | 1,207,689 | | | | | NextWave Personal | \$33,698 | SprintCom, Inc. | \$1,887 | Western PCS BTA I | \$1,590 | PCS Devco, Inc. | \$1,349 |
| 18 | 197 | Huntington, WV | 363,936 | | | | | The Chillicothe Tele | \$4,973 | SprintCom, Inc. | \$373 | SprintCom, Inc. | \$482 | Northcoast Operatin | \$34 |
| 18 | 259 | Logan, WV | 43,032 | | | | | Devon Mobile Comr | \$639 | SprintCom, Inc. | \$41 | SprintCom, Inc. | \$40 | RLV-PCS I Partners | \$19 |
| 18 | 359 | Portsmouth, OH | 93,356 | | | | | WIRELESS VENTU | \$1,253 | SprintCom, Inc. | \$97 | SprintCom, Inc. | \$85 | Northcoast Operatin | \$28 |
| 18 | 474 | Williamson, WV | 185,682 | | | | | SouthEast Telephor | \$1,403 | SprintCom, Inc. | \$172 | SprintCom, Inc. | \$227 | OPCSE-Galloway C | \$4 |
| 18 | | Cincinnati-Dayton | 4,716,665 | AT&T Wireless PCS | \$41,932 | GTE Macro Commu | \$42,733 | | | | | | | | |
| 19 | 66 | Cape Girardeau, M | 181,795 | | | | | ROBERTS-ROBER | \$2,503 | AT&T Wireless PCS | \$20 | Western PCS BTA I | \$38 | OPCSE-Galloway C | \$28 |
| 19 | 67 | Carbondale, IL | 209,497 | | | | | DCR PCS, Inc. | \$2,371 | AT&T Wireless PCS | \$2 | Western PCS BTA I | \$44 | OPCSE-Galloway C | \$16 |
| 19 | 90 | Columbia, MO | 190,537 | | | | | DCR PCS, Inc. | \$3,518 | OPCSE-Galloway C | \$40 | Western PCS BTA I | \$40 | Roberts-Roberts & | \$95 |
| 19 | 217 | Jefferson City, MO | 141,404 | | | | | ROBERTS-ROBER | \$2,123 | Western PCS BTA I | \$42 | ALLTEL Mobile Cor | \$30 | OPCSE-Galloway C | \$53 |
| 19 | 230 | Kirksville, MO | 55,563 | | | | | R.F.W. Inc. | \$287 | OPCSE-Galloway C | \$12 | Western PCS BTA I | \$12 | RLV-PCS I Partners | \$25 |
| 19 | 308 | Mt Vernon, IL | 119,286 | | | | | DCR PCS, Inc. | \$1,353 | Western PCS BTA I | \$13 | OPCSE-Galloway C | \$25 | Integrated Commun | \$11 |
| 19 | 355 | Poplar Bluff, MO | 148,240 | | | | | DCR PCS, Inc. | \$1,382 | Western PCS BTA I | \$46 | ALLTEL Mobile Cor | \$32 | OPCSE-Galloway C | \$12 |
| 19 | 367 | Quincy, IL | 177,213 | | | | | ROBERTS-ROBER | \$1,532 | Western PCS BTA I | \$20 | OPCSE-Galloway C | \$38 | Polycell Communica | \$21 |
| 19 | 383 | Rolla, MO | 98,233 | | | | | ROBERTS-ROBER | \$805 | Western PCS BTA I | \$30 | ALLTEL Mobile Cor | \$21 | OPCSE-Galloway C | \$8 |
| 19 | 394 | St Louis, MO | 2,742,114 | | | | | DCR PCS, Inc. | \$104,426 | OPCSE-Galloway C | \$2,500 | Western PCS BTA I | \$1,736 | NextWave Power P | \$3,373 |
| 19 | 428 | Springfield, MO | 532,880 | | | | | NextWave Personal | \$11,351 | Southwestern Bell M | \$1,472 | ALLTEL Mobile Cor | \$1,398 | OPCSE-Galloway C | \$1,460 |
| 19 | 470 | West Plains, MO | 67,165 | | | | | ROBERTS-ROBER | \$263 | Western PCS BTA I | \$29 | ALLTEL Mobile Cor | \$35 | OPCSE-Galloway C | \$42 |
| 19 | | St. Louis | 4,663,926 | AT&T Wireless PCS | \$118,836 | WirelessCo, L.P. | \$114,326 | | | | | | | | |
| 20 | 18 | Appleton, WI | 399,261 | | | | | Wireless PCS, Inc. | \$9,920 | AT&T Wireless PCS | \$713 | MVI Corp. | \$735 | Metro Southwest PC | \$802 |
| 20 | 132 | Escanaba, MI | 46,082 | | | | | Northern Michigan F | \$1,258 | AT&T Wireless PCS | \$19 | MVI Corp. | \$19 | Alpine PCS, Inc. | \$17 |
| 20 | 148 | Fond du Lac, WI | 90,083 | | | | | Wireless PCS, Inc. | \$1,777 | AT&T Wireless PCS | \$95 | MVI Corp. | \$135 | Metro Southwest PC | \$125 |
| 20 | 173 | Green Bay, WI | 310,435 | | | | | Wireless PCS, Inc. | \$8,111 | AT&T Wireless PCS | \$509 | MVI Corp. | \$582 | PCS One, L.L.C. | \$282 |
| 20 | 194 | Houghton, MI | 45,101 | | | | | Northern Michigan F | \$180 | AT&T Wireless PCS | \$10 | MVI Corp. | \$15 | Eldorado Communic | \$7 |
| 20 | 206 | Iron Mountain, MI | 44,596 | | | | | Northern Michigan F | \$319 | AT&T Wireless PCS | \$44 | MVI Corp. | \$50 | Metro Southwest PC | \$12 |
| 20 | 216 | Janesville, WI | 214,510 | | | | | Wireless PCS, Inc. | \$4,865 | AT&T Wireless PCS | \$64 | MVI Corp. | \$109 | NextWave Power P | \$345 |
| 20 | 234 | La Crosse, WI | 295,769 | | | | | Wireless PCS, Inc. | \$6,581 | MVI Corp. | \$640 | PCPCS Corporation | \$759 | Minnesota PCS Lim | \$90 |
| 20 | 272 | Madison, WI | 593,145 | | | | | Wireless PCS, Inc. | \$17,256 | AT&T Wireless PCS | \$2,421 | NextWave Power P | \$1,416 | PCS Wisconsin, LLC | \$3,248 |
| 20 | 276 | Manitowoc, WI | 80,421 | | | | | Wireless PCS, Inc. | \$1,584 | AT&T Wireless PCS | \$68 | MVI Corp. | \$91 | Metro Southwest PC | \$112 |
| 20 | 279 | Marinette, WI | 65,468 | | | | | Fortunet Wireless C | \$1,604 | AT&T Wireless PCS | \$220 | MVI Corp. | \$209 | Airadigm Communic | \$247 |
| 20 | 282 | Marquette, MI | 79,859 | | | | | Northern Michigan F | \$1,253 | AT&T Wireless PCS | \$49 | MVI Corp. | \$69 | Vtel Wireless, Inc. | \$18 |
| 20 | 297 | Milwaukee, WI | 1,751,525 | | | | | Indus, Inc. | \$60,002 | AT&T Wireless PCS | \$4,312 | Western PCS BTA I | \$4,116 | NextWave Power P | \$1,469 |
| 20 | 417 | Sheboygan WI | 103,877 | | | | | Wireless PCS, Inc. | \$2,507 | AT&T Wireless PCS | \$136 | MVI Corp. | \$149 | Metro Southwest PC | \$166 |
| 20 | 432 | Stevens Point, WI | 201,240 | | | | | Wireless PCS, Inc. | \$3,282 | MVI Corp. | \$421 | Wisconsin RSA #7 I | \$363 | PCS Devco, Inc. | \$210 |
| 20 | 466 | Wausau, WI | 220,060 | | | | | Wireless PCS, Inc. | \$3,907 | AT&T Wireless PCS | \$180 | MVI Corp. | \$271 | Metro Southwest PC | \$283 |
| 20 | | Milwaukee | 4,541,432 | WirelessCo, L.P. | \$85,043 | PCS PRIMECO, L.P. | \$86,000 | | | | | | | | |
| 21 | 12 | Altoona, PA | 222,625 | | | | | Longstreet Commur | \$2,219 | AT&T Wireless PCS | \$46 | AT&T Wireless PCS | \$46 | PCSouth, Inc. | \$88 |

Licenses holders are based upon the winning bidder at the end of the auction.

