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Second Annual Report and Analysis Of Competitive Market Conditions With Respect to Commercial Mobile Services

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Washington, D.C.

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	)
Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993	)
	)
Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services	)

SECOND REPORT

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EXECUTIVE SUMMARY

Our examination of the commercial mobile radio services (CMRS) industry indicates that competition in the mobile marketplace is emerging. According to the Commission's licensing data and projections concerning the effects of other recent Commission actions, as many as four new competitors have been licensed to provide CMRS in each market throughout the Nation. The introduction of digital-based technology has accelerated, and is expected to increase greatly the variety, quality, and capacity of CMRS offerings. These changes are reinforcing an overall trend in which the services that can be provided by the various components of CMRS are increasingly overlapping each other.

There have been a significant number of changes in the CMRS market since this Commission submitted its *First Report* to Congress in 1995.[1] In that report, we concluded that, although the mobile telephone segment of CMRS was not fully competitive, entry by additional CMRS providers was very likely to take place in the near future. As this Report indicates, the Commission has completed auctions for and issued over 1,500 new CMRS licenses since the *First Report*, and anticipates continuing to issue additional CMRS licenses at a rapid rate. These new licensees have started to enter the marketplace, and even more new licensees are expected to begin operations during the coming year. In addition, CMRS subscribership grew 30 percent, cumulative capital investment grew by 35 percent, and wireless industry employment grew approximately 24 percent, between December 1995 and December 1996.

The most significant entry during the past year has been in Personal Communications Services (PCS). Broadband PCS systems have been placed in operation in 29 Major Trading Areas, including: New York, Los Angeles-San Diego, Chicago, San Francisco, Charlotte, Dallas-Ft. Worth, Washington, D.C./Baltimore, Tampa, Houston, Miami-Ft. Lauderdale, New Orleans, Milwaukee, Pittsburgh, Richmond-Norfolk, Memphis, Birmingham, Portland, San Antonio, Salt Lake City, Jacksonville, El Paso-Albuquerque, Oklahoma City, Spokane, Knoxville, Honolulu, Cincinnati, Des Moines, and Little Rock. Most broadband PCS licensees appear to be expeditiously constructing and placing their systems in operation. There are now eight major cities (Des Moines, Honolulu, Jacksonville, Milwaukee, Oklahoma City, Portland, Salt Lake City, and San Diego) with two PCS licensees in operation. Although there has not been any significant reduction in per minute airtime charges by the incumbent cellular service providers since the licensing of PCS began, there has been a noticeable increase in the number of lower-priced service packages and alternative service options and features such as paging, voice-mail, first-minute of incoming calls free, and caller ID. Furthermore, the imminent availability of PCS in many markets appears to be accelerating the conversion of cellular systems from analog to

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[1] Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, First Report, 10 FCC Rcd 8844 (1995) (*First Report*).

digital technology, a change that will facilitate the offering of a broader array of wireless services by cellular licensees and that will help ensure the privacy of cellular calls.

The Commission will continue to gauge the extent to which wireless services are a complement to or a substitute for wireline services. It is our view that wireless services do not yet approach the ubiquity of wireline telephone service, but there are a number of trends apparent in the increased use of wireless telephony that may point to the use of wireless telephony as not just a supplementary communications tool to traditional wireline telephone service but as a future substitute for such service. Our analysis in this Report will focus in part on the extent to which the mass market is adopting wireless telephony as a substitute for wireline service.

The Commission has adopted a number of measures during the last year to enhance competition and expedite the deployment of CMRS, such as the new partitioning and disaggregation rules. These initiatives are expected to reduce the regulatory burdens on the present wireless communications industry and to facilitate and promote the provision of a wider array of services of improved quality and greater quantity, and at lower prices.

I. INTRODUCTION

Congress created the statutory classification of Commercial Mobile Radio Services in 1993 to promote the consistent regulation of similar mobile radio services, and also required that the Commission establish rules that promote competitive market conditions and enhance competition among CMRS providers.[2] In order to have current information available about the state of competition in the rapidly evolving CMRS industry, Congress also required that the Commission submit annual reports that analyze competitive conditions in the CMRS marketplace.[3] This Report is the second of the Commission's annual reports on the state of CMRS competition.

A significant number of changes have taken place in the CMRS market since this Commission submitted its *First Report* to Congress in 1995.[4] Most important, our *First Report* concluded that although the mobile telephone segment of CMRS was not fully competitive, entry by additional CMRS providers into mobile telephone service was very likely to take place in the near future. As this Report points out, entry is occurring in the form of new broadband PCS systems in many major market areas.

In examining the effects of this entry, as well as other factors and developments pertinent to the CMRS marketplace, we have focused our discussion in this Report on several areas. First, we will discuss trends and changes in each service since our last report. Second, we will analyze the effect of the changes on (i) intra-service competition, (ii) inter-service competition, and (iii) CMRS competition with wireline providers. We then highlight Commission initiatives affecting CMRS competition.

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[2] The Omnibus Budget Reconciliation Act of 1993, Pub. L. No. 103-66, Title VI, § 6002(b), amending the Communications Act of 1934 and codified at 47 U.S.C. § 332(d)(1) (*Omnibus Budget Act* or the *1993 Act*).

[3] Communications Act of 1934, 47 U.S.C. § 332(c)(1)(C) (*Communications Act*).

[4] This Report, like the *First Report*, discusses CMRS as a whole because Congress called on the Commission to report on "competitive market conditions with respect to commercial mobile services." 47 U.S.C. §332(c)(1)(C). An individual proceeding in which the Commission defines relevant product and geographic markets, such as a proposed license transfer, may present facts pointing to a narrower or broader product market definition than that used in this report. See *First Report*, 10 FCC Rcd at 8866, n. 137.

II. BACKGROUND

In the *First Report*, the Commission identified several important trends in the CMRS industry. First, we found that previously discrete categories of services within CMRS were beginning to compete with each other, and that CMRS might become a single market consisting of telecommunications for ``people on the move.''[5] Second, we indicated that the availability and popularity of CMRS could increase several-fold in the next few years.[6] Third, we determined that prices to consumers would be lower, that entry by new competitors and services would be easier, and that competitive forces would generally be much stronger than they had been in a cellular duopoly market structure and in other segments of the CMRS industry, because our spectrum allocations for PCS and satellite-based systems had multiplied the amount of spectrum available for wireless services.[7]

We concluded that these trends would benefit consumers and should be encouraged.[8] At the same time, the Commission indicated that it would continue to monitor the conduct of incumbent providers to ensure that no abuse of market power occurred that could frustrate or delay the introduction of additional competition.[9]

Since the *First Report*, the CMRS market has continued to undergo major changes that have resulted in increased competition and convergence among CMRS services. The Commission has facilitated these changes by promoting flexibility for CMRS licensees, increasing the speed of licensing, and eliminating unnecessary regulation. Mobile telecommunications initially consisted largely of discrete services that did not compete with each other to any significant degree, were used by relatively few customers, and were regulated in a traditional public utility manner by the Commission and by most states. Today, CMRS consists of the following services: cellular mobile telephone service, paging service,[10] SMRs that are interconnected to the public switched network (PSN), licensed PCS, interconnected Business Radio and 220 MHz services, multilateration systems in the location and monitoring service (LMS), air-to-ground service, satellite systems for mobile communications, and public coast stations in the maritime

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[5] *See First Report* at para. 7.

[6] *Id.*

[7] *Id.*

[8] *Id.* at para. 8.

[9] *Id.*

[10] Only paging systems made available to others on a subscription basis are CMRS. Internal company or governmental systems are considered private mobile radio service.

service. The major CMRS services, cellular, paging, PCS, and interconnected SMR, will be the focus of this Report.[11]

The convergence occurring among the major CMRS services has presented us with a challenge in framing the discussion of services and the competitive analysis. On the one hand, as we have noted, the major service components of CMRS are becoming more similar to each other, thus arguing for a discussion focussed on CMRS as a single service. On the other hand, because this service convergence is still taking place, distinctions among these CMRS services still remain. These distinctions have prompted us to discuss each service separately. This approach also should make it easier to track the evolution of CMRS competition from one annual report to the next. We do not intend for this analytic construct to suggest that each of the CMRS services will necessarily remain a distinct service over the long term nor that even now they do not compete with one another. In fact, in this Report, we discuss how we view the emerging narrowband PCS service as a component, along with paging, of a more broadly defined messaging market, distinct from the mobile telephony markets occupied by the cellular, broadband PCS, and interconnected SMR services.

The Commission has continued systematically to remove regulatory barriers in order to facilitate competition. Under authority granted in the *1993 Act*, the Commission allowed cellular carriers to provide dispatch service and forbore from regulating CMRS under several sections of Title II of the Communications Act.[12] Prior to issuing the *First Report*, the Commission also denied petitions filed by seven states to reinstate authority to regulate rates for CMRS, which had been preempted under the *1993 Act*.[13] This trend towards reduced regulation is continuing, as the Commission is licensing geographic area SMR systems that can compete on a more equal footing with cellular service and PCS to meet a variety of consumer and business needs.[14] The Commission has simultaneously pursued a flexible approach to spectrum allocation in its creation of a Wireless Communications Service, in which licensees may provide any fixed, mobile, or radiolocation service - - consistent with international allocations and technical limitations.[15] The

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[11] The other CMRS services, except for LMS, are briefly described in Appendix A. LMS is not discussed because no regular licenses have been issued for this service.

[12] *Communications Act*, 47 U.S.C. §§ 201-229.

[13] *See* Petition of the Connecticut Dept. of Public Utility Control to Retain Regulatory Control of the Rates of Wholesale Cellular Service Providers in the State of Connecticut, PR Docket No. 94-106, Report and Order, FCC 95-199, released May 19, 1995, 10 FCC Rcd 7025, *aff'd sub nom.* Connecticut Dept. of Public Utility Control v. F.C.C. 78 F.3d 842 (2d Cir. 1996).

[14] Over 1,000 new 900 MHz SMR licenses were recently granted as a result of an auction of 51 Metropolitan Trading Area (MTA) service areas.

[15] Amendment of the Commission's Rules to Establish Part 27, the Wireless Communications Service ("WCS"), GN Docket No. 96-228, Report and Order, FCC 97-50, adopted Feb. 20, 1997.

Commission has also removed regulatory barriers to market entry by enabling licensees to provide additional types of services on their licensed spectrum.[16] In addition, the Commission recently adopted rules that may facilitate additional entry by permitting PCS licensees to sell the rights to portions of their assigned spectrum.[17] In the same proceeding, the Commission adopted rules that may speed service to rural areas by permitting PCS licensees to sell the rights to portions of their licensed service area.[18] The Commission has also modified its rules to allow CMRS licensees to provide fixed as well as mobile services. In addition, the Commission has licensed several satellite-based systems that may greatly increase the availability of mobile communications services that cannot be provided by competing CMRS carriers, such as voice and data service in remote areas and transcontinental roaming.

Simultaneous with this increasing flexibility and these increasing spectrum allocations, CMRS has become a significant part of the Nation's economy. CMRS continues to show steady growth. Between December 1995 and December 1996, for example, the cellular industry by itself added about 10 million subscribers, reflecting 30 percent growth.[19] Double digit annual growth rates are anticipated for CMRS during the next 5 to 10 years.[20] As of December 1996, cumulative capital investment by the wireless industry totalled over $32.5 billion.[21] Wireless industry employment grew approximately 24 percent to 84,161 people, between December 1995 and December 1996.[22]

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[16] For example, the Commission modified its rules to allow CMRS licensees to provide fixed in addition to mobile services on their spectrum. *See* Amendment of the Commission's Rules to Permit Flexible Service Offerings in the Commercial Mobile Services, WT Docket No. 96-6, First Report and Order, FCC 96-283, 11 FCC Rcd 8965 (1996).

[17] Geographic Partitioning and Spectrum Disaggregation by Commercial Mobile Radio Services Licensees, WT Docket No. 96-148, Implementation of Section 257 of the Communications Act -- Elimination of Market Entry Barriers, GN Docket No. 96-113, Report and Order and Further Notice of Proposed Rulemaking, FCC 96-474, released Dec. 20, 1996, at para. 13.

[18] *Id*.

[19] *See* Table 1, ``Cellular Growth,'' and CTIA SEMI-ANNUAL DATA SURVEY RESULTS, Mar. 3, 1997.

[20] *See* CIBC Wood Gundy, *Projecting Wireless Telecommunications Growth*, February 11, 1997, GOLDMAN SACHS, GLOBAL WIRELESS COMMUNICATIONS OUTLOOK, February 20, 1996, at 4; OVUM, PCS - THE MASS MARKET FOR MOBILE COMMUNICATIONS, at Figure H2.19.

[21] The figures for employment and capital investment are significantly under-reported because CTIA's survey only collects information from companies that are currently operating and providing service. It does not include data from companies that are currently building their systems and are not yet providing service. CTIA Press Release, *The Wireless Revolution continues: 10.2 Million New subscribers In 1996: $23.6 Billion in Revenues; 16,000 New Employees*, Mar. 3, 1996, (*CTIA Survey).*

[22] *Id*.

The Commission staff initiated efforts to collect market and company specific data after the *First Report* was submitted to Congress. The Commission solicited public comment on a proposed survey of telecommunications access providers, including CMRS carriers,[23] and received significant opposition from CMRS carriers to the submission of such information.[24] As a result, we decided to rely on publicly available data for this Report, rather than impose an additional reporting burden on CMRS licensees. Accordingly, this Report represents a compilation and analysis only of publicly available data.[25]

III. COMPETITIVE ANALYSIS

A. Overview

Currently, there are over 95 million mobile radio users in the United States, most of whom subscribe to CMRS. CMRS encompasses approximately 44 million cellular subscribers, 34 million paging subscribers, and 2.3 million specialized mobile radio transmitters. Other mobile radio users include approximately 15 million private land mobile radio users. Although there are many differences among the various mobile radio services, the common element of all these services is that they use a radio frequency or channel to communicate to and from one or more mobile locations, such as motor vehicles. The commercial mobile radio services described

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[23] FEDERAL COMMUNICATIONS COMMISSION, PUBLIC NOTICE, *The Common Carrier Bureau Seeks Comment on Telecommunications Access Provider Survey*, Nov. 3, 1995, DA 95-2287, 11 FCC Rcd 1287 (1995).

[24] Comments were received from 35 parties, and reply comments from 22 parties. Although most commenters supported some information collection, most suggested substantial changes to the proposal. The wireless industry, as represented by the Cellular Industry Telecommunications Association (CTIA), Bell Atlantic NYNEX Mobile, SBC, and Vanguard Cellular, for example, argued that CMRS providers should not be subject to the proposed information collection requirements.

[25] In this Report, we have relied heavily on data that has been gathered and compiled by trade associations and securities analysts. We have also utilized company releases, newspaper and periodical articles, and certain materials made available to the Commission staff that were prepared by research companies and consultants that study various aspects of the wireless industry. We did not, however, verify the accuracy of this data. Such data is typically nationwide in scope, not regional or market-specific. Therefore, much of the analysis contained in this Report is necessarily limited to a nationwide or company-wide scope, rather than specific geographic markets. The usefulness of this data in measuring the extent of competition is limited because it contains no detailed balance sheet, cost, or income information, and any underlying ``raw'' data is often subject to disclosure constraints. Analysis is further complicated by the fact that wireless data reported by one industry analyst may rely on different facts than similar data reported by another analyst. Only a few state regulatory commissions require informational filings by CMRS providers, and these filings are usually state-wide, not market-specific, and are generally filed on a confidential basis. Reports by consultants and other private analysts, and trade press reports, generally do not state raw data in detail and do not disaggregate data on a market- or service-specific basis concerning sales under individual pricing plans, or concerning costs, assets and liabilities, and net income.

in this section are: cellular mobile telephone service, PCS, paging service,[26] and SMRs that are interconnected to the PSN.[27]

Our examination of the CMRS industry since our first report indicates that competition is developing throughout the industry. Based on the Commission's licensing data and projections concerning the effects of other recent Commission actions, as many as four new competitors have been licensed in the past two years to provide CMRS throughout the Nation.[28] Since the Commission's last report, eight broadband PCS licensees have began service in sections of 29 MTAs, and the rate of entry should accelerate over the course of 1997.[29] As of July 1996, APC (Sprint/APC), a PCS entrant in the Washington/Baltimore market, estimated that it had attracted over 100,000 subscribers since it began offering service in November 1995,[30] and that it is taking 35 percent of new wireless voice subscribers in that market.[31] The Commission does not have market share data or estimates for any other areas of the Nation.