This list does not reflect any change in winners' name or ownership. (i.e. transfers and/or sales)

Broadband PCS Auction Winners

| | | Geographic Lic. Scheme Spectrum per License Block | | MTA 30 A | | MTA 30 B | | BTA 30 C | | BTA 10 D | | BTA 10 E | | BTA 10 F | |
|-----|-----|---|------------|-------------------|------------------|---------------------|------------------|----------------------|------------------|--------------------|------------------|----------------------|------------------|-----------------------|------------------|
| MTA | BTA | Market Name | Population | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) |
| 21 | 82 | Clarksburg, WV | 190,498 | | | | | POLYCELL COMM | \$788 | AT&T Wireless PCS | \$19 | Virginia PCS Allianc | \$38 | Northcoast Operatin | \$29 |
| 21 | 117 | Du Bois, PA | 124,180 | | | | | Devon Mobile Comr | \$1,657 | CM-PCS Partners | \$41 | AT&T Wireless PCS | \$36 | Sea Breeze Partner | \$55 |
| 21 | 137 | Fairmont, WV | 57,249 | | | | | Quantum Communic | \$527 | AT&T Wireless PCS | \$36 | AT&T Wireless PCS | \$34 | Virginia PCS Allianc | \$31 |
| 21 | 203 | Indiana, PA | 89,994 | | | | | Devon Mobile Comr | \$1,076 | AT&T Wireless PCS | \$1 | AT&T Wireless PCS | \$10 | MCG PCS, Inc. | \$8 |
| 21 | 218 | Johnstown, PA | 241,247 | | | | | MCG PCS, Inc. | \$2,480 | AT&T Wireless PCS | \$24 | AT&T Wireless PCS | \$51 | Central Wireless Pa | \$23 |
| 21 | 306 | Morgantown, WV | 104,546 | | | | | MCG PCS, Inc. | \$579 | AT&T Wireless PCS | \$62 | PCPCS Corporation | \$41 | Virginia PCS Allianc | \$43 |
| 21 | 317 | New Castle, PA | 96,246 | | | | | Devon Mobile Comr | \$2,187 | AT&T Wireless PCS | \$49 | AT&T Wireless PCS | \$31 | Northcoast Operatin | \$3 |
| 21 | 328 | Oil City, PA | 105,882 | | | | | Devon Mobile Comr | \$1,424 | AT&T Wireless PCS | \$5 | AT&T Wireless PCS | \$12 | Polycell Communica | \$17 |
| 21 | 350 | Pittsburgh, PA | 2,507,839 | | | | | NextWave Personal | \$65,378 | AT&T Wireless PCS | \$2,792 | Radiofone PCS, L.L | \$2,606 | Devon Mobile Comr | \$195 |
| 21 | 431 | Steubenville, OH | 142,523 | | | | | Americall Internatio | \$1,221 | AT&T Wireless PCS | \$42 | PCPCS Corporation | \$16 | Northcoast Operatin | \$85 |
| 21 | 471 | Wheeling, WV | 219,937 | | | | | Americall Internatio | \$2,025 | AT&T Wireless PCS | \$22 | Virginia PCS Allianc | \$178 | Northcoast Operatin | \$83 |
| 21 | | Pittsburgh | 4,102,766 | WirelessCo, L.P. | \$28,719 | American Portable T | \$31,666 | | | | | | | | |
| 22 | 69 | Casper, WY | 135,172 | | | | | High Country Commr | \$1,532 | U S WEST Commu | \$582 | RT Communications | \$542 | RT Communications | \$212 |
| 22 | 77 | Cheyenne, WY | 103,939 | | | | | High Country Commr | \$3,685 | U S WEST Commu | \$372 | RT Communications | \$529 | RT Communications | \$221 |
| 22 | 89 | Colorado Spring, C | 409,482 | | | | | Mountain Solutions, | \$17,170 | AT&T Wireless PCS | \$679 | U S WEST Commu | \$1,126 | OPCSE-Galloway C | \$1,110 |
| 22 | 110 | Denver, CO | 2,073,952 | | | | | NextWave Personal | \$113,549 | AT&T Wireless PCS | \$8,711 | U S WEST Commu | \$5,300 | Radiofone PCS, L.L | \$2,305 |
| 22 | 149 | Ft Collins, CO | 186,136 | | | | | Mountain Solutions, | \$6,450 | AT&T Wireless PCS | \$407 | U S WEST Commu | \$430 | PCSouth, Inc. | \$117 |
| 22 | 168 | Grand Junction, CO | 187,062 | | | | | Mountain Solutions, | \$4,880 | AT&T Wireless PCS | \$310 | U S WEST Commu | \$457 | Lite-Wave Commun | \$86 |
| 22 | 172 | Greeley, CO | 131,821 | | | | | Mountain Solutions, | \$3,841 | U S WEST Commu | \$39 | AT&T Wireless PCS | \$178 | PCSouth, Inc. | \$52 |
| 22 | 366 | Pueblo, CO | 266,001 | | | | | Mountain Solutions, | \$4,992 | AT&T Wireless PCS | \$702 | MVI Corp. | \$744 | Mercury Mobility, L. | \$273 |
| 22 | 369 | Rapid City, SD | 181,278 | | | | | MCG PCS, Inc. | \$1,470 | U S WEST Commu | \$141 | AT&T Wireless PCS | \$141 | Montana PCS Allian | \$93 |
| 22 | 375 | Riverton, WY | 46,859 | | | | | RT Communication | \$398 | U S WEST Commu | \$10 | AT&T Wireless PCS | \$40 | Polycell Communica | \$15 |
| 22 | 381 | Rock Springs, WY | 56,981 | | | | | Mountain Solutions, | \$849 | U S WEST Commu | \$53 | AT&T Wireless PCS | \$60 | Silver Star Telephon | \$50 |
| 22 | 411 | Scottsbluff, NE | 101,954 | | | | | Wireless Telecomm | \$860 | U S WEST Commu | \$179 | AT&T Wireless PCS | \$100 | Tracy Corporation II | \$93 |
| 22 | | Denver | 3,880,637 | WirelessCo, L.P. | \$64,436 | GTE Macro Commu | \$64,502 | | | | | | | | |
| 23 | 104 | Danville, VA | 165,434 | | | | | Southeast Wireless | \$6,535 | SprintCom, Inc. | \$993 | Western PCS BTA I | \$1,079 | Devon Mobile Comr | \$1,500 |
| 23 | 266 | Lynchburg, VA | 154,497 | | | | | Southeast Wireless | \$6,144 | SprintCom, Inc. | \$977 | Western PCS BTA I | \$866 | Devon Mobile Comr | \$1,328 |
| 23 | 284 | Martinsville, VA | 90,577 | | | | | Devon Mobile Comr | \$1,434 | SprintCom, Inc. | \$83 | Western PCS BTA I | \$91 | Urban Communicat | \$8 |
| 23 | 324 | Norfolk, VA | 1,635,296 | | | | | NextWave Personal | \$65,677 | SprintCom, Inc. | \$4,735 | Western PCS BTA I | \$5,037 | OPCSE-Galloway C | \$5,783 |
| 23 | 374 | Richmond, VA | 1,090,869 | | | | | NextWave Personal | \$51,425 | SprintCom, Inc. | \$2,129 | Western PCS BTA I | \$2,424 | Urban Communicat | \$3,424 |
| 23 | 376 | Roanoke, VA | 609,215 | | | | | NextWave Personal | \$19,400 | SprintCom, Inc. | \$2,577 | Devon Mobile Comr | \$2,685 | Urban Communicat | \$4,073 |
| 23 | 430 | Staunton, VA | 100,322 | | | | | Devon Mobile Comr | \$1,887 | SprintCom, Inc. | \$689 | Western PCS BTA I | \$722 | Urban Communicat | \$616 |
| 23 | | Richmond-Norfolk | 3,846,210 | AT&T Wireless PCS | \$33,652 | PCS PRIMECO, L.P. | \$33,045 | | | | | | | | |
| 24 | 2 | Aberdeen, WA | 83,057 | | | | | Cook Inlet Western | \$472 | AT&T Wireless PCS | \$104 | U S WEST Commu | \$70 | Whidbey Telephone | \$19 |
| 24 | 36 | Bellingham, WA | 127,780 | | | | | NextWave Personal | \$6,148 | AT&T Wireless PCS | \$326 | Whidbey Telephone | \$272 | Cook Inlet Western | \$360 |
| 24 | 55 | Bremerton, WA | 189,731 | | | | | Cook Inlet Western | \$9,203 | AT&T Wireless PCS | \$354 | U S WEST Commu | \$395 | Whidbey Telephone | \$157 |
| 24 | 331 | Olympia, WA | 258,937 | | | | | NextWave Personal | \$13,804 | AT&T Wireless PCS | \$598 | Western PCS BTA I | \$637 | Point Enterprises, Ir | \$665 |
| 24 | 356 | Port Angeles, WA | 76,610 | | | | | Cook Inlet Western | \$597 | AT&T Wireless PCS | \$119 | Whidbey Telephone | \$89 | Whidbey Telephone | \$89 |
| 24 | 413 | Seattle, WA | 2,708,949 | | | | | NextWave Personal | \$190,063 | AT&T Wireless PCS | \$6,490 | Western PCS BTA I | \$8,500 | Cook Inlet Western | \$10,200 |
| 24 | 468 | Wenatchee, WA | 166,563 | | | | | Cook Inlet Western | \$890 | AT&T Wireless PCS | \$218 | Touch America, Inc. | \$212 | Northcoast Operatin | \$42 |
| 24 | 482 | Yakima, WA | 215,548 | | | | | Cook Inlet Western | \$3,558 | AT&T Wireless PCS | \$413 | U S WEST Commu | \$440 | Magnacom Wireless | \$242 |
| 24 | | Seattle (Excluding | 3,827,175 | GTE Macro Commu | \$106,355 | WirelessCo, L.P. | \$105,163 | | | | | | | | |
| 25 | 488 | San Juan, PR | 2,170,246 | | | | | PCS 2000, L.P. | \$84,688 | SprintCom, Inc. | \$31,002 | Puerto Rico Teleph | \$33,987 | OPCSE-Galloway C | \$2,597 |
| 25 | 489 | Mayaguez, PR | 1,351,600 | | | | | PCS 2000, L.P. | \$29,400 | Puerto Rico Teleph | \$15,154 | SprintCom, Inc. | \$13,259 | Pegasus PCS Partn | \$3,020 |
| 25 | 491 | US Virgin Islands | 102,000 | | | | | Windkeeper Commu | \$7,798 | SprintCom, Inc. | \$841 | Vitelcom, Inc. | \$953 | Westel, L.P. | \$700 |
| 25 | | Puerto Rico-U.S. V | 3,623,846 | AT&T Wireless PCS | \$56,899 | Centennial Cellular | \$54,672 | | | | | | | | |
| 26 | 52 | Bowling Green, KY | 222,748 | | | | | SouthEast Telephor | \$3,784 | Powertel, Inc. | \$360 | Powertel, Inc. | \$389 | Mercury PCS II, LLC | \$574 |
| 26 | 98 | Corbin, KY | 128,186 | | | | | Third Kentucky Cell | \$2,206 | Powertel, Inc. | \$40 | Powertel, Inc. | \$52 | Third Kentucky Cell | \$29 |
| 26 | 135 | Evansville, IN | 504,859 | | | | | NextWave Personal | \$6,926 | Powertel, Inc. | \$157 | Powertel, Inc. | \$201 | Communications Ve | \$197 |
| 26 | 252 | Lexington, KY | 816,101 | | | | | NextWave Personal | \$18,047 | Powertel, Inc. | \$743 | Powertel, Inc. | \$736 | Northcoast Operatin | \$455 |
| 26 | 263 | Louisville, KY | 1,352,955 | | | | | NextWave Personal | \$55,352 | Powertel, Inc. | \$3,897 | Powertel, Inc. | \$3,862 | Mercury PCS II, LLC | \$1,587 |
| 26 | 273 | Madisonville, KY | 46,126 | | | | | SouthEast Telephor | \$692 | Powertel, Inc. | \$44 | Powertel, Inc. | \$49 | Troup EMC Commu | \$46 |
| 26 | 338 | Owensboro, KY | 157,104 | | | | | SouthEast Telephor | \$2,468 | Powertel, Inc. | \$33 | Powertel, Inc. | \$16 | Troup EMC Commu | \$15 |
| 26 | 339 | Paducah, KY | 217,082 | | | | | SouthEast Telephor | \$2,417 | Powertel, Inc. | \$24 | Powertel, Inc. | \$44 | Troup EMC Commu | \$37 |
| 26 | 423 | Somerset, KY | 111,487 | | | | | SouthEast Telephor | \$1,523 | Powertel, Inc. | \$56 | Powertel, Inc. | \$55 | Third Kentucky Cell | \$15 |
| 26 | | Louisville-Lexington | 3,556,648 | AT&T Wireless PCS | \$49,262 | WirelessCo, L.P. | \$46,577 | | | | | | | | |
| 27 | 144 | Flagstaff, AZ | 96,591 | | | | | CH PCS, Inc. | \$3,506 | U S WEST Commu | \$615 | Western PCS BTA I | \$90 | WebTel Wireless, In | \$95 |

Licenses holders are based upon the winning bidder at the end of the auction.

This list does not reflect any change in winners' name or ownership. (i.e. transfers and/or sales)

Broadband PCS Auction Winners

| | | Geographic Lic. Scheme Spectrum per License Block | | MTA 30 A | | MTA 30 B | | BTA 30 C | | BTA 10 D | | BTA 10 E | | BTA 10 F | |
|-----|-----|---|------------|--------------------|---------------------|---------------------|---------------------|----------------------|---------------------|---------------------|---------------------|---------------------|---------------------|-----------------------|---------------------|
| MTA | BTA | Market Name | Population | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) |
| 27 | 322 | Nogales, AZ | 29,676 | | | | | CH PCS, Inc. | \$1,241 | U S WEST Commu | \$37 | Western PCS BTA I | \$51 | Cellutech | \$130 |
| 27 | 347 | Phoenix, AZ | 2,404,760 | | | | | CH PCS, Inc.*** | \$213,808 | U S WEST Commu | \$11,274 | Western PCS BTA I | \$9,777 | Cook Inlet Western | \$30,241 |
| 27 | 362 | Prescott, AZ | 107,714 | | | | | CH PCS, Inc. | \$4,575 | U S WEST Commu | \$164 | Western PCS BTA I | \$67 | WebTel Wireless, In | \$83 |
| 27 | 420 | Sierra Vista, AZ | 97,624 | | | | | CH PCS, Inc. | \$2,243 | U S WEST Commu | \$11 | Western PCS BTA I | \$31 | Poka Lambro PCS, | \$46 |
| 27 | 447 | Tucson, AZ | 666,880 | | | | | Magnacom Wireles | \$36,461 | U S WEST Commu | \$1,410 | Western PCS BTA I | \$1,558 | Cook Inlet Western | \$1,544 |
| 27 | 486 | Yuma, AZ | 106,895 | | | | | CH PCS, Inc. | \$5,438 | U S WEST Commu | \$55 | Western PCS BTA I | \$65 | Integrated Commu | \$51 |
| 27 | | Phoenix | 3,510,140 | AT&T Wireless PCS | \$78,347 | WirelessCo, L.P. | \$75,608 | | | | | | | | |
| 28 | 49 | Blytheville, AR | 79,446 | | | | | Eldorado Commun | \$472 | SprintCom, Inc. | \$49 | ALLTEL Mobile Cor | \$41 | PCSouth, Inc. | \$48 |
| 28 | 94 | Columbus, MS | 166,415 | | | | | Mobile Tri-States L. | \$2,344 | SprintCom, Inc. | \$2,287 | BellSouth Wireless, | \$2,049 | Mercury Mobility, L. | \$402 |
| 28 | 120 | Dyersburg, TN | 113,943 | | | | | Chase Telecommun | \$1,238 | SprintCom, Inc. | \$388 | BellSouth Wireless, | \$351 | PCSouth, Inc. | \$101 |
| 28 | 175 | Greenville, MS | 213,943 | | | | | MCG PCS, Inc. | \$1,064 | SprintCom, Inc. | \$1,841 | BellSouth Wireless, | \$1,794 | PCSouth, Inc. | \$523 |
| 28 | 210 | Jackson, MS | 615,521 | | | | | 21st Century Televis | \$18,126 | SprintCom, Inc. | \$5,238 | Bay Springs Teleph | \$4,749 | PCSouth, Inc. | \$5,004 |
| 28 | 211 | Jackson, TN | 255,379 | | | | | Chase Telecommun | \$2,882 | SprintCom, Inc. | \$211 | SprintCom, Inc. | \$191 | PCSouth, Inc. | \$185 |
| 28 | 290 | Memphis, TN | 1,396,390 | | | | | Chase Telecommun | \$52,328 | SprintCom, Inc. | \$3,512 | ALLTEL Mobile Cor | \$3,522 | Telecorp Holding Co | \$2,067 |
| 28 | 292 | Meridian, MS | 200,024 | | | | | Mobile Tri-States L. | \$6,745 | Bay Springs Teleph | \$1,656 | SprintCom, Inc. | \$1,023 | PCSouth, Inc. | \$1,059 |
| 28 | 315 | Natchez, MS | 73,214 | | | | | Reserve Telephone | \$741 | SprintCom, Inc. | \$427 | BellSouth Wireless, | \$353 | Mercury Mobility, L. | \$96 |
| 28 | 449 | Tupelo, MS | 291,701 | | | | | Eldorado Commun | \$4,520 | SprintCom, Inc. | \$600 | PCSouth, Inc. | \$615 | Mercury Mobility, L. | \$939 |
| 28 | 455 | Vicksburg, MS | 59,250 | | | | | PCSouth, Inc. | \$852 | SprintCom, Inc. | \$243 | Century Personal A | \$246 | Pinnacle Telecom, I | \$237 |
| 28 | | Memphis-Jackson | 3,465,226 | Powertel PCS Partn | \$43,169 | Southwestern Bell N | \$43,168 | | | | | | | | |
| 29 | 17 | Anniston, AL | 161,897 | | | | | Mercury PCS, L.L.C. | \$1,490 | Public Service PCS | \$65 | ALLTEL Mobile Cor | \$49 | Technicom, L.L.C. | \$49 |
| 29 | 44 | Birmingham, AL | 1,200,336 | | | | | Mercury PCS, L.L.C. | \$47,250 | ALLTEL Mobile Cor | \$5,380 | AT&T Wireless PCS | \$4,657 | OPCSE-Galloway C | \$1,212 |
| 29 | 108 | Decatur, AL | 131,556 | | | | | Mercury PCS, L.L.C. | \$2,901 | ALLTEL Mobile Cor | \$191 | AT&T Wireless PCS | \$230 | OPCSE-Galloway C | \$49 |
| 29 | 115 | Dothan, AL | 210,225 | | | | | Enterprise Commun | \$4,518 | ALLTEL Mobile Cor | \$2,804 | BellSouth Wireless, | \$2,580 | Mercury PCS II, LLC | \$675 |
| 29 | 146 | Florence, AL | 173,076 | | | | | Chase Telecommun | \$2,997 | ALLTEL Mobile Cor | \$679 | AT&T Wireless PCS | \$815 | Mercury PCS II, LLC | \$242 |
| 29 | 158 | Gadsden, AL | 174,034 | | | | | Mercury PCS, L.L.C. | \$1,606 | ALLTEL Mobile Cor | \$836 | BellSouth Wireless, | \$825 | OPCSE-Galloway C | \$155 |
| 29 | 198 | Huntsville, AL | 439,832 | | | | | Mercury PCS, L.L.C. | \$13,091 | ALLTEL Mobile Cor | \$994 | AT&T Wireless PCS | \$834 | OPCSE-Galloway C | \$363 |