The introduction of digital-based technology has accelerated, and is expected to increase greatly the range and quality of CMRS offerings, and enhance the privacy of communications. The segments of CMRS other than cellular (or two-way interconnected voice service) remain competitive, and the licensing of three broadband PCS carriers promises a greater degree of competition for existing cellular carriers as the broadband PCS carriers commerce service. These changes are reinforcing the overall trend toward competition among the various components of CMRS. Certain developments in the CMRS industry, such as the trend toward consolidation in the cellular and paging segments of the CMRS market, however, could adversely affect the wireless services market, and warrant continued monitoring. Also, the degree to which new entry by broadband PCS carriers lowers prices below the levels maintained by existing cellular carriers warrants monitoring.

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[26] Certain paging systems are not CMRS if they are systems internal to a company or government entity and are not made available to others on a subscription basis.

[27] A more complete description of the histories and characteristics of the services described in the following paragraphs can be found in the *First Report*, 10 FCC Rcd at 8847-61 (paras. 13-50).

[28] Each market has at least three new PCS licensees as a result of the A,B, and C-block auctions. In addition, Nextel has received waivers that enable it to offer a wide-area digital service.

[29] The discussion in Section III.B.2.a.(1)-(2), *infra*, describes PCS's inauguration of service.

[30] *See* PR Newswire, *New Sprint PCS Technology Center to be Focal Point for All-Digital Nationwide PCS Network State-of-the-Art Facility Will Serve as Network Control and Testing Center*, Oct. 29, 1996; Herschel Shostek Associates estimates that Sprint currently has 165,000 subscribers. Washington Post, *Customers Must Say No or Pay New Sprint Spectrum Charge*, Feb. 28, 1997.

[31] Reuters, *Sprint Spectrum Seen Self-Financing By 2001*, May 23, 1996.

There has been considerable activity in the wireless services marketplace since we issued the *First Report*. For example, we have issued 102 MTA A and B Block licenses, most of the 493 BTA C Block licenses for broadband PCS, 43 national and regional licenses for narrowband PCS, and 1,020 licenses for 900 MHz SMR. Moreover, we are in the process of issuing 1472 BTA D, E, and F Block licenses for broadband PCS. To date, broadband PCS licensees in 29 MTAs and two nationwide narrowband PCS licensees have initiated service, and there are eight major cities with two PCS licensees in operation. The majority of A and B Block broadband PCS operators are expected to start service by mid-1997. Because of the speed of these developments and the lack of current, probative data about actual services and prices in the marketplace, we must necessarily be cautious in the conclusions drawn in this Report regarding several important aspects of CMRS competition.

An important development that informs our analysis in this Report and which will have increased significance for our analysis in later reports, is the advent of wide-scale digital-based wireless services. Digital technology greatly increases the range, quality, and quantity of services that CMRS providers can offer to subscribers. Currently, digital technology, while generally accepted as presaging the future course of the wireless industry, is only beginning to be integrated into service offerings. The Commission declined to mandate a digital standard for cellular, wide-area SMR, or broadband PCS, preferring instead to allow the marketplace, through innovation and competition, to determine which technical standards best meet the needs of the marketplace.

This is particularly evident in broadband PCS, where the various licensees have selected TDMA (Time Division Multiple Access), CDMA (Code Division Multiple Access), and GSM (Global System for Mobile Communications) network equipment.[32] These carriers each perceive their digital technology choice as a major factor in their ability to compete with cellular carriers and eventually with each other. More significantly, this lack of uniformity has significant implications for cellular carriers as well, particularly those that seek to meld their cellular and broadband PCS properties into a seamless, nationwide telecommunications service that bundles wireless, local, long distance, and paging into a single product under a nationally recognized brand name. AT&T Wireless, for example, has chosen a TDMA standard for its cellular and PCS networks and intends to offer a seamless nationwide service built on dual mode, dual band handsets. It is premature at this point to provide an assessment of whether any digital technology may have a competitive advantage, but it is likely that digital technology will predominate in cellular, wide-area SMR, and broadband PCS systems.

In the *First Report*, we examined the differing views about which mobile radio services compete with each other and with wireline service and thereby have a restraining effect on

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[32] All of the broadband PCS systems implemented to date use GSM or CDMA equipment, while digital cellular systems in the United States principally use TDMA or CDMA. An exception is the Omnipoint PCS system in New York City that uses a hybrid of its proprietary technology (IS-661) and GSM.

pricing and other conduct. We noted that these assertions are often stated in terms of defining ``product'' or ``geographic'' markets.[33] We examined various relevant market definitions in order to begin to frame our ongoing competitive analysis of the CMRS industry. The *First Report*, for example, noted that some posit a relevant market consisting of only cellular service and another consisting only of ``trunked SMR service in the 800 MHz, 900 MHz and 220 MHz bands,''[34] whereas the Commission, in the *CMRS Third Report and Order*, found evidence supporting a product market that was much broader, including all commercial wireless services.[35] The Commission found that:[36]

> growth in the wireless marketplace is bringing with it an increasing degree of service convergence. Technology and consumer demand, facilitated by our general policy not to restrict the services that can be provided over any particular band, are prompting commercial service providers to follow marketing strategies that blur the differences between the various services comprising the wireless marketplace.

This convergence, we noted, could support broader product markets, for example, one emphasizing functionality, which would divide CMRS and related services into three categories -- telephone service, dispatch, and paging.[37]

For purposes of this Report, the following discussion has been divided into three main sections: (1) intra-service competition, or competition within a particular CMRS service; (2) inter-service competition, or competition among the CMRS services; and (3) CMRS competition with wireline providers. We believe that such an approach will be helpful, particularly in subsequent reports, in identifying and reporting on the most significant competitive changes that take place in the rapidly evolving CMRS industry.[38]

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[33] *First Report*, 10 FCC Rcd 8863 (para. 57).

[34] *Id.* at para. 58. *See United States v. AT&T Corp.*, Competitive Impact Statement at 6, No.94-01555 (D.D.C. filed Aug 5, 1994).

[35] *Id.* at 8864 (para. 59).

[36] *See* Implementation of Sections 3(n) and 332 of the Communications Act, Regulatory Treatment of Mobile Services, GN Docket No. 93-252, Third Report and Order, 9 FCC Rcd at 8020 (para.56) *(CMRS Third Report and Order)*.

[37] *Id.* at para. 61.

[38] As explained earlier in Section II, *supra*, our analysis relied heavily on data that has been gathered and complied by trade associations and securities analysts; company releases, newspaper and periodical articles; and consultant materials made available to the Commission staff. While an analysis of competition within relevant geographic markets, as discussed in the *First Report*, would allow stronger conclusions about the extent of competition in the

B. Intra-Service Competition

1. Cellular Mobile Telephone Service

a. *Overview*

In the *First Report*, we stated that, although the cellular business, with two facilities-based carriers and no known case of a cellular system ceasing operations, is more competitive than many telecommunications markets have been in the past, it is not the model of perfect competition.[39] The FCC licensed two primary facilities-based cellular providers per market area, each licensed to operate on 25 megahertz of spectrum.[40]

As of December 1996, cellular subscribership grew 30 percent, compared to 40 percent growth reported in December 1995. Annual cellular subscriber growth has averaged 53 percent since 1987.[41] Subscribership increased from approximately 28 million in June 1995 to more than 44 million in December 1996.[42] Service revenues also continued their upward climb, reaching $12.4 billion by December 1996, a 30 percent increase over 1995 revenues.[43] Chart 1 illustrates the dramatic growth of the cellular industry since its inception.

As of December 1996, there were approximately 1,693 cellular systems licensed to operate in the United States. Systems that are controlled by local telecommunications companies serve approximately 50 percent of cellular customers, compared to approximately 56 percent a

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wireless industry, the general lack of market specific data makes this problematic. Therefore, we have structured the analysis in this Report to use the more readily available national and regional data relating to the CMRS industry. *See First Report*, 10 FCC Rcd at 8863-66 (paras. 57-64).

[39] *See First Report*, 10 FCC Rcd at 8866 (para. 65).

[40] Under the original licensing structure, the A Block license was reserved for a non-wireline entity and the B Block license for a wireline entity, generally an affiliate of the local exchange provider in that area. The marketplace has evolved considerably, with the A and B Blocks less clearly distinguished by the wireline and non-wireline dichotomy.

[41] *See* Table 1, and CTIA SURVEY.

[42] There were approximately 34 million cellular subscribers at the close of 1995. *Id*.

[43] *Id.*

year earlier.[44] As of December 1996, the top five cellular operators, measured by reported subscribers, were AT&T Wireless Services, Bell Atlantic Nynex Mobile, Southwestern Bell Mobile Systems, GTE Mobilnet, and BellSouth Cellular Corp.[45] The ten largest cellular carriers had approximately 32 million subscribers as of December 31, 1996, roughly 73 percent of the total subscribers in the United States.[46]

As of December 1996, the average monthly bill per subscriber was $47.70, down from $51.00 in 1995.[47] Since 1987, cellular bills have declined roughly 64 percent.[48] We believe this decline in the average monthly bill per subscriber is attributable in part to the increasing number of lower priced service packages that are attracting consumers previously unable or unwilling to purchase cellular service because of the perceived high cost of the mobile telephone and charges.[49]

b. *Competitive Trends*

In the following sections, we discuss several trends in the cellular industry since the *First Report*, such as growth in the consumer market, company consolidations, more pricing options, resale, and roaming, that are relevant to the competitiveness of the cellular industry.

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[44] *See, e.g.*, SALOMON BROTHERS, WIRELESS WORLD - THE MOBILE TELEPHONE INDUSTRY, Apr. 1996 (*Salomon Brothers*); Radio Communications Report (RCR), *Top 20 Cellular Carriers*, Apr. 15, 1996, at 14. Much of the change is a result of the spinoff of Three-Sixty by Sprint.

[45] *See* Table 2 for a listing of the major cellular carriers based on total U.S. subscribers.

[46] The ten largest cellular carriers served more than 24 million subscribers at year end 1995, roughly 72 percent of the total subscribers in the United States. *See* Tables 1 and 2 and CTIA SURVEY.

[47] CTIA SURVEY. The average monthly bill numbers are in current (nominal) dollars. Average cellular bills may vary substantially from city to city and region to region.

[48] *Id.* Table 3 shows the decline of the average monthly bill per subscriber for cellular service as reported by CTIA. We adjust CTIA's figures for inflation and report the decline in real dollars. BUREAU OF LABOR STATISTICS CONSUMER PRICE INDEX FILE (1982-1984 Base Year).

[49] *See, e.g.*, Congressional Testimony by Charles King, before the U.S. House of Representatives Committee on Commerce, Subcommittee on Oversight and Investigations, Oct. 12, 1995 (King Testimony). In 1983 the average lowest price phone cost $2,628, while in 1995 the average lowest price phone cost $53. Herschel Shosteck Associates, DATA FLASH - CELLULAR MARKET FORECASTS, QUARTERLY SURVEY, September 1995 (published June 1996), at Figure 6.1 (*Shosteck June 1996*).

(1) Growth in Consumer Market

Cellular service has continued to evolve from a primarily mobile (*i.e.* installed in a vehicle) communications tool to a combination mobile and portable/pedestrian based ``anytime, anywhere'' communications tool.[50] There are several possible reasons for this development. First, cellular operators have expanded the range of service offerings and price plans, thus making cellular service more affordable and attractive to more consumers. In general, cellular operators subsidize the cost of some hand-held phones substantially in order to build a larger subscriber base. As part of service package offerings, for example, service providers in many major markets offer customers light compact phones for as little as one penny, while they offer phones with additional features, such as expanded memory functions, for between $25 and $100. Second, an increasing number of consumers are buying cellular service subscriptions for primarily personal use, in particular, for personal security reasons.[51] A number of cellular operators in major markets are offering plans for those subscribers primarily seeking a safety link, in some cases including a roadside assistance plan.[52]

(2) Consolidation

The second half of 1995 and 1996 have witnessed continued consolidation among major cellular operators. Much of this consolidation has occurred in a continuing effort to create national and supra-regional footprints[53] of cellular coverage.[54] In addition, these consolidations are driven by a strategy of leveraging brand name recognition in the distribution of wireless services and products, increasing equipment purchasing power, and facilitating nationwide roaming. Specifically, in June 1995, AT&T completed its acquisition of McCaw Cellular to form AT&T Wireless Services. One month later, Bell Atlantic Mobile and NYNEX Mobile completed their merger to become Bell Atlantic NYNEX Mobile, a company supporting 3.58

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[50] One survey of cellular users found that 54 percent owned a portable phone, 25 percent owned a transportable ``bag'' phone, and 21 percent owned a car-mounted mobile phone. Cellular Integration, *1995 Cellular Users Survey Results*, Dec. 1995, at 28.

[51] According to a 1995 survey conducted by the Electronic Industries Association, 89 percent of respondents stated that it was the ability to communicate in an emergency situation that is the number one reason to own a cellular phone. CTIA, THE WIRELESS SOURCEBOOK - FALL UPDATE, Fall 1995, at 18.

[52] Such plans generally offer the subscriber 10-15 minutes of free talk time for a low monthly rate of $15-$20, with additional usage charged at a per-minute rate.

[53] ``Footprint'' is an industry term of art referring to the total geographic area in which a wireless provider can offer its services.

[54] Since the late 1980s and early 1990s, cellular carriers have been increasing their geographic reach by purchasing MSAs and RSAs surrounding their core markets. In most cases, these augmentations of service area have more accurately reflected the scope of demand for services.

million subscribers.[55] On August 16, 1996 AirTouch completed its acquisition of Cellular Communication Inc. (CCI). CCI has an indirect ownership interest in New Par which owns and operates cellular systems in Michigan and Ohio.[56] AirTouch and US West began phasing in their merger dating from July 1994. In May 1996, US West began providing cellular services under the Airtouch brand name in twelve states.[57] Upon completion of the merger, AirTouch's Brand name will cover most states west of the Mississippi and parts of Georgia. AirTouch and US West are currently seeking regulatory approval to enter the merger's second phase where the companies will combine their respective domestic cellular properties into a joint venture.[58] On November 5, 1996, SBC Communications, the parent company of Southwestern Bell Mobile Systems, and Pacific Telesis announced that the Department of Justice had cleared their proposed merger to create a company with access to over 80 million potential wireless customers across the United States.[59] SBC and Pacific Telesis have also received approval from this Commission and the Nevada Public Service Commission, and expect to complete this merger as soon as they receive regulatory approval from the California Public Utilities Commission. None of these mergers will alter the Commission's market structure of two cellular systems in each area. Where a merger involves the licensees of both cellular systems in an area, one of them must be divested.[60] In the same vein, all such combinations are governed by the Commission's 45 megahertz CMRS spectrum cap.

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[55] PR Newswire, *Bell Atlantic First Quarter Net Up 13.5 Percent*, Apr. 18, 1996; *but see* RCR Top 20, which lists only 3.4 million subscribers. RCR, *Top 20 Cellular Carriers*, Apr. 15, 1996, at 14. *See also* Bell Atlantic Media Relations Home Page, *Bell Atlantic and NYNEX Agree to Merger of Equals*, Apr. 22, 1996 (detailing planned merger of parent Bell Operating Companies). Bell Atlantic Mobile Systems, Inc. & NYNEX Mobile Communications Co., Order, 10 FCC Rcd 13262, 13368, *app. for review pending*.

[56] AirTouch Communications Inc., 10-Q filed Nov. 12, 1996. AirTouch owned approximately 37 percent of Cellular Communication's outstanding capital stock before the acquisition. AirTouch values the acquisition at $1.6 billion including liability less cash and cash equivalents acquired.

[57] AirTouch Communications Inc., 10-Q filed Nov. 12, 1996.

[58] RCR, *US West Will Adopt AirTouch's Moniker*, Mar. 25, 1996, at 26. US West's cellular properties cover a population of 20 million, including the major cellular markets of Seattle, Portland, Oregon, Denver, Phoenix, Minneapolis/St. Paul, and Salt Lake City. *Id.* AirTouch also uses its brand name in nine states in the Northeast.