| 29 | 305 | Montgomery, AL | 440,745 | | | | | Central Alabama Pa | \$13,493 | ALLTEL Mobile Cor | \$5,815 | BellSouth Wireless, | \$6,350 | Mercury PCS II, LLC | \$1,772 |
| 29 | 415 | Selma, AL | 74,457 | | | | | Central Alabama Pa | \$443 | ALLTEL Mobile Cor | \$312 | BellSouth Wireless, | \$321 | Mercury PCS II, LLC | \$75 |
| 29 | 450 | Tuscaloosa, AL | 237,918 | | | | | Mercury PCS, L.L.C. | \$4,650 | ALLTEL Mobile Cor | \$561 | AT&T Wireless PCS | \$532 | Mercury Mobility, L. | \$192 |
| 29 | | Birmingham | 3,244,076 | WirelessCo, L.P. | \$35,597 | Powertel PCS Partn | \$35,278 | | | | | | | | |
| 30 | 38 | Bend, OR | 102,745 | | | | | Aer Force Commu | \$1,667 | Central Oregon Cell | \$139 | U S WEST Commu | \$122 | Westel, L.P. | \$215 |
| 30 | 97 | Coos Bay, OH | 79,600 | | | | | POLYCELL COMM | \$335 | AT&T Wireless PCS | \$107 | U S WEST Commu | \$20 | OPCSE-Galloway C | \$8 |
| 30 | 133 | Eugene, OR | 282,912 | | | | | Magnacom Wireles | \$15,066 | AT&T Wireless PCS | \$496 | U S WEST Commu | \$508 | Point Enterprises, Ir | \$687 |
| 30 | 231 | Klamath Falls, OR | 74,566 | | | | | POLYCELL COMM | \$459 | Central Oregon Cell | \$89 | U S WEST Commu | \$45 | Westel, L.P. | \$43 |
| 30 | 261 | Longview, WA | 85,446 | | | | | NextWave Personal | \$2,856 | AT&T Wireless PCS | \$142 | U S WEST Commu | \$173 | Magnacom Wireless | \$206 |
| 30 | 288 | Medford, OR | 209,038 | | | | | Americall Internati | \$4,285 | Central Oregon Cell | \$297 | U S WEST Commu | \$310 | Magnacom Wireless | \$492 |
| 30 | 358 | Portland, OR | 1,690,930 | | | | | NextWave Personal | \$105,260 | AT&T Wireless PCS | \$7,102 | U S WEST Commu | \$4,092 | Magnacom Wireless | \$4,371 |
| 30 | 385 | Roseburg, OR | 94,649 | | | | | Americall Internati | \$1,659 | Central Oregon Cell | \$152 | U S WEST Commu | \$127 | Magnacom Wireless | \$182 |
| 30 | 395 | Salem, OR | 440,062 | | | | | Magnacom Wireles | \$17,070 | AT&T Wireless PCS | \$1,499 | U S WEST Commu | \$1,748 | Point Enterprises, Ir | \$1,025 |
| 30 | | Portland | 3,059,948 | Western PCS Corp | \$34,155 | WirelessCo, L.P. | \$34,140 | | | | | | | | |
| 31 | 15 | Anderson, IN | 178,808 | | | | | Communications Ve | \$2,084 | AT&T Wireless PCS | \$144 | AT&T Wireless PCS | \$180 | OPCSE-Galloway C | \$41 |
| 31 | 47 | Bloomington, IN | 217,914 | | | | | NextWave Personal | \$5,680 | 21st Century Biddi | \$791 | OPCSE-Galloway C | \$442 | Communications Ve | \$44 |
| 31 | 93 | Columbus, IN | 139,128 | | | | | NextWave Personal | \$1,208 | AT&T Wireless PCS | \$5 | OPCSE-Galloway C | \$2 | OPCSE-Galloway C | \$6 |
| 31 | 204 | Indianapolis, IN | 1,321,911 | | | | | NextWave Personal | \$72,457 | AT&T Wireless PCS | \$1,561 | OPCSE-Galloway C | \$2,015 | 21st Century Biddi | \$2,475 |
| 31 | 233 | Kokomo, IN | 184,899 | | | | | 21st Century Televis | \$3,927 | OPCSE-Galloway C | \$284 | AT&T Wireless PCS | \$293 | FCC | |
| 31 | 235 | Lafayette, IN | 247,523 | | | | | NextWave Personal | \$9,209 | AT&T Wireless PCS | \$591 | OPCSE-Galloway C | \$528 | 21st Century Biddi | \$237 |
| 31 | 280 | Marion, IN | 109,238 | | | | | 21st Century Televis | \$2,374 | AT&T Wireless PCS | \$66 | OPCSE-Galloway C | \$33 | Communications Ve | \$95 |
| 31 | 309 | Muncie, IN | 182,386 | | | | | Communications Ve | \$2,396 | 21st Century Biddi | \$321 | AT&T Wireless PCS | \$319 | OPCSE-Galloway C | \$41 |
| 31 | 373 | Richmond, IN | 104,942 | | | | | WIRELESS VENTU | \$855 | AT&T Wireless PCS | \$62 | AT&T Wireless PCS | \$31 | OPCSE-Galloway C | \$9 |
| 31 | 442 | Terre Haute, IN | 236,968 | | | | | 21st Century Televis | \$5,345 | AT&T Wireless PCS | \$72 | OPCSE-Galloway C | \$51 | OPCSE-Galloway C | \$75 |
| 31 | 457 | Vincennes, IN | 93,758 | | | | | 21st Century Televis | \$480 | AT&T Wireless PCS | \$19 | OPCSE-Galloway C | \$1 | OPCSE-Galloway C | \$1 |
| 31 | | Indianapolis | 3,017,475 | WirelessCo, L.P. | \$70,433 | Ameritech Wireless | \$71,100 | | | | | | | | |
| 32 | 61 | Burlington, IA | 137,543 | | | | | BRK WIRELESS C | \$595 | Western PCS BTA I | \$172 | McLeod, Inc. | \$169 | Polycell Communica | \$86 |
| 32 | 70 | Cedar Rapids, IA | 260,686 | | | | | Wireless PCS, Inc. | \$5,171 | McLeod, Inc. | \$1,893 | McLeod, Inc. | \$1,374 | Iowa L.P. 136 | \$633 |
| 32 | 86 | Clinton, IA | 147,981 | | | | | POLYCELL COMM | \$863 | Western PCS BTA I | \$185 | McLeod, Inc. | \$181 | Redwood Wireless C | \$68 |
| 32 | 105 | Davenport, IA | 419,650 | | | | | Aer Force Commu | \$13,889 | AT&T Wireless PCS | \$2,770 | McLeod, Inc. | \$2,996 | Iowa L.P. 136 | \$1,364 |
| 32 | 111 | Des Moines, IA | 728,830 | | | | | Aer Force Commu | \$19,165 | McLeod, Inc. | \$8,083 | AT&T Wireless PCS | \$8,254 | OPCSE-Galloway C | \$2,013 |
| 32 | 118 | Dubuque, IA | 176,542 | | | | | Aer Force Commu | \$5,328 | McLeod, Inc. | \$294 | MVI Corp. | \$290 | Airadigm Communi | \$173 |