[59] SBC Communications/Pacific Telesis Group Press Release, Nov. 5, 1996. Although Pacific Telesis currently owns no cellular properties, because they were spun off to AirTouch, it has reentered the wireless market as a PCS licensee.

[60] *See* Section 22.942 (b), 47 C.F.R. § 22.942 (b).

Other companies that appear to be pursuing supra-regional and regional cellular operations include 360° Communications Co. (Three-Sixty),[61] SBC, CommNet Cellular, BellSouth, and GTE. The operations of Three-Sixty cluster in major urban centers in the mid-Atlantic United States, Florida, Texas, and the mid-West from Ohio to Iowa.[62] SBC also has clustered its cellular properties, with the largest concentration spanning Texas, Oklahoma, Kansas, Missouri and Indiana. Smaller clusters are in operation in the Washington, D.C./Baltimore/Northern Virginia area, Upstate New York, and eastern Massachusetts. CommNet has a strong cellular presence in the Rocky Mountain states, the Dakotas, and throughout Kansas. BellSouth has properties throughout its region of operation, but also reaches into Illinois, and the southeastern portion of Wisconsin from Milwaukee to Green Bay. In addition, BellSouth is the A Block operator in Los Angeles and Bakersfield, California. Finally, GTE has clustered cellular properties throughout California, Florida, eastern Texas, the mid-Atlantic states, Washington, and Minnesota.

(3) More Pricing Options

We anticipate that package prices will continue to decline in response to the increase of service options available to consumers, which is creating a general downward pressure on the pricing of certain types of service packages. In addition, in order to increase market penetration, cellular operators are likely to continue to offer lower-priced service options.[63] There is some

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[61] In March 1996, Sprint formally ``spun-off'' its cellular properties as Three-Sixty. Sprint's application for transfer of control described the transfer as the best alternative for ``complying with the FCC divestiture requirements [required under Section 24.204 regarding overlap of attributable interests] while also promoting Sprint's PCS wireless strategy and maximizing stockholder value.'' See Sprint Application for Transfer of Control, Exhibit 2, Description of Transaction and Public Interest Showing. Sprint is pursuing its wireless strategy through its Sprint Spectrum PCS properties. *See* Section III.B.2, *infra*, for a discussion of Sprint and other PCS providers.

[62] Since completing its spinoff from Sprint, Three-Sixty has acquired cellular properties in North and South Carolina, Ohio, Pennsylvania, West Virginia, Kentucky, and Florida. Most of these markets adjoin properties already held by Three-Sixty and appear to advance its strategy of regional market clustering. E. Mooney, *Three-Sixty Goes After Clustered Regional Strategy Through U.S.*, RCR, May 13, 1996, at 15. *See also* Communications Daily, *Large Players Consider Bundling Strategies To Win Customers*, Mar. 27, 1996, *quoting* Dennis Foster as saying that Three-Sixty will ``dominate second and third tier markets, where in some cases LECs are threatening to boost local costs to balance local and toll charges . . . . [S]uch markets are easier to enter and dominate.'' On November 1, 1996, Three-Sixty completed the acquisition of Independent Cellular Network Inc. which operates cellular licenses and systems in Kentucky, Ohio, Pennsylvania, and West Virginia for $514 million. Three-Sixty 10-Q, filed Nov. 14, 1996.

[63] Herschel Shosteck Associates, CELLULAR MARKET FORECASTS, VOLUME 9, April 1995 (SHOSTECK April 1995), at 29. The analysis in the following paragraphs uses data reported by SHOSTECK June 1996. This data is for the lowest available rates for prime time minutes. However, the use of this data is subject to a number of caveats: (1) We do not have the underlying data used by Shosteck and therefore are not able to verify its accuracy. (2) Contract terms may vary across markets within each year, and may vary over time (SHOSTECK June 1996 Appendix A and B notes). (3) Wireless carriers have been in the process of converting their analog systems to digital systems since 1992 and increasing their deployment of microcells since 1994 (SHOSTECK June 1996 Figure 1.6 Notes) Coincident

evidence that the prices for monthly access to cellular service, which may include bundled airtime, has not changed since 1991.[64] Some evidence suggests per minute charges have fallen since 1991,[65] and most publicly traded cellular firms report a continuing decline in the average monthly bill for cellular subscribers.[66] These trends may continue as carriers continue their efforts to attract new customers and to induce current customers to use their phones more frequently.[67]

Greater geographic scope has broadened the number of pricing packages as well. In terms of addressing demand from intensive-usage customers, principally business customers, these carriers are emphasizing the regional and national scope of their operations and expertise. Therefore, they are competing by increasing the geographic range of service plans[68] and reducing the fees charged for roaming.[69] Pricing in this area is beginning to show signs of downward

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with these developments has been an increase in the variety and number of plans with free minutes. Thus, the rates reported by Shosteck may only be available to subscribers with digital phones. As a result, some price reductions may only be available to those customers that purchase digital service. The effect of the latter two caveats may be to overstate plan price reductions as they may not apply to analog customers that comprise the majority of cellular customers.

[64] *Id.* Herschel Shosteck Associates reports that the price of access for the ten major cellular markets, in nominal dollars, has increased 12 percent between 1991 and 1995. (SHOSTECK, June 1996 Appendix B-1) However, in real dollars there has been no change in the average price of access for the 10 markets surveyed by Shosteck. We adjust Shosteck's figures to account for inflation using the Consumer Price Index for all urban consumers, as reported by the Bureau of Labor Statistics Data.

[65] This analysis is subject to the caveats listed in footnote 69. An analysis of the lowest available rates for prime time minutes in the ten major cellular markets from 1991 to 1995 show, in real dollars, a 30 percent decrease for 250 minutes, an 27 percent decrease for 150 minutes, and 20 percent decrease for 50 minutes, with most of the decline occurring since 1993. (SHOSTECK June 1996, Appendix A-4 to A-8), and Consumer Price Index for All Urban Consumers as reported by the Bureau of Labor Statistics Data.

[66] *See, e.g.*, 1996 Third Quarter 10-Qs by AirTouch, Three-Sixty, US Cellular, Vanguard, Century Telephone, Western Wireless, Palmer Wireless, Commnet Cellular, and InterCel.

[67] SHOSTECK April 1995, at 30. According to Shosteck, cellular carriers are reappraising their pricing strategies to prepare for competition from PCS providers. Shosteck argues that cellular carriers will continue to reduce their prices for 150 and more minutes of airtime, in order to further attract business usage, and begin to reduce prices for limited minutes of airtime and access, in order to continue to attract the consumer market. The latter strategy will be facilitated through the offering of ``area tariff bands'' which will cover a home band smaller in size than regular coverage areas. Thus, for those who use their phones outside of the home band, prices will be higher. *Id.*

[68] For example, Bell Atlantic NYNEX Mobile offers a Mobilnet service plan which provides predictable pricing across the geographic range of BANM operations along the northeastern United States metropolitan corridor.

[69] In some cases, several independent operators have entered into agreements designed to facilitate roaming, which offers mutual benefits to these carriers in customer retention.

movement. For example, Bell Atlantic/NYNEX expanded its local calling area from Maine to Georgia and is charging 69 cents per minute for calls within that area, BellSouth reduced the charge for cellular roaming by eliminating the $3.00 daily roaming rate and reducing the per minute charge for roaming calls from 99 cents to 65 cents, and is charging its digital customers 45 cents per minute to roam on other GSM systems, and US West expanded its home-rate zones to reduce the number of roaming charges for certain types of subscribers.[70]

In order to continue to broaden their customer base, carriers are offering service plans built on relatively narrowly defined geographic coverage areas, or types of consumers. Examples of the former type of plan include the "Security Plans" offered by many providers, and the TalkAlong programs offered by operators such as BANM and AirTouch. These carriers are competing by providing an entry-level, lower priced service plan that enables the user to make calls at one rate within a specified market area, while paying a significantly higher rate for calls made outside that area. In addition, some carriers are offering prepaid phone service to consumers with tight budgets or poor credit histories who traditionally would have been rejected service. Reports indicate that 20 to 60 percent of customers applying for mobile phone service are denied contracts due to an inadequate or poor credit history.[71] Cellular One, Southern New England Telephone (SNET), SBC, Alltel, Ameritech, GTE Mobilenet, Frontier and other carriers have packages that typically include a phone and a prepaid phone card. The prepaid phone cards can be bought in dollar value increments ranging from $25 to $100, and these consumers' airtime rates range from 38 cents to 70 cents per minute.

Thus, some carriers, in concentrating on their usage-intensive customers, are creating larger geographic home markets and reducing roaming charges at the same time that they are offering service plans designed to attract the mass-market consumers whose use of the phone is

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[70] PR Newswire, *BellSouth Mobility DCS Customers Can New Use Digital Mobile Phones In Major Cities Across U.S.*, Nov. 26, 1996; BellSouth Press Release, *BellSouth Mobility Reduces Roaming Rates to More than 450 Cities in the U.S.*, Apr. 3, 1995; P. Weaver, *From Wireless Phones To Mobile Offices*, Nation's Business, Feb. 1, 1996; Newsday, *Money and Careers*, Dec. 1, 1996.

[71] *See*, Business Wire, *Cellular One Launches Prepaid Calling Card Service*, Nov. 21, 1996; Business Wire, *Centigram Provides Next Generation Of Mobilemanager Applications For Service Providers; New Features In Prepaid Cellular, Debit Card Services Meet Needs of Today's Users While Increasing Network Usage*, June 25, 1996; Dallas Morning News, *SW Bell Hopes Prepaid Cellular Will Extend Reach*, Oct. 15, 1996; Mobile Phone News, *Cellular Carriers Using Prepaid Offering To Tap New Segments*, Oct. 7, 1996; Mobile Phone News, *Carriers Recognize Need for Prepaid Service Offering*, Aug. 5, 1996; Mobile Phone News, *Companies Introduce Different Versions of Cellular Prepaid*, Apr. 8, 1996; and PR Newswire, *Frontier Launches Prepaid Phone Card Program with DigiTEC 2000, A Leading Prepaid Distributor*, Jan. 15, 1997.

expected to be much more limited, both in terms of call volume and geography. These two trends speak to companies' efforts to expand the reach of their operations and to facilitate penetration into each market's potential subscriber base.

(4) Increased Resale

The presence of resellers is an added factor in intra-cellular competition. Resellers, who buy airtime at wholesale rates from facilities-based providers and resell it at retail prices, add to the mix of service options available to consumers.[72] For example, MCI, the largest reseller of cellular service, has created a combined package of cellular service and its long distance service in an effort to differentiate itself from its facilities-based CMRS competitors. Other resellers target niche markets, such as certain small businesses or consumers that meet a particular profile. Some resellers, for example, market a prepaid cellular service to consumers with poor credit ratings. Under this approach, a company pairs a shrink-wrapped phone and prepayment arrangements into the handset in order to attract people who have poor credit and who cannot secure cellular service through primary cellular providers, or people who prefer to closely monitor their usage of a cellular phone by paying in advance.[73]

MCI has pursued a strategy based entirely on resale to achieve national scope and scale economies by providing wireless services in conjunction with its more recognized branded long distance service. In May 1995, MCI purchased Nationwide Cellular Service Inc., the largest reseller of cellular telephone services in the United States,[74] and in April 1996, MCI announced its intention to increase cellular service to create a nationwide presence through resale.[75]

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[72] *See* Interconnection and Resale Obligations Pertaining to Commercial Mobile Radio Services, CC Docket No. 94-54, First Report and Order, FCC 96-263, 61 FR 38399 (July 24, 1996), at paras. 10-11.

[73] One such company, Telemac Cellular Corp., is marketing a phone to carriers that functions like a credit-paid cellular phone, such as those found in rental cars. In this case, however, customers have several options to pay for airtime, including credit and debit cards, cash, and ATM transactions. Another company, JRC, offers its service to dealers, retailers and distributors rather than to carriers. Customers buy a phone and debit cards with blocks of prepaid airtime, which can be increased at any time by the customer. Airtime costs 70 cents per minute, but there are no activation or monthly fees or deposits. Mobile Phone News, *Companies Introduce Different Versions Of Cellular Pre-Paid*, Apr. 8, 1996.

[74] Resellers buy cellular service at wholesale rates from licensed cellular operators and resell those services to consumers. As discussed below in the discussion of PCS, MCI recently agreed with NextWave to resell service on its nationwide PCS system. PR Newswire, *MCI, NextWave Sign 10-Year 10-Billion Minute National PCS Airtime Agreement*, Aug. 26, 1996

[75] Reuters, *MCI To Expand Cellular Services*, Mar. 25, 1996; L. Sakelaris, *MCI Works At 1994 Promise To Be ``Formidable'' In Wireless*, RCR, Apr. 8, 1996, at 10. MCI began offering local cellular service in Connecticut and western Massachusetts in December 1996, and initiated its service by offering all corporate customers free domestic cellular long distance (up to $50 per month for each line) for twelve months that if they sign up by March

Through the resale of A-band and B-band licensees' airtime, MCI offers cellular service in over 30 markets covering almost 55 percent of the U.S. population, including New York, Los Angeles, Chicago, Washington/Baltimore, Miami, Boston, San Francisco, Dallas, Houston, Philadelphia, Atlanta, Denver, and Minneapolis.[76]

While resellers in general have a presence in most major and second tier markets, they do not appear to be pursuing major business strategies.[77] The primary reason for this is that resellers generally lack brand recognition as well as value-added functionality, such as intelligent switching and long distance infrastructure. Moreover, as a general matter, resellers contribute to the marketplace by increasing the range of choice for consumers, but it remains the case that resellers provide service to a small percentage of the total cellular subscribers.[78] Finally, there is insufficient data to assess the extent, if any, of any downward trend in cellular pricing in particular geographic areas resulting from competition from cellular resellers.

(5) Facilitating Roaming

Roaming is an integral part of the major cellular operators' national strategies. Roaming revenues in 1996 amounted to $2.8 billion, or about 12 percent of total 1996 revenues.[79] As discussed above, pricing in this area is beginning to show signs of decreasing. Several carriers have entered into roaming alliances. AirTouch, Bell Atlantic Nynex Mobile and US West provide seamless roaming for their customers through the Independent Telecommunications Network (ITN), and Ameritech Cellular Services, BellSouth Mobility, GTE Mobilnet, Southwestern Bell Mobile Systems, and Alltel provide seamless roaming through Mobilink. Arrangements

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31, 1997. Communications Daily, Dec. 4, 1996.

[76] Business Wire, *MCI Cellular Expands to St. Louis, Pittsburgh and Austin Markets*, Jan. 9, 1997.

[77] 47 C.F.R. § 22.901(e). The Commission extended the resale rule (prohibiting providers of cellular, broadband PCS, and wide-area SMR from unreasonably restricting the resale of their services) for five years beyond conclusion of the initial round of licensing currently-allocated broadband PCS spectrum. The rule would ``sunset'' at that time. *See* Interconnection and Resale Obligations Pertaining to Commercial Mobile Radio Services, CC Docket No. 94-54, Report and Order, FCC 96-263, 61 FR 38399 (July 24, 1996).

[78] Of total cellular subscribers, the top twenty cellular resellers serve a little more than 2 percent of total subscribers, or 748,000. Among the top twenty resellers, MCI controls 50 percent of those subscribers. RCR, *RCR Top 20 Cellular Resellers*, Mar. 11, 1996.

[79] CTIA, SEMI-ANNUAL DATA SURVEY RESULTS, March 3, 1997. Roaming revenues were $2.5 billion, or 13 percent of revenues in 1995.

such as these allow carriers to realize savings through bulk contracts and shared distribution facilities.[80] In addition, AT&T has entered a roaming agreement with Palmer Wireless to provide roaming capabilities for AT&T's digital subscribers when they enter Palmer Wireless' area.[81]

2. Personal Communications Services

The Commission has allocated 153 megahertz of spectrum for PCS, which is divided into three broad categories: broadband, narrowband, and unlicensed PCS.[82] A fundamental characteristic of this allocation is to allow the market, rather than the Commission, to determine the best use of this spectrum. The Commission has defined PCS as a ``wide array of mobile, portable and ancillary communications services to individuals and businesses.''[83] Broadband PCS licenses, for example, can be used for any mobile or fixed service, in contrast to the Commission's earlier allocations, which tended to be for specific services, such as mobile telephone, dispatch, or paging. Broadband PCS providers are initially offering primarily mobile telephone service, with enhanced features such as paging and data. Narrowband PCS providers have started to offer advanced paging-like and messaging services. The Commission also expects that PCS generally will inject major new competition into the mobile telecommunications market by creating at least three new major competitors to cellular and to other current CMRS providers in each geographic

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[80] Mobile Phone News, *Mobilink Members Improve Roaming Service*, Apr. 29, 1996. Under this arrangement, a customer who is roaming and needs customer service would be connected to a representative of their home market service provider. *See also* Mobile Phone News, *Alliance Provides Seamless Roaming*, May 13, 1996. The alliance through ITN will also be used to provide seamless nationwide roaming between the member companies' cellular and PCS networks. *Id.*

[81] PR Newswire, *Palmer Wireless in Roaming Agreement with AT&T Wireless*, Oct. 16, 1996. Palmer Wireless owns and operates 17 non-wireline cellular telephone systems in Florida, Alabama, Georgia, and South Carolina.

[82] Unlicensed PCS is not considered CMRS. Unlicensed PCS received an allocation of 30 megahertz from the Commission. Unlicensed PCS will consist of terminal devices, such as telephones, without centralized base stations. The devices will likely consist of new cordless telephones, local area networks in offices, and other kinds of short-range communications. Unlicensed PCS operations are restricted to very low power, which limits their range but enables spectrum to be reused quite efficiently. The Commission expects unlicensed PCS to be used as a substitute for fixed telephone service in homes and offices. Although this Report will not discuss unlicensed PCS, to the extent that it becomes a substitute for fixed wireline telephone service in the future, unlicensed PCS will be discussed in subsequent reports in the relevant portion of the competitive analysis.

[83] *See, e.g.*, Implementation of Section 309(j) of the Communications Act, Competitive Bidding, PP Docket No. 95-253, Notice of Proposed Rulemaking, 8 FCC Rcd 7635, 7654 (para. 116) (1993) (*Competitive Bidding NPRM*).

area. Recent rule changes that permit PCS licensees to assign a portion of their spectrum to another entity should further facilitate additional CMRS entry.[84]

a. *Broadband PCS*

(1) Overview

The Commission has allocated 120 megahertz of spectrum to broadband PCS, which has been divided into 6 bands: 3 bands each containing 30 megahertz (Blocks A, B and C), and 3 bands each containing 10 megahertz (Blocks D, E and F).[85] In June 1995, the Commission licensed Blocks A and B for 51 MTAs.[86] The majority of these licenses went to companies, or joint ventures of companies, that are already established in the cellular business.[87] On May 6, 1996, the Commission completed the C Block auction for 493 BTA licenses. The C Block auction was limited to entrepreneurs, and winning bids in the auction totaled $10.1 billion, net of bidding credits. Companies owned by women won 95 licenses, minority-owned companies won 150 licenses, and rural telephone companies won 27 licenses. Eighteen of the C Block licenses were reauctioned to entrepreneurs in July 1996 after BDPCS and National Telecom PCS failed to make their required down payments.[88] Winning bids in the C Block reauction totaled $904 million. Companies owned by women won 2 licenses, minority-owned companies won 2 licenses, and a single rural telephone company won a license. Most of the C Block licenses have been issued. On January 14, 1997, the Commission completed the simultaneous DEF Block auction of 1,472 broadband PCS licenses.[89] Winning bids, net of bidding credits, totaled

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[84] Geographic Partitioning and Spectrum Disaggregation by Commercial Mobile Radio Services Licensees, WT Docket No. 96-148, Implementation of Section 257 of the Communications Act -- Elimination of Market Entry Barriers, GN Docket No. 96-113, Report and Order and Further Notice of Proposed Rulemaking, FCC 96-474, released Dec. 20, 1996, at para. 13.

[85] Amendment of the Commission's Rules to Establish New Personal Communications Services, Memorandum Opinion and Order, GN Docket No. 90-314, 9 FCC Rcd 4957, 4963, 4970-71 (paras. 17, 26-27) (1994) (*PCS Memorandum Opinion and Order*).

[86] *Id.*, 9 FCC Rcd at 4969-70, 4988 (paras. 24 n.23, 26, 78); Commission News Release 54546, FCC Grants 99 Licenses for Broadband Personal Communications Services in Major Trading Areas, released June 23, 1995.

[87] *See* Table 4 for a complete list of the licensees in Blocks A and B.

[88] The discussion in Section III.B.2.a.4 describes the auction results in detail.

[89] Federal Communications Commission, Public Notice, *D,E,and F Block Auction Closes - Winning Bidders in the Auction of 1,479 Licenses to Provide Broadband PCS in Basic Trading Areas*, DA- 97-81, Jan. 15, 1997. There were no final winning bids made for 7 of the 1479 licenses auctioned at the DEF Block auction. *See* Table 5b for a complete list of D,E, and F Block auction winners.

$2.5 billion. While the F Block licenses were limited to entrepreneurs, entrepreneurs also won licenses in the D and E Blocks. Small businesses won 41 percent of the licensees.

Generally, broadband PCS system design will be similar to cellular, except that these systems will operate in a digital format upon their inception, and hence will have greater capacity than the traditional analog systems.[90] However, because of the propagation characteristics of the broadband PCS frequencies, many more cells and base stations will be required than for cellular. This may increase the cost of infrastructure for broadband PCS compared to that for cellular.[91]

(2) Inauguration of Service

Eight broadband PCS licensees --Sprint, Western Wireless, BellSouth, Powertel, Pacific Bell, Primeco PCS, Omnipoint, and GTE Mobilnet -- have already inaugurated service in portions of 29 MTAs. In eight large markets, Des Moines, Honolulu, Jacksonville, Milwaukee, Oklahoma City, Portland, Salt Lake City, and San Diego, there are now two PCS licensees in operation. Announcements from many A and B block PCS licensees indicate that they will introduce PCS in much of the United States during 1997. [92] These start-up operations provide some indication of how PCS operators will compete in the wireless marketplace.

In November 1995, American Personal Communications (APC) became the first company to initiate commercial broadband PCS service in the United States. APC markets its service in the Washington, D.C./Baltimore MTA under the Sprint Spectrum brand.[93] By Sprint/APC's own estimation, it has attracted over 100,000 subscribers since it began offering service in November

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[90] In contrast, cellular systems are predominantly analog systems, although cellular operators continue to upgrade their systems to digital.

[91] Neither of these factors appears to be discouraging entry into the PCS market.

[92] Sprint plans to introduce service in New York, San Francisco, Dallas-Ft. Worth, Boston, Miami, Minneapolis-St. Paul, Denver, Seattle, and Kansas City by the first half of 1997. Thus, Sprint's service will be available in 65 cities nationwide at the completion of the first phase of its launch in 1997. Associated Press, *Sprint Plans Mobile Service*, Dec. 15, 1996.

[93] APC is 51 percent owned by APC, Inc., which acts as managing general partner, and 49 percent owned by Sprint Telecommunications Venture, also known as Sprint Spectrum.

1995.[94] Sprint/APC also claim that it is taking 35 percent of new wireless voice subscribers in the Washington, D.C./Baltimore area.[95]

In March 1996, Western Wireless inaugurated its VoiceStream PCS service in Honolulu, Hawaii.[96] On June 27, 1996, it introduced VoiceStream service to Salt Lake City, Utah,[97] on July 29, 1996 in Albuquerque, New Mexico, on August 14, 1996 in Portland, Oregon, on November 21, 1996 in Oklahoma City,[98] and on December 31, 1996 in Des Moines, Iowa.[99] Western Wireless reported having 17,600 subscribers in its four markets as of the end of September 1996.[100]

On July 18, 1996, BellSouth Mobility DCS[101] launched its service in Charlotte, North Carolina, Greenville-Spartanburg, South Carolina, and the Knoxville and Tri-Cities areas in Tennessee, and two PCS providers began operations in October 1996. Pacific Bell Mobile

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[94] This subscriber number is as of the end of July, 1996. *See* PR Newswire, *New Sprint PCS Technology Center to be Focal Point for All-Digital Nationwide PCS Network State-of-the-Art Facility Will Serve as Network Control and Testing Center*, Oct. 29, 1996.

[95] Reuters, *Sprint Spectrum Seen Self-Financing By 2001*, May 23, 1996.

[96] L. Bonnema, *Western Wireless Says `Aloha' to PCS*, RCR, Mar. 11, 1996 (*Bonnema*), at 1. VoiceStream has constructed 50 tower sites providing coverage across the island of Oahu and into parts of the neighboring islands of Kauai and Maui, but expects to provide coverage to the entire State by 1998.

[97] Business Wire, *Western Wireless Launches Nation's Third PCS System;Start of PCS Service in Utah is Digital Equivalent of 19th Century Linking of Telegraphs and Railroads*, June 27, 1996.

[98] Business Wire, *Western Wireless introduces PCS in Oklahoma City*, Nov. 21, 1996.

[99] Business Wire, *Western Wireless Introduces PCS in Des Moines*, Dec. 31, 1996.

[100] Business Wire, *Western Wireless Announces Third Quarter 1996 Financial Results, Nov., 12, 1996. See* also, Merrill Lynch, *So, How Do PCS Rate Plans Compare To Cellular*, Telecommunications/Wireless Bulletin, June 28, 1996, at 2. Merrill Lynch estimates that Western Wireless is continuing to add subscribers at about the same monthly rate. Based on such an extrapolation, Western Wireless would have approximately 13,200 subscribers by the end of August 1996. There is no similar subscriber data available for Western Wireless' Salt Lake City, Albuquerque, and Portland, Oregon operations.

[101] BellSouth Personal Communications has changed its name to BellSouth Mobility DCS, with DCS standing for ``digital communications services.'' The company will operate independently from BellSouth Mobility in the MTA covering North Carolina and South Carolina and the MTA covering Eastern Tennessee, which cover roughly 12 million people. A recent press release from BellSouth Mobility DCS states that it will price its services ``slightly'' below current cellular rates in each market with packages that will include a number of minutes of use and other features at no additional charge. PR Newswire, *BellSouth Readies New Name, Marketing, For PCS*, June 4, 1996.

Services launched service in San Diego on October 29, 1996. Powertel launched its service in Alabama (Montgomery and Tuscaloosa), Memphis, Tennessee, and Jacksonville, Florida.

Two PCS providers began operations in November 1996. On November 13, 1996, PrimeCo launched service in Norfolk and Richmond, Virginia; Jacksonville, Miami, Orlando, and Tampa, Florida; Chicago; Milwaukee; New Orleans; Dallas/Ft. Worth, Houston, and San Antonio, Texas; and Honolulu. PrimeCo is the first PCS licensee to initiate service using CDMA technology. Omnipoint started service in New York City on November 14, 1996, and although its will ultimately use a proprietary hybrid technology, the current system uses GSM technology.[102]

Sprint, Powertel, and Western Wireless broadened their service areas in December 1996. Sprint launched service in San Diego, Fresno, Milwaukee, Portland, Spokane, Albany, Syracuse, and Pittsburgh in December 1996.[103] Powertel broadened its operations in Alabama (Birmingham, Anniston, Dothan, Florence and Gadsden), Florida (Panama City, Gainesville, and Tallahassee) and Mississippi (Tupelo).[104] Western Wireless added the Des Moines, Iowa metropolitan area to its list of operating service areas on December 31, 1996.[105]

Finally, since the beginning of 1997, GTE Mobilnet inaugurated its service in Cincinnati, and Sprint, Powertel, and Pacific Bell continued to broaden their service areas. On February 6, 1997 Pacific Bell launched its service in Las Vegas, Nevada and Powertel expanded its operations into Huntsville, Alabama, and GTE Mobilnet launched its service in Cincinnati on February 18, 1997.[106] Sprint has activated PCS systems in six areas (Salt Lake City on January 21, 1997, Oklahoma City and Tulsa on February 20, 1997, and Little Rock, Des Moines, and the Rio

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[102] Omnipoint expects to have statewide coverage in New York by the end of 1997. PR Newswire, *NYPA Agrees to Let Omnipoint Put PCS Antennas On Towers,* Nov. 26, 1996.

[103] Newsbytes News Network, *Sprint Starts New PCS Service in 4 Cities*, Dec. 16, 1996, PR Newswire, *Sprint PCS(SM) Launches Advanced wireless service In San Diego, Pittsburgh, Albany, and Syracuse,* Dec. 30, 1996. Sprint initiated service in Washington DC/Baltimore using GSM technology, but its other markets are utilizing CDMA technology.

[104] InterCel Press Release, *Powertel Opens Six New Markets*, Dec. 13, 1996, and InterCel Press Release, *Powertel's PCS Coverage Continues to Expand as Additional Major Markets Open for Business*, Dec. 17, 1996.

[105] Business Wire, *Western Wireless Introduces PCS in Des Moines*, Dec. 31, 1996.

[106] Business Wire, *Powertel Launches PCS in Huntsville; Another Market Opens Utilizing Global System For Mobile Communications Digital Technology,* Feb. 6, 1997; Business Wire, *Nevada Bell Mobile Services Launches Digital PCS In Las Vegas,* Feb. 6, 1997; Business Wire, *GTE Activates its first PCS wireless network in Cincinnati,* Feb. 18, 1997.

Grande Valley area in Texas on February 25, 1997) since January 1, 1997.[107] Thus, since issuing our *First Report*, eight broadband PCS licensees --Sprint, Western Wireless, BellSouth, Powertel, Pacific Bell, Primeco PCS, Omnipoint, and GTE Mobilnet -- have inaugurated service in portions of 29 MTAs, and eight major cities (Des Moines, Honolulu, Jacksonville, Milwaukee, Oklahoma City, Portland, Salt Lake City, and San Diego) have two PCS licensees in operation. Most of the remaining A and B block broadband PCS licensees are expected to turn on their systems by mid-1997.

Several major broadband PCS licensees appear to be pursuing national scope strategies.[108] In addition, a number of licensees planning to use GSM technology have entered into roaming agreements to increase their geographic coverage. These include BellSouth, Omnipoint, Pacific Bell Mobile Services, Western Wireless, and Sprint/APC.[109] AT&T Wireless, which holds 21 broadband PCS licenses, is expected to launch its first PCS system in Atlanta in early 1997,[110] and in the northeast region of the Nation by mid-1997.[111] AT&T has consistently based its PCS planning on a frequency-independent wireless strategy that seeks to create a seamless wireless network spanning its cellular and PCS systems and employing dual mode, dual band phones and one-company branding.[112]

(3) Pricing Plans

Sprint/APC has created several pricing plans in an effort to both compete directly with its local cellular competitors and to differentiate itself as a new service concept in comparison

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[107] PR Newswire, *Sprint PCS(SM) Continues Service Launch, Adding Six Cities To What Will Be America's First 100% Digital Nationwide PCS Network Nortel Markets Begin Launching as Part of Sprint PCS National Network,* Feb. 26, 1997.

[108] *See* Chart 2 for a list of the major PCS licensees, ranked according to the population of their geographic service area.

[109] M2 Presswire, *PACIFIC BELL: Pacific Bell Mobile Services signs roaming agreements with four GSM-based carriers,* Sept. 19, 1996, Mobile Communications Report, *In The News: PrimeCo and Omnipoint Launch PCS Services,* Nov. 18, 1996.

[110] PCS Week, *AT&T Wireless Eyes C-Block Licensees As Potential Partners,* May 15, 1996.

[111] M. Mills, *Ringing in the New*, Wash. Post, Washington Business Section, 1, 14 (Jan. 13, 1997).