Licenses holders are based upon the winning bidder at the end of the auction.
This list does not reflect any change in winners' name or ownership. (i.e. transfers and/or sales)

Broadband PCS Auction Winners

| | | Geographic Lic. Scheme Spectrum per License Block | | MTA 30 A | | MTA 30 B | | BTA 30 C | | BTA 10 D | | BTA 10 E | | BTA 10 F | |
|-----|-----|---|------------|--------------------|------------------|---------------------|------------------|----------------------|------------------|----------------------|------------------|----------------------|------------------|-----------------------|------------------|
| MTA | BTA | Market Name | Population | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) |
| 32 | 150 | Ft Dodge, IA | 131,731 | | | | | BRK WIRELESS CO | \$519 | AT&T Wireless PCS | \$181 | McLeod, Inc. | \$190 | Redwood Wireless C | \$59 |
| 32 | 205 | Iowa City, IA | 115,731 | | | | | Aer Force Communi | \$2,564 | McLeod, Inc. | \$970 | McLeod, Inc. | \$493 | Iowa L.P. 136 | \$1,174 |
| 32 | 283 | Marshalltown, IA | 55,695 | | | | | BRK WIRELESS CO | \$373 | Western PCS BTA I | \$70 | McLeod, Inc. | \$69 | Redwood Wireless C | \$35 |
| 32 | 285 | Mason City, IA | 118,834 | | | | | BRK WIRELESS CO | \$551 | Western PCS BTA I | \$149 | McLeod, Inc. | \$147 | Redwood Wireless C | \$73 |
| 32 | 337 | Ottumwa, IA | 122,988 | | | | | BRK WIRELESS CO | \$373 | RLV-PCS I Partners | \$154 | McLeod, Inc. | \$150 | Redwood Wireless C | \$183 |
| 32 | 421 | Sioux City, IA | 328,919 | | | | | POLYCELL COMM | \$4,989 | McLeod, Inc. | \$717 | U S WEST Commu | \$801 | Northeast Nebraska | \$300 |
| 32 | 462 | Waterloo, IA | 261,009 | | | | | Wireless PCS, Inc. | \$2,873 | McLeod, Inc. | \$359 | AT&T Wireless PCS | \$371 | Redwood Wireless C | \$471 |
| 32 | | Des Moines-Quad | 3,006,139 | Western PCS Corp | \$22,100 | WirelessCo, L.P. | \$21,043 | | | | | | | | |
| 33 | 56 | Brownsville, TX | 277,825 | | | | | NextWave Personal | \$13,217 | Western PCS BTA I | \$414 | AT&T Wireless PCS | \$257 | Americall Internatio | \$257 |
| 33 | 99 | Corpus Christi, TX | 499,988 | | | | | Americall Internatio | \$10,307 | Western PCS BTA I | \$734 | AT&T Wireless PCS | \$740 | NextWave Power P | \$2,514 |
| 33 | 121 | Eagle Pass, TX | 100,813 | | | | | Rosas, Inc. | \$941 | Mercury PCS II, LLC | \$288 | AT&T Wireless PCS | \$179 | Americall Internatio | \$248 |
| 33 | 242 | Laredo, TX | 152,881 | | | | | Americall Internatio | \$6,800 | Western PCS BTA I | \$590 | Elitel, Inc. | \$1,064 | Integrated Commun | \$801 |
| 33 | 268 | McAllen, TX | 424,063 | | | | | NextWave Personal | \$17,838 | Western PCS BTA I | \$748 | AT&T Wireless PCS | \$600 | Integrated Commun | \$831 |
| 33 | 401 | San Antonio, TX | 1,530,954 | | | | | NextWave Personal | \$79,151 | Western PCS BTA I | \$2,679 | AT&T Wireless PCS | \$2,947 | OPCSE-Galloway C | \$1,688 |
| 33 | | San Antonio | 2,986,524 | WirelessCo, L.P. | \$54,394 | PCS PRIMECO, L.P. | \$51,950 | | | | | | | | |
| 34 | 129 | Emporia, KS | 46,157 | | | | | Kansas Personal Co | \$800 | Mercury Mobility, L. | \$63 | AT&T Wireless PCS | \$59 | Cellutech | \$118 |
| 34 | 220 | Joplin, MO | 215,095 | | | | | NextWave Personal | \$2,868 | Southwestern Bell M | \$266 | ALLTEL Mobile Con | \$245 | DCC PCS, Inc. | \$592 |
| 34 | 226 | Kansas City, MO | 1,839,569 | | | | | NextWave Personal | \$59,334 | ALLTEL Mobile Con | \$4,782 | AT&T Wireless PCS | \$5,258 | DCC PCS, Inc. | \$2,066 |
| 34 | 247 | Lawrence, KS | 81,798 | | | | | Mountain Solutions, | \$2,991 | AT&T Wireless PCS | \$41 | ALLTEL Mobile Con | \$42 | DCC PCS, Inc. | \$122 |
| 34 | 275 | Manhattan, KS | 122,878 | | | | | Mountain Solutions, | \$2,910 | Western PCS BTA I | \$154 | Mercury Mobility, L. | \$154 | DCC PCS, Inc. | \$291 |
| 34 | 349 | Pittsburg, KS | 90,934 | | | | | DCR PCS, Inc. | \$131 | AT&T Wireless PCS | \$185 | Southwestern Bell M | \$120 | Cook Inlet Western | \$53 |
| 34 | 393 | St Joseph, MO | 191,489 | | | | | RLV-PCS I PARTN | \$2,750 | AT&T Wireless PCS | \$39 | Triad Cellular Corpo | \$24 | DCC PCS, Inc. | \$129 |
| 34 | 414 | Sedalia, MO | 79,705 | | | | | ROBERTS-ROBER | \$446 | AT&T Wireless PCS | \$9 | ALLTEL Mobile Con | \$8 | Integrated Commun | \$6 |
| 34 | 445 | Topeka, KS | 245,679 | | | | | Kansas Personal Co | \$8,458 | Mercury Mobility, L. | \$338 | AT&T Wireless PCS | \$322 | DCC PCS, Inc. | \$415 |
| 34 | | Kansas City | 2,913,304 | WirelessCo, L.P. | \$23,619 | American Portable T | \$23,612 | | | | | | | | |
| 35 | 60 | Buffalo, NY | 1,231,795 | | | | | Omnipoint PCS Ent | \$34,326 | Rivgam Communica | \$1,852 | FCC | | Devon Mobile Comr | \$2,744 |