[112] The two modes would be analog and digital (TDMA), while the two bands would be those occupied by cellular and broadband PCS. *See, e.g.,* Newaves, *In The Hot Seat*, Dec 95/Jan 96. Steve Hooper, president of AT&T Wireless, is quoted as saying ``this should prove to be an important early-to-market edge to AT&T Wireless in the impending industry-wide push to sign up customers.'' *See also* Newaves, *Inner View of Steve Hooper* (interview with Steve Hooper), Mar. 1996, at 24, wherein Hooper states that ``we do not see a service distinction between PCS and cellular . . . It is a function of digital technology, not a function of frequency.''

to cellular providers. Sprint/APC's basic calling package starts at $15 a month for access, which includes the first fifteen minutes of outgoing calls free, the first minute of each incoming call free, $0.31 a minute airtime charge above that, regardless of the time of day, a flat rate of $0.50 per minute for calls placed or received outside of the subscriber's home area, a built in pager, caller ID, and voice messaging. There is no activation fee; however, subscribers must purchase one of three phones, which range in price between $129 and $200. In contrast to practices followed by many cellular carriers, Sprint/APC does not require new customers to commit to a minimum period during which they will continue to take the service and pay a penalty if they discontinue.

Western Wireless is giving prospective subscribers in its markets a choice of handsets, which combine a wireless phone, numeric pager, and answering machine, as well as caller identification, call hold, and call waiting.[113] Similar to Sprint/APC, VoiceStream also makes available optional advanced integrated voice, facsimile, and data messaging. Western Wireless offers different sets of packages in Honolulu and Salt Lake City. In Honolulu, VoiceStream has four service plans, with the lowest cost plan priced at $20 per month with 15 minutes of free airtime and a $25 activation fee. Western Wireless charges 25 cents per minute for additional airtime, but, like APC, the first minute of every incoming call is free. It also charges 10 cents per minute for calls placed from one PCS phone to another PCS phone anywhere in the United States. Unlike APC, VoiceStream's service plans require a one-year contract. The three other service plans are priced at $30, $60, and $100, and each varies in the amount of bundled minutes and peak and off-peak per minute charges. In terms of VoiceStream's cellular competitors in Hawaii, Honolulu Cellular and GTE Mobilnet cover the entire State of Hawaii and offer a range of service packages. In Salt Lake City, VoiceStream is competing with AT&T Wireless and Airtouch Cellular. VoiceStream offers five service plans, with the lowest cost one the same as that described above for Honolulu.

BellSouth's product is similar to that of Sprint/APC and Western Wireless. BellSouth is offering three service plans in a three state area that vary according to the competitive wireless providers in the area.[114] The plans include monthly usage, airtime, and a number of advanced features at no additional charge. BellSouth does not charge for the first minute of all inbound calls, does not require a long-term contract or charge for roaming within the three state region,

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[113] The two phones, the Nokia 2190 portable and the Motorola PCS Flare pocket phone, retail for $200 and $250, respectively. In comparison, Honolulu Cellular, which is majority owned by BellSouth Cellular Corp., offers phones in the zero to $39 range.

[114] Communications Today, *BellSouth Launches PCS in Three States*, July 19, 1996.

but does charge a one-time activation fee of $25. In addition, their subscribers can roam on other GSM systems for 45 cents per minute.[115]

Powertel's pricing is similar to its cellular competitors' for high use customers, it is offering significant price discounts relative to its cellular competitors on relatively low usage packages. Powertel is not requiring long-term contracts, and is not charging for the first minute of all incoming calls. However, in an attempt to, "reach new customers that may have steered clear of wireless due to horror stories of runaway phone bills and stolen phone numbers," Powertel offered a limited holiday promotion for unlimited local calling within its entire coverage area for all of 1997 for $50 a month to subscribers that signed up before January 18, 1997.[116]

While Omnipoint's three pricing plans differ in the number of free minutes and number of features selected by the subscriber rather than in the price of additional air-time. Each plan includes $5 worth of calls, and similar to other PCS entrants, Omnipoint is not requiring long-term contracts. Calls to other Omnipoint handsets are charged at local off-peak rates, and all calls to anywhere in North America, Puerto Rico, U.S. Virgin Islands, and roaming calls are charged $0.69 per minute.

PrimeCo, a partnership of AirTouch, Bell Atlantic NYNEX Mobile, and US West is offering two levels of service: TalkAlong, which is a mass market service modeled after a same-named cellular service package, and PowerBand, which will be marketed as a high-end service package incorporating enhanced features such as paging, caller ID, and data capabilities. PrimeCo charges a subscriber the same "home rate" for any calls within the subscribers home state or within any state in which PrimeCo offers service.

Like most of the PCS licensees, Pacific Bell is not requiring customers to sign long-term contracts, however, Pacific Bell does not have peak and off-peak rates. It is offering four levels of service plans which differ in both their number of free minutes and the per minute airtime rate. Subscribers can pay $19.95 a month for 20 minutes of free airtime, and $0.40 per minute for additional airtime; $36.96 a month for 90 minutes of free airtime, and $0.30 per minute for any additional airtime; $64.95 a month for 180 minutes of free airtime and $0.25 per minute for any additional airtime; or $89.95 a month for 330 minutes of free airtime and $0.20 per minute for any additional airtime.[117]

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[115] BellSouth Mobility has entered roaming agreements with other GSM providers (Omnipoint, Pacific Bell, and Western Wireless). *PR Newswire*, BellSouth Mobility DCS Customers Can Now Use Digital Mobile Phones In Major Cities Across U.S., Nov. 26, 1996.

[116] Business Wire, *Clarification of BW1318, Powertel/Intercel*, Dec. 9, 1996.

[117] Business Wire, *Nevada Bell Mobile Services Launches Digital PCS in Las Vegas*, Feb. 6, 1997.

(4) C, D, E, and F-Block Auctions

On May 6, 1996, the Commission completed the auction of 493 licenses to provide broadband PCS on the C Block in the 2 GHz band. These licenses authorize service on 30 megahertz of spectrum in 493 Basic Trading Areas (BTA) and BTA-like areas. Unlike the A and B Block auctions, which were open to all interested bidders, participation in the C Block auction was limited to entrepreneurs.[118] This "entrepreneurs" auction was designed to fulfill requirements established by the *Omnibus Budget Act*. Section 309(j)(4)(D) provides that, in prescribing competitive bidding regulations, the Commission shall, *inter alia*:[119]

> [E]nsure that small businesses, rural telephone companies and businesses owned by members of minority groups and women are given the opportunity to participate in the provision of spectrum-based services, and, for such purposes, consider the use of tax certificates, bidding preferences, and other procedures ...

For the C Block auction, the Commission eliminated the race- and gender-based measures to avoid further delay in the auction and legal uncertainties raised by the Supreme Court's decision in the *Adarand* case.[120] The Commission modified its rules for this auction to include bidding preferences for small businesses only, and emphasized that the limited proposal should not be read to indicate that it has concluded that race- or gender-based measures are inappropriate for future spectrum auctions.[121]

Bidding preferences for small businesses participating in the auction included a 25 percent bidding credit for all businesses with $40 million or less in gross annual revenues over the past three years. These same participants were also given the option of paying for their

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[118] The Commission designated frequency Blocks C (1895-1910/1975-1990 MHz) and F (1890-1895/1970-1975 MHz) as ``entrepreneurs' blocks.'' *See* Implementation of 309(j) of the Communications Act, Competitive Bidding, PP Docket No. 93-253, Fifth Report and Order, FCC 94-178, 9 FCC Rcd 5532, 5584 (paras. 118-29)(1994).

[119] *Communications Act*, 47 U.S.C. § 309(j)(4)(D).

[120] Adarand Constructors, Inc. v. Peña, 115 S.Ct. 2097 (1995).

[121] *See* Implementation of Section 309(j) of the Communications Act, Competitive Bidding, PP Docket No. 93-253; Amendment of the Commission's Cellular PCS Cross-Ownership Rule, GN Docket No. 93-314; Implementation of Section 3(n) and 332 of the Communications Act, Regulatory Treatment of Mobile Services, GN Docket No. 93-252, Further Notice of Proposed Rule Making, FCC 95-263, 10 FCC Rcd 11872 (1995). *See also* 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, and Amendment of the Commission's Cellular/PCS Cross-Ownership Rule, GN Docket No. 90-314, Report and Order, FCC 96-278, 11 FCC Rcd 7824 (1996) (*Broadband PCS Spectrum Cap Report and Order*), (finding that the record supports neither race-based F Block auction rules under a strict scrutiny standard nor gender-based F Block auction rules under the intermediate scrutiny standard).

licenses in quarterly installment payments over a ten-year period at below market interest rates.[122] Participants with greater than $40 million in gross annual revenues but less than $75 million were not eligible for the bidding credit, but did qualify for the installment payment plan at a slightly higher interest rate. Of the 255 participants, 253 qualified for the bidding credit and the most favorable installment payment plan.

Winning bids, net of bidding credits, totaled $10.1 billion, and ranged from $1.44 to $77.13 per pop, with a $23.33 per pop average.[123] Despite the narrowed scope of the designated entity provisions, the 255 participants attracted to the auction included 34 companies owned by women, 46 minority-owned companies, and 41 rural telephone companies. Of the 255 participants, 89 bidders succeeded in winning at least a single license and 15 bidders won 10 or more licenses. Companies owned by women won 95 licenses, minority-owned companies won 150 licenses, and rural telephone companies won 27 licenses. A complete list of licensees in the C Block auction is presented in Table 5a. The C Block licensees are expected to begin to enter the market in mid to late 1997.

NextWave is the licensee for markets comprising the largest percentage of the population. Their high bids totaled $4.2 billion, for markets covering nearly 94 million in population. In the auction, NextWave bid on clusters of BTAs surrounding major metropolitan areas and succeeded in winning licenses forming ten market clusters, including the two largest markets in the auction, New York and Los Angeles.[124] NextWave has announced plans to position itself as a carriers' carrier, or a wholesaler of capacity on the CDMA digital networks it plans to build in its markets.[125] Such a strategy will allow companies who did not participate in the PCS auctions to

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[122] Winning bidders must tender a down payment equal to 10 percent of their winning high bids before licenses are granted. The remaining 90 percent can be paid in quarterly installment payments over a period of ten years, with interest only due over the first six years, followed by interest and principal payments in the final four years. The interest rate is equal to the rate on 10-year U.S. Treasury obligations on the date the license is granted. *See* Implementation of Section 309(j) of the Communications Act, Competitive Bidding, PP Docket No. 93-253; Amendment of the Commission's Cellular PCS Cross-Ownership Rule, GN Docket No. 90-314; Implementation of 3(n) and 332 of the Communications Act, Regulatory Treatment of Mobile Services, GN Docket No. 93-252; Sixth Report and Order, FCC 95-301, 11 FCC Rcd 136 (1995).

[123] The trade press typically reports an $39.88 average net winning bid per pop. However, this figure is not an average since it is the sum of the winning bids, net of bidding credits, divided by the U.S. population. Further, the figure is not representative of the actual winning net bids because it fails to capture the wide range of the winning bids across BTAs. (*See, e.g.,* Communications Today, *Bidders Find Redemption In PCS Reauction,"* July 8, 1996 and Investment Dealers' Digest, *Telecom Bankers Sweat Over PCS Offering Plans,* Dec. 2, 1996).

[124] Other major clusters include the Houston/Austin markets in Texas, significant portions of Ohio and Indiana, Central and Northern Florida, the western half of North Carolina, portions of Connecticut, Massachusetts, and Maine, and Washington, D.C.

[125] Qualcomm, Inc., the developer of CDMA technology, is an investor in NextWave.

offer wireless services. In fact, on August 26, 1996, an agreement between NextWave and MCI was announced in which MCI will purchase at least 10 billion minutes of PCS capacity from NextWave over a 10-year period.[126] It will also help A and B Block license holders employing CDMA networks to fill in holes in their footprints. CDMA operators, such as Sprint/APC, the largest winner in the A and B Block auction, and PrimeCo, the third largest winner, are considered to be likely buyers.[127]

Pocket Communications (Pocket) is the second largest C-block licensee, winning markets covering 34 million people with high bids totalling $1.4 billion. Pocket focused its bidding in the Midwest, and succeeded in winning a cluster of markets stretching from Detroit to Dallas. Unlike NextWave and the third largest winner, General Wireless (GWI), Pocket has chosen the PCS 1900 digital standard over CDMA. PCS 1900 is the North American version of the GSM standard which is widely deployed in Europe. The decision to adopt the GSM standard is part of Pocket's strategy to beat other PCS operators to the marketplace.[128]

GWI, the third largest C-block licensee, won markets covering 17 million people with high bids totaling $873 million. These GWI's licenses cover Southern Florida, Northern California, and Atlanta. The fifth highest bidder, Omnipoint PCS, won licenses covering 13 million POPs, with high bids totaling $509 million. Most of the population is located in markets adjoining the A Block New York MTA license granted to Omnipoint under the Commission's Pioneer Preference rules.

Eighteen of the C Block licenses were reauctioned to entrepreneurs in July 1996 after BDPCS and National Telecom PCS failed to make their required down payments.[129] Winning bids in the C Block reauction totaled $904 million. Of the 18 licenses reauctioned, 16 were won by entities that won licenses in the initial C Block auction, with 7 of these won by NextWave, bringing its coverage to more than 100 million in population and extending its footprint to the Seattle/Portland, Minneapolis, and Denver metropolitan areas. Companies owned by women

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[126] PR Newswire, *MCI, NextWave Sign 10-Year 10-Billion Minute National PCS Airtime Agreement*, Aug. 26, 1996.

[127] DONALDSON, LUFKIN AND JENRETTE SECURITIES CORPORATION, THE WIRELESS COMMUNICATIONS INDUSTRY: SUMMER 1996, at 22 (*DLJ*).

[128] R. Lee, *DCR PCS Reigns as GSM*, WIRELESS WEEK, May 20, 1996, at 1. Sprint used the same strategy when it formed an alliance with American Personal Communications to launch its PCS brand in the Baltimore-Washington market. Sprint/APC's choice of GSM allowed it to launch Sprint Spectrum months in advance of competing digital services.

[129] BDPCS had 17 license applications pending and was the fourth largest C-block bidder. National Telecom PCS had a single license application pending.

won 2 licenses, minority-owned companies won 2 licenses, and a single rural telephone company won a license. Most of the C Block licenses have been issued.

On January 14, 1997, the Commission completed a simultaneous DEF Block auction of 1,472 broadband PCS licenses.[130] Three 10 megahertz licenses per BTA were offered at this auction that attracted established A, B and C Block licensees, seeking to augment their 30 megahertz licenses or to acquire adjacent markets. These licensees include AT&T Wireless, Sprint, Omnipoint, NextWave, BellSouth, and Powertel.[131] Numerous entrepreneurial entities also participated as a result of the preferential payment terms.[132] Winning bids, net of bidding credits, totaled $2.5 billion and ranged from $0.01 per pop to $51.03 per pop with a $2.75 per pop average. While the F Block licenses were limited to entrepreneurs, entrepreneurs also won licenses in the D and E Blocks. Small businesses won 41 percent of the licensees. A complete list of winners in the DEF Block auction is presented in Table 5b.

b. *Narrowband PCS*

The Commission allocated 3 megahertz of spectrum to narrowband PCS, all of which is expected to be used for advanced messaging, such as two-way and digitized voice paging, rather than traditional tone, numeric or alphanumeric one-way paging. We have auctioned and issued 11 nationwide and 30 regional licenses.[133] The Commission plans to issue as many as 1,343 additional licenses for smaller areas. Most of the current narrowband PCS licensees are already

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[130] Federal Communications Commission, Public Notice, *D,E,and F Block Auction Closes - Winning Bidders in the Auction of 1,479 Licenses to Provide Broadband PCS in Basic Trading Areas*, DA- 97-81, Jan. 15, 1997. There were no final winning bids made for 7 of the 1479 licenses auctioned at the DEF Block auction.

[131] *See*, AT&T Press Release, *AT&T Wireless Acquires 222 Licenses in 10-MHz FCC Auctions*, Jan. 14, 1996; PR Newswire, *BellSouth Gains 37 New Wireless Markets In the Southeast; Gain From Auction Fills In Wireless Footprint in Nine-State Region,* Jan. 14, 1997; PR Newswire, *Sprint Wins Wireless Licenses in 139 Markets in Latest Round of PCS Auctions; Licenses To Be Part Of An Unprecedented Nationwide Wireless Footprint,* Jan. 14, 1997; Business Wire, *Powertel Acquires Additional Contiguous PCS Licenses in D, E, and F-Block Auctions*, Jan. 15, 1997; PR Newswire, *Omnipoint Wins Licenses To Expand PCS Coverage To Nearly 100 Million Potential Customers,* Jan. 14, 1997; PR Newswire, *NextWave Wins 32 PCS Licenses, Adds 53 Million POPs, New Markets Included Chicago, San Francisco, Philadelphia, Detroit, and Dallas*, Jan. 14, 1997.

[132] *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, and Amendment of the Commission Cellular Cross-Ownership Rule, GN Docket No. 90-314, Report and Order, FCC 96-278, 11 FCC Rcd 7824 (1996). *See also* 47 C.F.R. § 20.6.

[133] *See* Table 6 for a complete list of narrowband PCS licensees.

providing paging or other mobile telecommunications services using previously assigned spectrum. No carrier may obtain more than three narrowband PCS licenses in a single market.[134]

In September 1995, Mtel commercially deployed its SkyTel 2-Way service, which notifies the sender that a message has been received and permits the recipient to select a response offered by the sender or a response preprogrammed into the pager.[135] On February 24, 1997, PageNet launched VoiceNow in Dallas, Texas.[136] PageNet's VoiceNow service allows subscribers to receive, store, and play digitalized voice messages, as well as confirm their receipt. Other companies are also developing voice and other messaging products using their narrowband PCS spectrum.[137] Two-way narrowband PCS service is currently being priced closer to cellular service than to traditional paging service.[138] It is difficult to predict whether this will change as more competitors enter the market.[139]

3. Paging Service

a. *Overview*

Traditional one-way paging service remains the second most popular segment of CMRS in terms of number of customers served. At the end of 1996, there were an estimated 34.1

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[134] The Commission believed this would allow narrowband PCS providers the flexibility to combine channels to accommodate specific service needs while ensuring that there would be several facilities-based providers of narrowband PCS services in each area. Amendment of the Commission's Rules to Establish New Narrowband Personal Communications Services, ET Docket No. 92-100, Memorandum Opinion and Order, 9 FCC Rcd 1309, 1312-13 (paras. 20, 24, 25) (1994).

[135] In association with Wireless Access, Mtel has also developed and is presently testing a two-way device for SkyTel 2-Way service that will permit the recipient to customize a response. S. Steward, *Tracking the Narrowband Train*, Wireless World, Mar. 1996, at 71.

[136] Reuters, *Paging Network Inc Launches VoiceNow in Dallas*, Feb. 24, 1997.

[137] PageMart is developing VoiceMart, which provides voice messaging and acknowledgement paging. AirTouch also is developing a low-cost messaging service. AT&T Wireless Messaging and Mobile Media/ MobileComm are also developing two-way paging services. *Id*. at 72-76.

[138] S. Steward, *Tracking the Narrowband Train*, Wireless World, at 70. Mtel's basic, local monthly SkyTel 2-Way service starts at $25 plus $15 for pager rental; nationwide monthly service starts at $75 plus $15 for pager rental. The pager can be purchased for $399. PageNet is offering three price packages in Dallas, starting at $4.95 per month, and going up to $16.95 depending upon the subscriber's usage. The VoiceNow pager can be purchased for $230 or leased for $10 a month. *See* Reuters, *Paging Network Inc Launches VoiceNow in Dallas*, Feb. 24, 1997.

[139] There are currently 11 nationwide narrowband PCS licensees and 30 regional licensees.

million paging subscribers, a 22 percent increase over the previous year.[140] Mass-market consumers have been the fastest growing segment of the subscriber base, and their increase reflects changes in distribution strategies and lower prices resulting from increased competition within the paging industry.[141]

Paging companies provide a range of one-way paging services. In its simplest form, a pager is a small portable receiver that vibrates or beeps when its telephone number has been called. These types of pagers are called ``tone only'' pagers and accounted for approximately 5 percent of the 1995 paging market.[142] More advanced numeric or tone-plus-voice pagers emit a beeping sound when called and provide either a digitally-displayed phone number or a brief voice message. They represented the largest segment of the 1995 paging market, approximately 88 percent.[143] Alphanumeric pagers, which were introduced in the mid 1980s, are the most advanced of the traditional, one-way pagers and allow the user to receive and store both numbers, such as phone or account numbers, and text, such as stock quotes or sports scores. They generate the greatest monthly revenue per pager and accounted for about 7 percent of the 1995 paging market.[144]

In most areas, subscribers can choose among many carriers, which may offer local, regional, or nationwide service. In large metropolitan areas the presence of 18 or more providers, including several nationwide providers, is typical.[145] Although a majority of customers subscribe to local service,[146] there is a growing demand for regional and national service.[147]

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[140] PR Newswire, *Largest Segments of the Wireless Communications Market Continued Healthy Growth In 1996 Reports IDC/LINK,* Feb. 10, 1997.

[141] GOLDMAN SACHS, THE GLOBAL WIRELESS TELECOMMUNICATIONS OUTLOOK, Feb. 20, 1996 (*Goldman Sachs*), at 40.

[142] *Yankee Group* at 20.

[143] *Id.*

[144] *Id. See also* LEHMAN BROTHERS, THE INVESTOR'S GUIDE TO THE U.S. PAGING INDUSTRY, VOLUME II: 1996 AND BEYOND, Sept. 15, 1995, at 23 (*Lehman Brothers II*). Although they represented only 7 percent of the units in service, alphanumeric pagers generated approximately 10 percent of paging revenues during the same period. SMITH BARNEY, THE COMING EVOLUTION OF PAGING, 1996 HANDBOOK OF THE U.S. PAGING INDUSTRY, Jan. 19, 1996 (*Smith Barney*) at 40.

[145] An analysis of FCC licensing data as of the end of 1995 indicates that the 25 largest cities in the Nation have an average of over 18 paging licensees, not including resellers. A similar analysis of the 25 smallest metropolitan areas, such as Bismarck, ND, Cheyenne, WY, Gadsden, AL, Kokomo, IN, and Sherman, TX, revealed the presence of an average of over 11 paging licensees per area.

[146] *Yankee Group* at 5.

Paging companies are currently expanding their range of services to include more two-way paging, using narrowband PCS licenses and spectrum.[148] *See* discussion of narrowband PCS, *supra*.

b. *Competitive Trends*

In the following sections, we discuss several trends in the paging industry since the *First Report*, such as company consolidations, lower prices, and increased ease of entry, that are relevant to the competitiveness of the paging industry.

(1) Consolidation

There are over 500 paging carriers in the United States today.[149] The top 10 carriers, however, constitute approximately 83 percent of the entire industry.[150] A surge of consolidation activity among paging companies, through mergers and acquisitions,[151] has increased the

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[147] As of year-end 1995, nationwide service comprised nearly 5 percent of the total paging subscribers, while regional service accounted for 23 percent of the market. *Yankee Group* at 5. A year earlier, nationwide service represented 3 percent of pagers in service. *Smith Barney* at 17. There appears to be much room for growth of nationwide service, however, since nearly one-third of users have indicated that they desire nationwide coverage from their paging service providers. *Yankee Group* at 4. Nationwide service can be provided through national licenses, using FM radio subcarriers, leasing fiber-optic lines or satellite uplinks, or reselling service purchased from national carriers. Merger activity among paging carriers also offers the possibility of improvements in geographic coverage and lowered costs resulting from economies of scale.

[148] Two-way service had 15,400 subscribers at the end of 1995. *See DLJ* at 30.

[149] *Smith Barney* at 12. *See* Table 7 for a list of the largest paging carriers.

[150] This percentage was calculated using company reported paging subscribers and an estimate of total paging subscribers. *See*, Wireless Business & Finance, *Results Indicate Maturing Cellular, Unsettled Paging Market*s, Feb. 12, 1997. *DLJ* estimates that, as of the end of March, 1996, the top 10 paging carriers constituted almost 70% of the industry compared to 55% in 1995. *DLJ* at 27. *But see Lehman Brothers II* at 17 (top ten paging companies constitute 62 percent of market). The 83 percent share may be overstated as it does not reflect the expanded universe of paging subscribers due to PCS systems that include paging as part of the total service package.

[151] The consolidation trend within the paging industry has continued since publication of the *First Report*, driven by the need to achieve sufficient economies of scale to compete effectively in the long term. MobileMedia added over 2 million subscribers through its acquisitions of MobileComm (fourth largest in 1995) and Dial Page, elevating it to second largest in the industry. Arch Communications moved into third place with 2.7 million pagers in service when it bought USA Mobile (977,000 subscribers) and Westlink Paging (15th largest in 1995 with 500,000 subscribers) in May 1996. Metrocall became the fourth largest in the industry with its purchase of rival A+ Network (nearly 600,000 subscribers and 14th largest in 1995) in May 1996. ProNet purchased Teletouch, raising its total subscriber base to 1.4 million. *See, e.g., DLJ* at 27; *Smith Barney* at 13.

marketshare of the ten top paging operators from 46 percent in 1992.[152] During 1996, the ten top carriers recorded a 35 percent increase in subscribers, including those obtained through acquisitions.[153] The largest of these carriers are PageNet and MobileMedia, neither of which is affiliated with other telecommunications companies.[154] The trend in mergers and acquisitions continued throughout 1996.[155] In addition to the merger and acquisition activity over the past year, the means of distribution for paging services has also changed dramatically. The number of resellers has proliferated,[156] and the presence of such resellers has accounted for as much as 40 percent of the incremental growth rate for paging services.[157] LECS or their corporate affiliates typically provide paging service where the former provide telephone service, but are not major providers

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[152] *Lehman Brothers II* at 17; *Yankee Group* at 10. In 1982, the market share of the 15 largest paging companies was 28 percent. During the next 13 years, the number of paging operators declined from 1,000 to between 500 and 600. *Id*. Consolidation also offers regional carriers the possibility of increasing their geographic coverage. Most of the consolidation activity appears to be firms increasing their geographic coverage rather than increasing concentration in a particular market

[153] By the end of 1995, the ten top carriers for 1995 had a 55 percent increase in subscribers, including those obtained through acquisitions. *Yankee Group* at 10.

[154] Paul Kagan Associates, *Paging's Top Consolidators*, 1996. According to Kagan, PageNet has a 19.4 percent share of the U.S. market and MobileMedia an 11.9 percent share. *But see Yankee Group* at 10 (MobileMedia has 14 percent share of the U.S. market after acquisition of MobileComm). PR Newswire reports on January 30, 1997 that MobileMedia filed for Chapter 11 bankruptcy protection. PR Newswire, *MobileMedia Corporation Seeks To Reorganize Under Chapter 11*, Jan. 30, 1997.

[155] ProNet acquired Teletouch, Sun, Signet Raleigh, Page One, AGR, Total, Cal Page, and Williams. Metrocall acquired Parking Paging and Satellite Paging, and Arch completed its acquisition of Westlink and A+ Network during 1996. Other consolidation activities in 1996 include Preferred Networks acquisition of Big Apple Paging, and announcement of an agreement to acquire Mercury Paging and Communications; and A+ Network's acquisition of Portable Communications of America and South Central Communications corporation. Company reports, PR Newswire, *Preferred networks Reports Third Quarter Results*, Nov. 14, 1996, PR Newswire, *A+ Network Reports Third Quarter Results*, Nov. 7, 1996, PR Newswire, *Metrocall Completes A+ Network Merger,* Nov. 15, 1996.

[156] *Smith Barney* at 42; *DLJ* at 27; *Lehman Brothers II* at 124. In most reseller relationships, paging companies offer resellers offer resellers bulk minutes of airtime at wholesale rates, which are sold at retail prices. DLJ estimate that resellers account for more than 40 percent of the industry subscribers. The resellers pay their own marketing, billing, collecting and customer equipment costs, which allows the paging companies essentially to maintain the same margins from reselling as from selling directly, although the revenue per pager is lower. *DLJ* at 29.

[157] For example: MCI is a reselling channel for PageNet and Mtel; Sprint/APC has an agreement to resell paging services purchased from PageNet. Some reseller deals have been signed with non-paging entities such as banks and credit card companies. *DLJ* at 29. *But see* discussion of how resellers can overstate the true number of paging subscribers at note 65, *supra.*

of the service. Two-way paging is currently provided by only one carrier, who has a nationwide license.[158]

(2) Reduced Revenue per Subscriber

Charges for local, one-way paging service usually consist of a flat monthly fee, averaging between $10 and $15, depending on the number of features and functions selected by the subscriber.[159] Higher end services, such as regional, nationwide, alphanumeric, and two-way paging, are more expensive.[160] Paging receivers are sold or rented through paging carriers and many retail outlets. Paging companies, however, have encouraged subscribers to buy rather than lease their pagers, and the increasing number of customers owning their pagers reflects this fact. This trend toward customer-owned and maintained equipment has resulted in lower monthly bills and a consequent decline in the average monthly revenue per subscriber industry-wide.[161] The growth of resellers, who alleviate marketing expenses for the service provider, and the declining cost of pagers provided to those customers who continue to lease their pagers, have also contributed to the lower monthly revenue per subscriber for paging carriers.[162]

(3) Easier Entry

Not only is the paging market unconcentrated, entry into the paging industry is relatively easy. Cellular, PCS,[163] and SMR licensees have the flexibility to provide paging services, and entry can occur through either an FM subcarrier or purchasing a portion of a licensee's spectrum as allowed by the Commission's new rules permitting broadband PCS licensees to sell portions

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[158] Mtel's SkyTel 2-Way service. This service is provided on narrowband PCS spectrum.

[159] *See* Paul Kagan & Associates, *Paging Profit Trends: Gaining Ground,* 1996; *DLJ* at 31.

[160] *DLJ* at 33. *See also* PR Newswire, ``PageNet Launches Field Testing of VoiceNow, World's First Wireless Pocket Answering Machine," June 24, 1996. Local numeric service, on average, costs $12.50 per month (including $2.50 for the lease of the pager) while even the lowest priced two-way service, PageNet's VoiceNow service, will start at $19.95 per month (including $10 for the lease of the pager).

[161] In the last five years, service revenues per subscriber have been declining by 10 to 15 percent. *Yankee Group* at 15. *See also,* PR Newswire, *Cellular and Paging Financial Operations Remain Sound In Sprite of Stock Woes Sustained Reductions in Cellular Cost of Service Protect Margins In Time of Falling Revenues, Sub; Paging Margins Stable For Industry In Spite Of Deteriorating Performance Among Several Carriers,* Dec. 11, 1996.

[162] *Lehman Brothers II* at 36.

[163] Primeco has added alphanumeric paging as an additional feature to phone service. It charges $14.95 per month for unlimited messaging. PR Newswire, *Primeco Offers Text Messaging Service,* Nov. 26, 1996.

of their service areas or portions of their licensed spectrum.[164] Therefore, new competitors can enter the market and correct for the earning of any extraordinary profits or other poor market performance. The generally modest spectrum requirements for paging systems, which give potential entrants many options to obtain needed spectrum, facilitate entry. For example, paging companies can and do use subcarriers on licensed FM radio broadcast stations throughout the Nation to operate paging services. Also, due to the operational flexibility built into the Commission's Rules, paging companies may also use spectrum from other services such as IVDS, and SMR. In fact, the largest purchaser of 900 MHz SMR spectrum in the auction concluded in May 1996 was PageNet, the largest paging company in the Nation.

We noted in the *First Report* that the paging segment of the CMRS market is considered to be very competitive, citing the combination of high capacity, large numbers of service providers, ease of market entry, and ease of changing service providers.[165] Although there have been a number of significant developments in the paging industry during the past year, we continue to consider this to be a very competitive market for the following reasons. First, although the number of paging companies has decreased, there are still many companies actively competing with each other in each market. Although there are fewer paging companies now, a sizeable competitive fringe of small local and regional paging companies still compete with a decreasing number of large paging firms. Second, paging prices are generally quite low compared to other CMRS services, and the available evidence suggests that prices are declining.