| 35 | 215 | Jamestown, NY | 186,945 | | | | | New England Wirele | \$3,794 | AT&T Wireless PCS | \$21 | OPCSE-Galloway C | \$21 | Devon Mobile Comr | \$14 |
| 35 | 330 | Olean, NY | 239,343 | | | | | New England Wirele | \$4,697 | OPCSE-Galloway C | \$53 | OPCSE-Galloway C | \$27 | Devon Mobile Comr | \$54 |
| 35 | 379 | Rochester, NY | 1,118,963 | | | | | Omnipoint PCS Ent | \$27,255 | OPCSE-Galloway C | \$701 | AT&T Wireless PCS | \$532 | Northcoast Operatin | \$850 |
| 35 | | Buffalo-Rochester | 2,777,046 | WirelessCo, L.P. | \$18,893 | AT&T Wireless PCS | \$19,864 | | | | | | | | |
| 36 | 50 | Boise, ID | 416,503 | | | | | PCS 2000, L.P. | \$7,742 | AT&T Wireless PCS | \$927 | U S WEST Commu | \$1,062 | Magnacom Wireless | \$747 |
| 36 | 202 | Idaho Falls, ID | 190,267 | | | | | High Country Commr | \$4,441 | AT&T Wireless PCS | \$254 | U S WEST Commu | \$275 | Valley Wireless, L.P. | \$143 |
| 36 | 258 | Logan, UT | 79,415 | | | | | PCS 2000, L.P. | \$277 | AT&T Wireless PCS | \$34 | U S WEST Commu | \$34 | Integrated Commun | \$7 |
| 36 | 353 | Pocatello, ID | 89,651 | | | | | High Country Commr | \$1,020 | U S WEST Commu | \$104 | AT&T Wireless PCS | \$102 | Westel, L.P. | \$93 |
| 36 | 365 | Provo, UT | 269,407 | | | | | PCS 2000, L.P. | \$6,678 | AT&T Wireless PCS | \$166 | U S WEST Commu | \$246 | NextWave Power P | \$173 |
| 36 | 392 | St George, UT | 83,263 | | | | | PCS Plus, LLC An A | \$2,522 | AT&T Wireless PCS | \$293 | Triad Cellular Corpo | \$271 | South Central Utah | \$279 |
| 36 | 399 | Salt Lake City, UT | 1,308,035 | | | | | PCS 2000, L.P. | \$82,294 | AT&T Wireless PCS | \$4,605 | U S WEST Commu | \$4,276 | NextWave Power P | \$1,190 |
| 36 | 451 | Twin Falls, ID | 136,831 | | | | | High Country Commr | \$2,574 | AT&T Wireless PCS | \$550 | U S WEST Commu | \$495 | Westel, L.P. | \$536 |
| 36 | | Salt Lake City | 2,573,372 | Western PCS Corp | \$45,847 | WirelessCo, L.P. | \$46,180 | | | | | | | | |
| 37 | 58 | Brunswick, GA | 71,130 | | | | | KMTel L.L.C. | \$1,232 | BellSouth Wireless, | \$2,581 | SprintCom, Inc. | \$2,269 | Mercury PCS II, LLC | \$699 |
| 37 | 159 | Gainesville, FL | 260,538 | | | | | NextWave Personal | \$7,144 | SprintCom, Inc. | \$4,684 | BellSouth Wireless, | \$4,159 | Mercury PCS II, LLC | \$1,104 |
| 37 | 212 | Jacksonville, FL | 1,114,847 | | | | | NextWave Personal | \$38,246 | SprintCom, Inc. | \$15,608 | ALLTEL Mobile Con | \$12,969 | Southern Wireless, | \$8,489 |
| 37 | 340 | Panama City, FL | 171,195 | | | | | Southeast Wireless | \$4,110 | BellSouth Wireless, | \$5,054 | SprintCom, Inc. | \$5,585 | Mercury PCS II, LLC | \$1,916 |
| 37 | 439 | Tallahassee, FL | 418,963 | | | | | Southeast Wireless | \$21,668 | SprintCom, Inc. | \$16,005 | BellSouth Wireless, | \$14,317 | Mercury PCS II, LLC | \$4,808 |
| 37 | 454 | Valdosta, GA | 139,226 | | | | | SOWEGA Wireless | \$1,689 | SprintCom, Inc. | \$2,130 | BellSouth Wireless, | \$2,033 | Mercury PCS II, LLC | \$473 |
| 37 | 467 | Waycross, GA | 99,034 | | | | | Savannah Independ | \$577 | SprintCom, Inc. | \$2,017 | BellSouth Wireless, | \$1,813 | Mercury PCS II, LLC | \$387 |
| 37 | | Jacksonville | 2,274,933 | Powertel PCS Partn | \$46,000 | PCS PRIMECO, L.P. | \$44,501 | | | | | | | | |
| 38 | 23 | Athens, OH | 123,864 | | | | | The Chillicothe Tele | \$1,357 | SprintCom, Inc. | \$101 | SprintCom, Inc. | \$86 | Northcoast Operatin | \$36 |
| 38 | 80 | Chillicothe, OH | 93,579 | | | | | The Chillicothe Tele | \$1,613 | SprintCom, Inc. | \$97 | SprintCom, Inc. | \$85 | Northcoast Operatin | \$19 |
| 38 | 95 | Columbus, OH | 1,477,891 | | | | | NextWave Personal | \$45,476 | SprintCom, Inc. | \$3,064 | SprintCom, Inc. | \$2,693 | Northcoast Operatin | \$2,393 |
| 38 | 281 | Marion, OH | 92,023 | | | | | Micom Associates, | \$1,211 | SprintCom, Inc. | \$92 | SprintCom, Inc. | \$82 | Northcoast Operatin | \$28 |
| 38 | 342 | Parkersburg, WV | 180,025 | | | | | The Chillicothe Tele | \$1,896 | SprintCom, Inc. | \$168 | SprintCom, Inc. | \$203 | RLV-PCS I Partners | \$77 |
| 38 | 487 | Zanesville, OH | 178,179 | | | | | The Chillicothe Tele | \$1,402 | SprintCom, Inc. | \$168 | SprintCom, Inc. | \$185 | Northcoast Operatin | \$55 |
| 38 | | Columbus | 2,145,561 | AT&T Wireless PCS | \$22,290 | American Portable T | \$22,177 | | | | | | | | |
| 39 | 8 | Albuquerque, NM | 688,612 | | | | | Magnacom Wireless | \$33,323 | SprintCom, Inc. | \$2,026 | U S WEST Commu | \$1,750 | Poka Lambro PCS, | \$1,208 |
| 39 | 68 | Carlsbad, NM | 48,605 | | | | | High Country Commr | \$521 | SprintCom, Inc. | \$141 | PVT Wireless Limite | \$128 | PVT Wireless Limite | \$80 |
| 39 | 128 | El Paso, TX | 649,860 | | | | | NextWave Personal | \$25,748 | SprintCom, Inc. | \$1,653 | SprintCom, Inc. | \$1,719 | Americall Internatio | \$1,582 |

Licenses holders are based upon the winning bidder at the end of the auction.

This list does not reflect any change in winners' name or ownership. (i.e. transfers and/or sales)

Broadband PCS Auction Winners

| | | Geographic Lic. Scheme Spectrum per License Block | | MTA 30 A | | MTA 30 B | | BTA 30 C | | BTA 10 D | | BTA 10 E | | BTA 10 F | |
|-----|-----|---|------------|---------------------|------------------|--------------------|------------------|---------------------|------------------|----------------------|------------------|----------------------|------------------|----------------------|------------------|
| MTA | BTA | Market Name | Population | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) |
| 39 | 139 | Farmington, NM | 162,776 | | | | | PCS Plus, LLC An A | \$4,222 | SprintCom, Inc. | \$236 | Triad Cellular Corpo | \$293 | Lite-Wave Commun | \$266 |
| 39 | 162 | Gallup, NM | 122,277 | | | | | PCS Plus, LLC An A | \$1,817 | SprintCom, Inc. | \$177 | U S WEST Commu | \$172 | Poka Lambro PCS, | \$74 |
| 39 | 244 | Las Cruces, NM | 197,166 | | | | | NextWave Personal | \$7,281 | SprintCom, Inc. | \$397 | Rivgam Communica | \$674 | Poka Lambro PCS, | \$138 |
| 39 | 386 | Roswell, NM | 70,068 | | | | | PVT Wireless Limite | \$1,175 | SprintCom, Inc. | \$44 | U S WEST Commu | \$50 | Central Wireless Pa | \$168 |
| 39 | 407 | Santa Fe, NM | 174,526 | | | | | Magnacom Wireles | \$6,600 | SprintCom, Inc. | \$561 | U S WEST Commu | \$370 | Poka Lambro PCS, | \$533 |
| 39 | | El Paso-Albuquerq | 2,113,890 | Western PCS Corp | \$8,634 | AT&T Wireless PCS | \$8,634 | | | | | | | | |
| 40 | 125 | El Dorado, AR | 108,810 | | | | | Eldorado Communic | \$846 | ALLTEL Mobile Con | \$55 | OPCSE-Galloway C | \$77 | Mercury Mobility, L. | \$90 |
| 40 | 140 | Fayetteville, AR | 222,526 | | | | | DCR PCS, Inc. | \$2,282 | ALLTEL Mobile Con | \$321 | Western PCS BTA I | \$266 | Eldorado Commun | \$229 |
| 40 | 153 | Ft Smith, AR | 282,187 | | | | | DCR PCS, Inc. | \$4,661 | Western PCS BTA I | \$339 | ALLTEL Mobile Con | \$312 | OnQue Communica | \$338 |
| 40 | 182 | Harrison, AR | 74,459 | | | | | PCS Plus, LLC An A | \$395 | Western PCS BTA I | \$70 | ALLTEL Mobile Con | \$61 | PCSouth, Inc. | \$64 |
| 40 | 193 | Hot Springs, AR | 117,439 | | | | | PCS Plus, LLC An A | \$1,886 | Western PCS BTA I | \$194 | ALLTEL Mobile Con | \$194 | Eldorado Commun | \$149 |
| 40 | 219 | Jonesboro, AR | 159,439 | | | | | DCR PCS, Inc. | \$1,853 | ALLTEL Mobile Con | \$112 | Western PCS BTA I | \$96 | PCSouth, Inc. | \$161 |
| 40 | 257 | Little Rock, AR | 852,026 | | | | | DCR PCS, Inc. | \$22,610 | Western PCS BTA I | \$596 | ALLTEL Mobile Con | \$641 | Telecorp Holding Cd | \$696 |
| 40 | 348 | Pine Bluff, AR | 152,918 | | | | | Omnipoint PCS Ent | \$1,531 | Western PCS BTA I | \$100 | ALLTEL Mobile Con | \$100 | Mercury Mobility, L. | \$100 |
| 40 | 387 | Russellville, AR | 81,863 | | | | | PCS Plus, LLC An A | \$582 | ALLTEL Mobile Con | \$80 | Western PCS BTA I | \$93 | OnQue Communica | \$81 |
| 40 | | Little Rock | 2,051,667 | Southwestern Bell N | \$12,733 | WirelessCo, L.P. | \$12,321 | | | | | | | | |
| 41 | 4 | Ada, OK | 52,677 | | | | | OnQue Communica | \$783 | Triad Cellular Corpo | \$11 | AT&T Wireless PCS | \$31 | Central Wireless Pa | \$9 |
| 41 | 19 | Ardmore, OK | 83,979 | | | | | OnQue Communica | \$1,654 | Triad Cellular Corpo | \$99 | AT&T Wireless PCS | \$100 | Poka Lambro PCS, | \$57 |
| 41 | 130 | Enid, OK | 85,998 | | | | | National Telecom H | \$286 | Triad Cellular Corpo | \$120 | AT&T Wireless PCS | \$109 | Poka Lambro PCS, | \$190 |
| 41 | 248 | Lawton, OK | 177,830 | | | | | Comtel PCS Mainst | \$1,806 | Triad Cellular Corpo | \$343 | AT&T Wireless PCS | \$394 | DCC PCS, Inc. | \$279 |
| 41 | 267 | McAlester, OK | 50,914 | | | | | OnQue Communica | \$774 | Southwestern Bell N | \$71 | AT&T Wireless PCS | \$62 | OnQue Communica | \$34 |
| 41 | 329 | Oklahoma City, OK | 1,305,472 | | | | | NextWave Personal | \$31,433 | Triad Cellular Corpo | \$1,389 | AT&T Wireless PCS | \$929 | DCC PCS, Inc. | \$1,114 |
| 41 | 354 | Ponca City, OK | 48,056 | | | | | Mark M. Guest | \$312 | Triad Cellular Corpo | \$29 | AT&T Wireless PCS | \$35 | DCC PCS, Inc. | \$63 |
| 41 | 433 | Stillwater, OK | 72,552 | | | | | MBO Wireless, Inc. | \$923 | Triad Cellular Corpo | \$146 | AT&T Wireless PCS | \$128 | WebTel Wireless, In | \$106 |
| 41 | | Oklahoma City | 1,877,478 | Western PCS Corp | \$11,111 | WirelessCo, L.P. | \$13,142 | | | | | | | | |
| 42 | 41 | Billings, MT | 290,242 | | | | | POLYCELL COMM | \$3,211 | Touch America, Inc. | \$537 | Western PCS BTA I | \$529 | Montana PCS Allian | \$255 |
| 42 | 53 | Bozeman, MT | 65,077 | | | | | Mountain Solutions, | \$1,715 | Touch America, Inc. | \$177 | Western PCS BTA I | \$168 | Montana PCS Allian | \$206 |
| 42 | 64 | Butte, MT | 65,252 | | | | | MCG PCS, Inc. | \$261 | Western PCS BTA I | \$195 | Touch America, Inc. | \$194 | Montana PCS Allian | \$179 |
| 42 | 171 | Great Falls, MT | 161,038 | | | | | MCG PCS, Inc. | \$640 | Touch America, Inc. | \$342 | Western PCS BTA I | \$341 | Montana PCS Allian | \$117 |
| 42 | 188 | Helena, MT | 58,752 | | | | | Mountain Solutions, | \$1,158 | Western PCS BTA I | \$129 | Touch America, Inc. | \$114 | Montana PCS Allian | \$77 |
| 42 | 224 | Kalispell, MT | 59,218 | | | | | Mountain Solutions, | \$716 | Western PCS BTA I | \$271 | MVI Corp. | \$288 | Montana PCS Allian | \$75 |
| 42 | 228 | Kenewick, WA | 150,033 | | | | | OnQue Communica | \$1,438 | Western PCS BTA I | \$188 | U S WEST Commu | \$196 | FCC | |
| 42 | 250 | Lewiston, ID | 110,028 | | | | | PCS 2000, L.P. | \$537 | Touch America, Inc. | \$176 | Western PCS BTA I | \$178 | Magnacom Wireles | \$92 |
| 42 | 300 | Missoula, MT | 139,270 | | | | | USA Micro-Cellular, | \$789 | Western PCS BTA I | \$274 | Touch America, Inc. | \$268 | Montana PCS Allian | \$176 |
| 42 | 425 | Spokane, Wa | 612,862 | | | | | Cook Inlet Western | \$11,783 | Touch America, Inc. | \$1,673 | AT&T Wireless PCS | \$1,694 | Magnacom Wireles | \$1,559 |
| 42 | 460 | Walla Walla, WA | 151,563 | | | | | Cook Inlet Western | \$1,310 | Western PCS BTA I | \$172 | U S WEST Commu | \$189 | Magnacom Wireles | \$166 |
| 42 | | Spokane-Billings | 1,863,335 | Poka Lambro Telep | \$5,688 | WirelessCo, L.P. | \$6,191 | | | | | | | | |
| 43 | 83 | Clarksville, TN | 220,469 | | | | | Chase Telecommun | \$4,178 | Powertel, Inc. | \$202 | Powertel, Inc. | \$178 | Tennessee L.P. 121 | \$131 |
| 43 | 96 | Cookeville, TN | 117,613 | | | | | Chase Telecommun | \$1,307 | Powertel, Inc. | \$1,727 | Powertel, Inc. | \$1,808 | Tennessee L.P. 121 | \$183 |
| 43 | 314 | Nashville, TN | 1,429,309 | | | | | Chase Telecommun | \$60,123 | Powertel, Inc. | \$3,264 | Powertel, Inc. | \$3,201 | OPCSE-Galloway C | \$1,652 |
| 43 | | Nashville | 1,767,391 | WirelessCo, L.P. | \$16,374 | AT&T Wireless PCS | \$15,810 | | | | | | | | |
| 44 | 229 | Kingsport, TN | 652,639 | | | | | Chase Telecommun | \$8,525 | SprintCom, Inc. | \$534 | SprintCom, Inc. | \$659 | Virginia PCS Allian | \$388 |
| 44 | 232 | Knoxville, TN | 948,055 | | | | | Chase Telecommun | \$23,865 | SprintCom, Inc. | \$13,455 | Powertel, Inc. | \$10,111 | Tennessee L.P. 121 | \$4,457 |
| 44 | 295 | Middlesboro, KY | 121,217 | | | | | Chase Telecommun | \$1,682 | SprintCom, Inc. | \$133 | SprintCom, Inc. | \$144 | Third Kentucky Cell | \$23 |
| 44 | | Knoxville | 1,721,911 | AT&T Wireless PCS | \$10,635 | BellSouth Personal | \$11,149 | | | | | | | | |
| 45 | 167 | Grand Island, NE | 141,541 | | | | | 21st Century Teles | \$4,448 | U S WEST Commu | \$215 | Western PCS BTA I | \$215 | Wireless II, L.L.C. | \$170 |
| 45 | 185 | Hastings, NE | 72,833 | | | | | USA Micro-Cellular, | \$930 | U S WEST Commu | \$161 | Western PCS BTA I | \$144 | 21st Century Biddin | \$164 |
| 45 | 256 | Lincoln, NE | 309,515 | | | | | 21st Century Teles | \$7,658 | U S WEST Commu | \$725 | Western PCS BTA I | \$542 | Polycell Communica | \$140 |
| 45 | 270 | McCook, NE | 36,618 | | | | | 21st Century Teles | \$672 | Cambridge Telepho | \$75 | Western PCS BTA I | \$46 | Tracy Corporation II | \$43 |
| 45 | 323 | Norfolk, NE | 112,526 | | | | | USA Micro-Cellular, | \$815 | Wireless II, L.L.C. | \$207 | Western PCS BTA I | \$201 | Northeast Nebraska | \$206 |
| 45 | 325 | North Platte, NE | 80,249 | | | | | 21st Century Teles | \$1,549 | U S WEST Commu | \$121 | Western PCS BTA I | \$100 | Montana PCS Allian | \$49 |
| 45 | 332 | Omaha, NE | 905,991 | | | | | DCR PCS, Inc. | \$25,310 | U S WEST Commu | \$6,351 | McLeod, Inc. | \$6,366 | CM-PCS Partners | \$845 |
| 45 | | Omaha | 1,659,273 | AT&T Wireless PCS | \$4,647 | Cox Cable Commur | \$5,078 | | | | | | | | |
| 46 | 114 | Dodge City, KS | 37,454 | | | | | CELLUTECH | \$102 | Pioneer Telephone | \$26 | Pioneer Telephone | \$30 | Global Information T | \$29 |
| 46 | 163 | Garden City, KS | 65,059 | | | | | TWS, LLC | \$365 | Pioneer Telephone | \$58 | Pioneer Telephone | \$72 | Global Information T | \$59 |
| 46 | 170 | Great Bend, KS | 40,779 | | | | | FAMS & ASSOCIA | \$191 | Pioneer Telephone | \$22 | Pioneer Telephone | \$18 | Global Information T | \$17 |
| 46 | 187 | Hays, KS | 60,926 | | | | | Mountain Solutions, | \$492 | Pioneer Telephone | \$57 | Pioneer Telephone | \$57 | Global Information T | \$69 |