Although for purposes of this Report we have discussed narrowband PCS as a subset of PCS, it is becoming more apparent that narrowband PCS is much more closely related to paging than it is to broadband PCS. This is because of the relatively small amount of spectrum associated with each narrowband PCS license, which provides capacity necessary for paging or relatively short data transmissions only. In addition, many of the auction winners for nationwide and regional narrowband PCS licenses are major participants in the paging industry. Therefore, in subsequent reports we will discuss narrowband PCS as part of a broader discussion that

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[164] The Commission has stopped issuing new paging licenses until auctions are held, but firms can gain entry by either operating as a subcarrier to an FM carrier or by purchasing a portion of an existing licensee's spectrum. *See* Amendment of the Rules Concerning Use of Subsidiary Communications Authorizations, BC Docket No. 82-536, First Report and Order, FCC 83-154, 48 Fed Reg. 28445, (June 22, 1983); Geographic Partitioning and Spectrum Disaggregation by Commercial Mobile Radio Services Licensees, WT Docket No. 96-148; Implementation of Section 257 of the Communications Act, Elimination of Market Entry Barriers, GN Docket No. 96-113, Report and Order and Further Notice of Proposed Rulemaking, FCC 96-474, released Dec. 20, 1996. Amendment of Part 90 of the Commissions Rules to Provide for the Use of the 220-222 MHz Band by the Private Land Mobile Radio Service, PR Docket No. 89-552 and Implementation of Sections 3(n) and 332 of the Communications Act, Regulatory Treatment of Mobile Services, GN Docket No. 93-252, Third Report and Order and Fifth Notice of Proposed Rule Making, FCC 97-57, adopted Feb. 19, 1997.

[165] *First Report*, 10 FCC Rcd at 8867-68 (para. 67). *See also CMRS Second Report and Order*, 9 FCC Rcd at 1468 (para. 140).

includes the messaging and paging segments of the CMRS industry, and we will plan to assess the competitiveness of the paging industry from this perspective.

4. Specialized Mobile Radio

a. *Overview*

The Commission created the SMR service in 1974 as a dispatch service to provide two-way voice communications between business vehicles, such as taxicabs and delivery trucks, and central dispatchers.[166] Industry projections indicate that, by the year 2000, SMR services will reach 4.2 million customers, with 9 million customers in service by the year 2003.[167] The SMR industry has continued to show healthy growth, with consistent double-digit growth rates. By the end of 1996, there were approximately 2.3 million vehicles and portable units served by SMR systems, a gain of 13 percent since the end of 1995.[168] Although the monthly churn rate[169] for SMR operators fell in 1996 to 1.5 percent from 1.8 percent in 1995, industry analysts believe the predominant cause for churn is competition from cellular and PCS carriers.[170] Finally, most operators would appear to have the ability to grow because only 22% of the industry participants are at or near capacity.[171]

Although relatively little information is available about the operations and business performance of specific SMR companies, it is clear that Nextel is the largest SMR operator, by

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[166] *See* An Inquiry Relative to Future Use of Frequency Band 806-960 MHz and Amendment of Parts 2, 18, 21, 73, 89, 91 and 93 of the Rules Relative to Operations in the Land Mobile Service Between 806-960 MHz, Docket No. 18262, 51 FCC 2d 945 (1975).

[167] F. Joyce & S. Hamrick, *SMRs: The Little/Big Industry*, Telecom Exchange, Apr./May 1996, at 21. The number of SMR systems in the 220 MHz band is growing rapidly.

[168] In terms of revenues, the industry accumulated 1995 revenues of $550 million, a 17 percent increase from 1994's $470 million. At the end of 1995, more than 2 million vehicles and portable units were served by SMR systems, a gain of 13 percent since the end of 1994. *See,* Land Mobile Radio News, *SMR Industry To Serve 4 Million Subscribers By 2000, Study Predicts*, Feb. 16, 1996; Land Mobile Radio News, *SMR Operators Headed For Second Straight Year of 13% Growth But Some 220 MHz Providers Get Off to Slow Start,* Nov. 22, 1996.

[169] The churn rate represents the number of customers lost during a specified time period expressed as a percentage of the total number of customers at the beginning of the period.

[170] Land Mobile Radio News, *SMR Operators Headed For Second Straight Year of 13% Growth But Some 220 MHz Providers Get Off to Slow Start,* Nov. 22, 1996.

[171] *Id.*

a considerable margin.[172] Large regional operators, such as Pittencrieff, Chadmore, and Southern, have also contributed to the level of competition in SMR markets.[173]

There has been a relatively small amount of merger activity in the SMR industry during the past year, so there remain a fairly sizable number of very small operators. It is expected that these small operators will serve as a significant competitive presence in most market areas to keep SMR service prices at their generally low levels. As Nextel continues to convert to its new digital infrastructure, and as Geotek continues to build its digital system, both of which have significant data transmission capabilities, it is likely that there will be increased competition in the data segment of the SMR market during the coming year. In addition to the SMR segment that provides voice services, Ardis and RAM Mobile Data operate nationwide SMR systems that are exclusively devoted to providing various non-voice data services to businesses.

b. *Comparison to Cellular Service*

In the *First Report*, the Commission found that interconnected SMRs that provide mobile telephone service, and which may therefore be considered in competition with cellular carriers, have a small share of the mobile telephone business and do not exercise market power.[174] Recently, the Commission concluded that certain SMR providers have significant potential to compete directly with cellular and broadband PCS providers in the new term.[175]

Since our last report, Nextel has launched its PowerFone service in Atlanta, Boston, Chicago, Denver, Detroit, Las Vegas, San Francisco, Sacramento, Stockton, and Modesto.[176]

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[172] Nextel reports that radio service revenues (including airtime usage and monthly fees) were $82.884 million for the three months ending September 30, 1996. Nextel reports that they have 300,300 digital units in service by the end of 1996, and that 72,300 digital customers were added in the last quarter of 1996. PR Newswire, *Next Reports Third-Quarter Results, Company Well Positioned for Nationwide Roll-out of Digital Service*, Nov. 14, 1996. PR Newswire, *Nextel Introduces National Wireless Network With No Roaming Charges*, Jan. 14, 1997.

[173] In October, 1996, Nextel announced that it had reached an agreement to acquire Pittencrieff. *See* PR Newswire, *Nextel Improves Position in Southwest Through Acquisition of Pittencrieff Communications*, Oct. 3, 1996.

[174] *First Report* at 8868 (para. 67).

[175] *See* Interconnection and Resale Obligations Pertaining to Commercial Mobile Radio Services, CC Docket No. 94-54, First Report and Order, FCC 96-263, 61 FR 38399 (July 24, 1996), at para. 19.

[176] Nextel launched its service in Chicago on September 16, 1996, Boston on October 2, 1996, Denver on October 14, 1996, and Atlanta on October 29, 1996. PR Newswire, *Nextel Launches New Wireless Service Ahead of Schedule in Atlanta*, Oct. 29, 1996; PR Newswire, *Nextel Launches New All-in-One Wireless Service in Denver*, Oct. 14, 1996; PR Newswire, *Nextel Launches New Digital Cellular, Instant Conferencing and paging Service Ahead of Schedule in Boston*, Oct. 2, 1996. Newsbytes, *Nextel Wireless Network Takes On National Strategy*, Mar.

Geotek's service is available in Boston, Philadelphia, New York, Miami, Orlando, Dallas, Washington, D.C., and Baltimore.[177] Almost all customers buy a telephone or other transceiver from their SMR provider. While prices for the newest digital SMR transceivers are expected to be between $350 and $429,[178] Nextel's Powerfone starts at $199 for a portable mobile-installed unit.[179] Subscribers of integrated SMR services generally pay between $45 and $160 per month per unit.[180] For example, Nextel reports that its average monthly revenue from its digital SMR customers is $75, compared to average monthly revenues of $46 for analog cellular.[181] Nextel discontinued charging roaming fees for its customers traveling anywhere on its digital network, and its monthly service rates range from $24 to $59 depending upon the market.[182] However, it is too early to tell what impact these systems will have on mobile voice communications.

However, SMR is technically different from cellular in several ways, the most significant of which is the fact that most SMR subscribers generally are not connected to the PSN. The majority of SMR customers, 78 percent, use their radios for dispatch (one-to-many) communications services, while the rest use a combination of dispatch and mobile telephone service via interconnection to the PSN.[183]

SMRs and cellular also differ in that SMR systems traditionally use high power transmitters to cover relatively wide geographic areas, whereas cellular systems use multiple low power transmitters and cover relatively small geographic areas or cells. The design of the largest SMR systems has been changing in recent years to one that is more similar to that of cellular systems.

3, 1997.

[177] Business Wire, *Geotek Announces Nationwide Marketing Agreement With IBM,* Dec. 24, 1996.

[178] Motorola introduced a revamped handset for its iDEN system, with the price of the phone expected to range from $350 to $429. Reuters, *Motorola Launches Enhanced Cell Phone*, June 17, 1996.

[179] Newsbytes, *Nextel Wireless Network Takes On National Strategy,* Mar. 3, 1997.

[180] Reuters, June 17, 1996.

[181] *Communications Daily,* Oct. 31, 1996.

[182] In Sacramento, Nextel per minute charges range from $0.16 to $0.21 for each cellular call, and $0.10 for two-way messages. PR Newswire, *Nextel Introduces National Wireless Network With No Roaming Charges*, Jan. 14, 1997, Newsbytes, *Nextel Wireless Network Takes On National Strategy,* Mar. 3, 1997; The Sacramento Bee, *Nextel Takes On Cellular Market Service To Feature Two-Way Radio,* Mar. 4, 1997.

[183] *See Land Mobile Radio News, SMR Operators Headed For Second Straight Year of 13% Growth But Some 220 MHz Providers Get Off to Slow Start,* Nov. 22, 1996; S. Virostek, *Where Does SMR Grow From Here?*, WirelessNOW-Online@commnow.com, Apr. 5, 1996. According to Virostek, the ratio of dispatch to interconnect customers is expected to equalize over the next five years as wide-area SMR licensees such as Nextel and Geotek deploy digital networks which are capable of handling large volumes of interconnected calls.

Fewer subscribers can be accommodated by traditional SMR systems because each frequency typically is occupied over an area approximately 10 times larger than the area served by a single cellular transmitter. A further difference is that the amount of spectrum allocated to SMR is far less than the 50 megahertz allocated to cellular. A total of approximately 19 megahertz of spectrum is available for use by SMRs, 14 megahertz in the 800 MHz band and 5 megahertz in the 900 MHz band.

The Commission has never required a specific technical standard for SMRs, as it has for cellular. As a result, several different, non-compatible protocols exist. Most SMR telephones can use only one technical protocol for signalling. This, combined with the cost of a new telephone, may inhibit a customer's changing from one SMR system to another.[184] Although several SMR providers are adopting a single digital standard, at least two different digital technologies are now in use.[185] Digital SMR systems are viewed as providing increased capacity and significant improvements in voice quality over traditional analog systems and will contribute some relief to rising capacity constraints among a number of operators. More significantly, digital systems will allow SMR providers increased interconnection potential in league with added dispatch and data capabilities. Wide-band SMR operators such as Nextel and Geotek intend to use digital technology to offer a broad range of services to mobile workforces in a single subscriber unit.[186]

c. *Competitive Trends*

(1) Reduced Regulation

Traditionally, SMRs were small, independent companies, unaffiliated with larger communications companies. The SMR environment has changed considerably in the last few years.

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[184] The extent to which these factors will slow or deter switching by SMR customers depends in part on the existence of a market for used handsets, and other factors such as the quality of the alternatives. If there is an active market, then SMR customers could more easily swap equipment to move from one provider to another, without suffering a significant economic penalty. The current relatively high SMR churn rates suggest that these factors are not a serious impediment to switching to another system.

[185] A principal digital SMR system is Motorola's Integrated Dispatch Enhanced Network (iDEN®) protocol, which uses a 3:1 Time Division Multiple Access scheme, thus allowing simultaneous conversations on each channel. iDEN® is deployed by Nextel and the Chadmore Wireless Group. Geotek has developed another major digital protocol, Frequency-Hopping Multiple Access (FHMA), which is essentially a spread spectrum system built on a macrocellular architecture. Geotek's system multiplexes three digitized voice conversations into each radio channel. For a discussion of this and Motorola's technology. *See* N. Goldman, *The Testing of Geotek*, The Israeli Business & Technology Magazine, Sept.-Oct. 1994.

[186] Nextel uses iDEN® to provide a combination of traditional two-way service, telephone interconnect, text messaging, and data transmission on 800 MHz spectrum. Geotek claims it has targeted small- and medium-size businesses to provide integrated telephony, dispatch, vehicle location, credit card verification, and database query into a single handheld or vehicular-based unit.

The Commission recently changed its Rules to permit telephone companies and their affiliates (*e.g.*, cellular companies) to own SMRs.[187] In addition, the Commission has changed its Rules to allow 900 MHz SMRs to be licensed on an MTA basis, instead of on the basis of much smaller geographic areas.[188] In December 1995, for the upper 200 channels in the 800 MHz frequency band, the Commission replaced its traditional licensing of individual base stations with rules that allow wide-area geographic licensing on contiguous spectrum, similar to that for cellular systems. This will facilitate the implementation of new spectrum efficient technologies and enable small SMRs to consolidate into wide-area SMRs.[189] Thus, while SMRs' service areas generally encompass local markets, they will increasingly be able to expand easily to serve regional and nationwide markets. Moreover, while there are many relatively small SMRs in the United States, there is a trend towards consolidation which may result in markets being served by several large SMRs, plus a fringe of smaller SMRs.

(2) Additional Spectrum

In April 1996, the 900 MHz SMR auction ended, with 79 companies winning 1,020 major trading area licenses.[190] Three of the auction winners acquired licenses providing nation-wide coverage -- Geotek (181 licenses), Nextel (177 licenses), and PageNet (126 licenses). The other largest winners were RAM Mobile Data (83 licenses), FleetTalk (63 licenses), Centennial Communications (43 licenses), and Motorola (37 licenses). Starting in August 1996, the Commission issued all of these licenses.

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[187] *See* Eligibility for the Specialized Mobile Radio Services and Radio Services in the 220-222 MHz Land Mobile Band and Use of Radio Dispatch Communications, GN Docket No. 94-90, Report and Order, 10 FCC Rcd 6280 (1995).

[188] Amendment of Parts 2 and 90 of the Commission's Rules to Provide for the Use of 200 Channels Outside the Designated Filing Areas in the 896-901 MHz and the 935-940 MHz Bands Allotted to the Specialized Mobile Radio Pool PR Docket No. 89-553; Implementation of Section 309(j) of the Communications Act, Competitive Bidding PP Docket No.93-253; Implementation of Sections 3(n) and 332 of the Communications Act, GN Docket No. 93-252; Second Report & Order and Second Further Notice of Proposed Rule Making, FCC 95-159, 10 FCC Rcd 6884 (1995). The MTAs follow county lines, matching municipal boundaries while largely following economic boundaries. These boundaries are based on the *Rand McNally 1992 Commercial Atlas & Marketing Guide*, 123th Edition, Rand McNally & Company, Dec. 1991. There are a few exceptions and additions for Alaska and other non-contiguous territories, such as Guam and Puerto Rico.

[189] Amendment of Part 90 of the Commission's Rules to Facilitate Future Development of SMR Systems in the 800 MHz Frequency Band, PR Docket No. 93-144, RM-8030, RM-8029, Implementation of Sections 3(n) and 332 of the Communications Act, Regulatory Treatment of Mobile Services, GN Docket No. 93-252, and Implementation of Section 309(j) of the Communications Act, Competitive Bidding, PP Docket No. 93-253, First Report and Order, Eighth Report and Order, and Second Further Notice of Proposed Rulemaking, FCC 95-501, 11 FCC Rcd 1463 (1996). These rules apply only to the upper 200 channels in the SMR category.

[190] There are 51 MTAs, in each of which the Commission offered 20 licenses, with 10 channels per license. *See* Table 8 for a complete list of 900 MHz SMR auction winners.