Licenses holders are based upon the winning bidder at the end of the auction.
 This list does not reflect any change in winners' name or ownership. (i.e. transfers and/or sales)

Broadband PCS Auction Winners

| | | Geographic Lic. Scheme Spectrum per License Block | | MTA 30 A | | MTA 30 B | | BTA 30 C | | BTA 10 D | | BTA 10 E | | BTA 10 F | |
|-----|-----|---|------------|----------------------|---------------------|---------------------|---------------------|----------------------|---------------------|--------------------|---------------------|----------------------|---------------------|----------------------|---------------------|
| MTA | BTA | Market Name | Population | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) | Winning Bidder | Net Bid (thous.) |
| 46 | 200 | Hutchinson, KS | 125,094 | | | | | Kansas Personal Co | \$441 | Western PCS BTA I | \$156 | OPCSE-Galloway C | \$64 | Mercury Mobility, L. | \$39 |
| 46 | 253 | Liberal, KS | 53,960 | | | | | GLOBAL INFORMA | \$319 | Panhandle Telecom | \$54 | Triad Cellular Corpo | \$31 | Panhandle Telecom | \$40 |
| 46 | 396 | Salina, KS | 143,408 | | | | | Aer Force Commu | \$1,201 | Western PCS BTA I | \$179 | OPCSE-Galloway C | \$71 | Mercury Mobility, L. | \$43 |
| 46 | 472 | Wichita, KS | 597,494 | | | | | Omnipoint PCS Ent | \$9,632 | Western PCS BTA I | \$747 | Mercury Mobility, L. | \$539 | OPCSE-Galloway C | \$644 |
| 46 | | Wichita | 1,124,174 | AT&T Wireless PCS | \$4,393 | WirelessCo, L.P. | \$4,901 | | | | | | | | |
| 47 | 190 | Hilo, HI | 120,317 | | | | | DCR PCS, Inc. | \$3,611 | AT&T Wireless PCS | \$266 | SprintCom, Inc. | \$242 | Magnacom Wireless | \$228 |
| 47 | 192 | Honolulu, HI | 836,231 | | | | | DCR PCS, Inc. | \$53,594 | AT&T Wireless PCS | \$3,502 | SprintCom, Inc. | \$6,443 | Magnacom Wireless | \$4,799 |
| 47 | 222 | Kahului, HI | 100,504 | | | | | CH PCS, Inc. | \$7,752 | AT&T Wireless PCS | \$459 | SprintCom, Inc. | \$515 | Magnacom Wireless | \$574 |
| 47 | 254 | Lihue, HI | 51,177 | | | | | New Wave PCS, Inc. | \$2,513 | AT&T Wireless PCS | \$169 | SprintCom, Inc. | \$157 | Magnacom Wireless | \$215 |
| 47 | | Honolulu | 1,108,229 | Western PCS Corp | \$22,361 | PCS PRIMECO, L.P. | \$21,675 | | | | | | | | |
| 48 | 31 | Bartlesville, OK | 48,066 | | | | | Cook Inlet Western | \$215 | ALLTEL Mobile Con | \$91 | AT&T Wireless PCS | \$99 | Mercury Mobility, L. | \$51 |
| 48 | 88 | Coffeyville, KS | 63,504 | | | | | Cook Inlet Western | \$436 | Western PCS BTA I | \$79 | AT&T Wireless PCS | \$37 | Mercury Mobility, L. | \$19 |
| 48 | 311 | Muskogee, OK | 148,267 | | | | | Cook Inlet Western | \$5,905 | ALLTEL Mobile Con | \$464 | AT&T Wireless PCS | \$534 | MBO Wireless, Inc. | \$402 |
| 48 | 448 | Tulsa, OK | 836,559 | | | | | Cook Inlet Western | \$31,869 | ALLTEL Mobile Con | \$2,154 | AT&T Wireless PCS | \$1,948 | NextWave Power P | \$1,298 |
| 48 | | Tulsa | 1,096,396 | Southwestern Bell N | \$17,562 | WirelessCo, L.P. | \$16,802 | | | | | | | | |
| 49 | 14 | Anchorage, AK | 388,943 | | | | | Americall Internatio | \$4,922 | SprintCom, Inc. | \$2,082 | MVI Corp. | \$2,283 | PacifiCom - Alaska, | \$263 |
| 49 | 136 | Fairbanks, AK | 92,111 | | | | | Americall Internatio | \$563 | SprintCom, Inc. | \$449 | MVI Corp. | \$400 | Americall Internatio | \$37 |
| 49 | 221 | Juneau, AK | 68,989 | | | | | LORALEN CORP. | \$623 | SprintCom, Inc. | \$407 | MVI Corp. | \$340 | Americall Internatio | \$120 |
| 49 | | Alaska | 550,043 | American Portable T | \$1,000 | GCI Communicator | \$1,650 | | | | | | | | |
| 50 | 490 | Guam | 133,000 | | | | | DCR PCS, Inc. | \$1,073 | IT&E Overseas, Inc | \$165 | Guam Telephone A | \$153 | Longstreet Commur | \$128 |
| 50 | 493 | Northern Mariana Is | 43,000 | | | | | DCR PCS, Inc. | \$422 | IT&E Overseas, Inc | \$155 | Guam Telephone A | \$191 | Longstreet Commur | \$183 |
| 50 | | Guam-Northern Ma | 176,000 | Poka Lambro Telepl | \$107 | American Portable T | \$142 | | | | | | | | |
| 51 | 492 | American Samoa | 47,000 | | | | | Westel, L.P. *** | \$170 | AT&T Wireless PCS | \$25 | AT&T Wireless PCS | \$30 | Westel, L.P. | \$41 |
| 51 | | American Samoa | 47,000 | South Seas Satellite | \$215 | Communications Int | \$228 | | | | | | | | |

Licenses holders are based upon the winning bidder at the end of the auction.
 This list does not reflect any change in winners' name or ownership. (i.e. transfers and/or sales)