The winning bidders have varying plans for their new spectrum. The top bidder in terms of dollars spent, PageNet, sought additional licenses at 900 MHz to supplement its three nationwide narrowband PCS licenses, on which it plans to offer its VoiceNow and advanced messaging services.[191] Geotek increased it holdings from roughly 1,200 channels in 36 markets by another 1,810 channels in 42 regional markets, with its total population coverage jumping from 83 million to more than 200 million. Despite this significant increase in coverage, Geotek has not reported a change from its plan to buildout in major urban markets, such as Philadelphia, New York, Washington, D.C./Baltimore, Dallas, and Miami.[192] Nextel is reported to have acquired the 900 MHz spectrum in order to move its analog subscribers from its 800 MHz SMR frequencies, where it is concentrating on delivering its digital-based integrated dispatch, paging, mobile telephone, and mobile data service.[193]

C. Inter-Service Competition

In the past, the Commission has found that, for purposes of determining which services are substantially similar in order to develop comparable technical and operational rules, all CMRS services compete or have the potential to compete with each other, and are thus substantially similar.[194] This finding was instrumental in our establishment of a ``level playing field" for continued regulation of CMRS and for the removal of unwarranted regulatory burdens on all CMRS providers.[195]

In general, all CMRS providers compete by providing communications to consumers on a real-time (or virtually real-time) basis while they are ``on the move."[196] We continue to recognize that, in today's CMRS marketplace, the various services that meet this common communica-

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[191] *DLJ* at 38.

[192] *Id.*

[193] *Id. See also* L. Sakelaris, *Nextel Wins 177 Licenses*, RCR, Apr. 22, 1996, at 42.

[194] *See* Implementation of Sections 3(n) and 332 of the Communication's Act, Regulatory Treatment of Mobile Services, GN Docket No. 93-252, Third Report and Order, 9 FCC Rcd 7988 at 7996 (para. 12) (1994) (*CMRS Third Report and Order*).

[195] *Id.* at 7996 (para 11). *See also* Applications of Motorola, Inc. for Consent to Assign 800 MHz Licenses to Nextel Communications, Order, 10 FCC Rcd 7783, 7786 (wherein the Wireless Telecommunications Bureau found that the relevant product market definition, for purposes of determining the assignment of licenses to Nextel, was one encompassing all terrestrial CMRS offerings, and that such a definition was consistent with the definition adopted by the Commission in the *CMRS Third Report and Order*). The Commission stated, however, that it may apply different policy objectives, or may utilize a different competitive analysis, in other contexts. *Id.* at 8024 (para. 63).

[196] *See CMRS Third Report and Order*, 9 FCC Rcd at 8021 (para. 58).

tions need do so in different ways, by providing services with different features, functions, cost, and quality of service.[197] We have found that services meeting the same customer needs of mobile communications in different ways can nevertheless be viewed as competing against each other.[198] We find, however, that for purposes of this Report, it is necessary to distinguish between the two main components of consumers' mobile communications needs: mobile telephony, which is primarily founded on voice-based communications, and messaging service, which is based on the one-way and two-way delivery of data-based messages. Presumably, as technological innovations advance, CMRS providers will seek to provide combinations of voice and messaging services to meet consumer demand for a combined service offering.[199] We address these new competitive developments herein as well.

1. Mobile Telephony

The following sections offer an assessment of the state of competition between the major CMRS providers that offer mobile telephony.

a. *Cellular vs. PCS*

The advent of PCS will result in the entry of at least three, and possibly six, new mobile telephony providers in most geographic markets.[200] By most accounts and projections, PCS is expected to increase considerably the degree of price competition and choice in the mobile telephony marketplace. By the year 2000, PCS carriers are projected to attract 50 percent of new wireless subscribers, and capture approximately 29 percent of the mobile market.[201] By 2005, cellular is expected to account for approximately 56 percent of the mobile market, fol-

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[197] *Id.*

[198] *Id.* (para. 59).

[199] This is evident in the service offerings of the broadband PCS providers that offer paging in conjunction with their voice-based services. This is possible because broadband PCS providers are using digital technologies that allow them to offer a larger array of services over their networks.

[200] As a result of recent rule changes permitting PCS licensees to sell portions of their spectrum to other entities, the number of providers in a market area could be even higher than six. *See*, Geographic Partitioning and Spectrum Disaggregation by Commercial Mobile Radio Services Licensees, WT Docket No. 96-148; Implementation of Section 257 of the Communications Act, Elimination of Market Entry Barriers, GN Docket No. 96-113, Report and Order and Further Notice of Proposed Rulemaking, FCC 96-474, released Dec. 20, 1996.

[201] *See* BEAR STEARNS, TELECOMMUNICATIONS UNTETHERED VOLUME II: BATTLE ON TWO FRONTS, May 20, 1996, at 19 (*Bear Stearns*).

lowed by PCS (with approximately a 38 percent market share), and enhanced SMR (with approximately a 5 percent market share).[202]

(1) Pricing

Although there are a limited number of PCS providers currently operating, there are indications that they are offering a range of services competitive with cellular operators, and that most PCS entrants are offering lower priced packages than the incumbent cellular providers. Although data remains preliminary, the operating PCS providers appear to be competing relatively aggressively with cellular operators on price in addition to promoting their value added services.

One study conducted by Merrill Lynch compared PCS and cellular service rate plans in Honolulu, Salt Lake City, and Washington/Baltimore.[203] However, the magnitude of the discount varied considerably depending upon the market and the assumptions made about the subscriber's usage of airtime.[204] For instance, depending upon the subscriber's usage, a Sprint/APC subscriber's average monthly bill in Washington/Baltimore could range from 2 percent higher to 15 percent lower compared to the lowest price alternative cellular provider, whereas the potential savings range from 4 percent to 17 percent in Salt Lake City, and from 17 percent to 20 percent in Honolulu.

More recent data from Paul Kagan Associates (*Kagan*) reports survey results for 7 PCS entrants in 36 markets.[205] The data is categorized by low use packages (15 to 60 minutes),

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[202] *Id.*

[203] Merrill Lynch, *So, How Do PCS Rate Plans Compare to Cellular?*, Telecommunications/Wireless Bulletin, June 28, 1996. Unlike the Shosteck study, the Merrill Lynch study includes a broad assortment of information on the packages it examines. However, the Merrill Lynch study reports pricing information for only one period, thus, it cannot be used to examine pricing trends over time.

[204] *Id.*, at 2. Merrill Lynch's study is based on several potential average monthly bills that include monthly access fees, potentially some bundled minutes, and additional per-minute airtime charges. The analysis does not include long distance charges, taxes, or any other special surcharges. Therefore, the conclusions drawn in the Merrill Lynch study are affected by the subscriber's total minutes of use and how these minutes were distributed between peak and off-peak times. Consequently the PCS entrant may not offer the lowest price package for all customers. The Commission will have to track price packages to determine whether the differences in pricing between PCS and cellular firms continue over time, and whether the discounts offered by PCS providers lead the cellular incumbents to lower their prices.

[205] The analysis is compiled from three issues of *Kagan's Wireless Market Stats* (Oct. 21, 1996, Nov. 22, 1996, and Dec. 18, 1996). The *Kagan* reports do not provide any of the specific package and per minute price data. Thus, our analysis necessarily must rely on *Kagan's* calculated prices for several service package levels. Similarly to the Merrill Lynch study, the results reported by *Kagan* may depend upon the assumptions used to formulate the hypothetical packages. The PCS entrants are Sprint, BellSouth Mobility, Powertel, Western Wireless, Omnipoint, PrimeCo, and Pacific Bell Mobility. The markets include: Washington/Baltimore; Charlotte, Greens-

medium use packages (75 to 225 minutes), and high use packages (300 to 750 minutes). PCS providers entered 23 of the 36 metropolitan areas as the lowest cost provider for relatively low use packages. BellSouth Mobility entered 7 markets with discounts of 13 percent to 32 percent from the lowest price cellular competitor for low use customers. Powertel entered 4 markets with discounts of 7 percent to 35 percent from the lowest price cellular competitor. Western Wireless entered 4 markets with discounts of 17 percent to 33 percent from the lowest price cellular competitor. Sprint entered 4 markets with discounts of 15 percent to 33 percent from the lowest price cellular competitor,[206] Omnipoint entered a single market with a discount of 1 percent from the lowest price cellular competitor, PrimeCo entered 2 markets with discounts of 3 percent to 8 percent from the lowest price cellular competitor,[207] and Pacific Bell entered a single market with a discount of 10 percent from the lowest price cellular competitor.

Kagan reports similar results for medium and high use packages. PCS providers entered 28 of the 36 markets as the lowest cost provider for medium use packages and 27 of the 36 markets as the lowest cost provider for high use packages. Of the 28 markets that PCS providers entered as the lowest cost provider for medium use packages, BellSouth Mobility entered 7 markets with discounts of 1 percent to 22 percent, Powertel entered 3 markets with discounts of 16 percent to 28 percent, Western Wireless entered 5 markets with discounts of 13 percent to 34 percent from the lowest price cellular competitor, Sprint entered 2 markets with discounts of 7 percent to 9 percent from the lowest price cellular competitor,[208] Omnipoint entered a single market with a discount of less than 1 percent, and PrimeCo entered 10 markets with discounts of 4 percent to 33 percent from the lowest price cellular competitor.[209]

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boro, Wilmington, Raleigh/Durham, and Fayetteville, North Carolina; Columbia, Florence, Greenville, and Myrtle Beach, South Carolina; Knoxville and Memphis, Tennessee; Montgomery and Tuscaloosa, Alabama; Miami/Ft. Lauderdale, Tampa, Orlando, and Jacksonville, Florida; Chicago, Illinois; MIlwaukee, Wisconsin; Albuquerque, New Mexico; Honolulu, Hawaii; Salt Lake City, Utah; Portland, Oregon; Richmond and Norfolk, Virginia; New Orleans, Louisiana; New York City, New York; Dallas/Ft. Worth, Houston, Austin, and San Antonio, Texas; Oklahoma City, Oklahoma; Spokane, Washington; and Fresno, and San Diego, California.

[206] The data reported by *Kagan* suggest that Sprint's low usage package offers consumers a discount of 7 percent to 9 percent off the alternative PCS provider's similar package in the two markets that Sprint entered as the second PCS provider.

[207] PrimeCo's prices are 9 percent to 63 percent higher than the lowest price package in the two markets it entered as the second PCS operator.

[208] Sprint's prices are 3 percent to 13 percent higher than the lowest price package of the first PCS operator in the two markets it entered as the second PCS operator.

[209] PrimeCo's prices are 1 percent to 24 percent higher than the lowest price package of the first PCS operator in the two markets it entered as the second PCS operator.

Of the 27 markets that PCS providers entered as the lowest cost provider for high use packages, BellSouth Mobility DCS entered 7 markets with discounts of 7 percent to 32 percent from the lowest price cellular competitor, Powertel entered 2 markets with discounts of 9 percent to 17 percent from the lowest price cellular competitor, Western Wireless entered 5 markets with discounts of 4 percent to 29 percent from the lowest price cellular competitor, Sprint/APC entered 2 markets with discounts of 2 percent to 15 percent from the lowest price cellular competitor,[210] and PrimeCo entered 11 markets with discounts of 1 percent to 28 percent from the lowest price cellular competitor.[211]

The data reported by *Kagan* allows the Commission to examine price activity over a limited period of time in five markets (Honolulu, Jacksonville, Milwaukee, New York City, and Portland).[212] There are eight large cities (Des Moines, Honolulu, Jacksonville, Milwaukee, Oklahoma City, Portland, Salt Lake City, and San Diego) with two operational PCS licensees. Sprint is the second operational PCS licensee in Portland and Milwaukee and PrimeCo is the second operational PCS licensee in Honolulu and Jacksonville. According to the data reported by *Kagan*, PrimeCo's entry prices in Honolulu ranged from 1 percent to 9 percent higher than the other PCS licensee in Honolulu, and from 15 percent to 63 percent higher than the other PCS licensee in Jacksonville. The data for Sprint suggests its prices range from 7 percent lower to 13 percent higher than the other PCS licensee in Portland, and from 9 percent lower to 3 percent higher than the other PCS licensee in Milwaukee. Moreover, while the pricing information reported in the *Kagan* reports does not suggest a price reaction in the market with the entry of a second PCS licensee,[213] the *Kagan* data suggests that BANM lowered its package price for two packages (30 and 120 minutes of airtime) after Omnipoint's entry into New York City, such that BANM is now the lowest price provider for these two packages.[214]

Current indications of cellular pricing and marketing efforts suggest that the projected entry of PCS providers into every major cellular market by the beginning of the third quarter of 1997 is causing cellular providers to increase the range of their service offerings and packages.

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[210] Sprint's prices are 4 percent lower than the lowest price alternative in one market and 11 percent higher than the lowest price of the first PCS operator in the markets it entered as the second PCS operator.

[211] PrimeCo's prices are 2 percent to 15 percent higher than the lowest price package of the first PCS operator in the two markets it entered as the second PCS operator.

[212] We have insufficient data to determine whether there is a trend since we only have data for two months and *Kagan* does not consistently report price information for the same described packages.

[213] We cannot draw strong conclusions from the data reported by *Kagan* because *Kagan* does not report package prices for the same three described packages over time. For instance, the low usage package may be defined assuming 20 minutes of airtime in one month, but 30 minutes of airtime the next month.

[214] The price charged by BANM fell from $31.89 to $19.99 for a 30 minute package and from $79.99 to $72.39 for a 120 minute package. *Kagan, Wireless Market Stats*, Nov. 22, 1996, and Dec. 18, 1996.

This is evident in the wider range of pricing options being made available to wider classes of subscribers. It is unclear whether the differences in pricing packages will remain over time, or that the cellular incumbents will lower their prices in response to the PCS provider's entry.[215] However, we note that, while neither AT&T Wireless nor Airtouch Cellular have modified their prices in Salt Lake City in response to the entry of VoiceStream,[216] several of GTE Mobilnet's pricing plans in Honolulu have been reduced by 30 percent since the beginning of this year.[217] The Commission expects PCS to be a close substitute to cellular service, hence the Commission expects that the differences in pricing between PCS and cellular providers will not persist. Thus, the Commission will continue to monitor prices to determine the impact the PCS entrants have on competition.

(2) Mass Marketing

The most direct effect that PCS has had on the cellular market to date is the way in which voice-based wireless services are now being marketed to consumers. In the most obvious case, the introduction of low-end cellular service packages appears to be a preemptive move in anticipation of competition from PCS. These service packages indicate that cellular providers have fully embraced the consumer market as a segment in which they must compete, thus no longer limiting their efforts to the traditional business market. One of the more widely offered of such plans is the TalkAlong service package originally developed by US West for the mass market.[218] The TalkAlong concept is designed to be an entry-level service with distribution

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[215] *Kagan* reports that cellular firms are not lowering prices across the board in response to the entry of PCS. Rather in some markets cellular providers have not changed their rates, and in other markets cellular providers have increased their rates since last spring. *Kagan, Wireless Market Stats,* Dec. 18, 1996.

[216] In Salt Lake City, AT&T Wireless offers digital cellular service at a lower package and per minute price than its analog service packages and per minute prices. For example, its Advantage 30 package, which includes 30 minutes of airtime, is priced at $30 for analog service, but $27 for digital service; peak per minute usage is 59 cents a minute for analog, but 53 cents a minute for digital. It is likely that AT&T is charging lower prices for digital service to attract new digital customers and to encourage migration from its analog system. It is too early to judge how this fares competitively with VoiceStream's all digital system.

[217] In addition, GTE Mobilnet offers Honolulu subscribers its TeleGo service, which is priced at $25 per month and includes a free cellular telephone that functions as a cordless phone in the home or office and a cellular phone outside the home or office. Honolulu Cellular claims to differentiate its service from others by calculating how much airtime a customer uses and automatically placing the customer in one of three pricing structures. Honolulu Cellular states that it has not lowered rates since the start of entry of VoiceStream into the market. *Bonnema* at 29.

[218] The TalkAlong program was test-marketed by US West in the State of Washington in November 1994. TalkAlong has been adopted by AirTouch and Bell Atlantic-NYNEX Mobile for their cellular markets as well as by the national wireless alliance, PrimeCo Personal Communications, composed of Bell Atlantic-NYNEX Mobile, AirTouch, and the US West Media Group.

through mass-market retailers, such as electronics, pharmacy, grocery, and discount stores.[219] It is built around a shrink-wrapped phone, which, once purchased ``off-the-shelf,'' can be activated through a call to an ``800'' number.[220] Most importantly, the service is designed around a local call zone wherein preferentially low rates apply.[221] Since its widespread introduction in 1995, TalkAlong has attracted 500,000 cellular subscribers and is available at more than 1,000 retail sites.[222]

Services similar to TalkAlong have been introduced by other cellular carriers. AT&T introduced the GoPhone in a number of its markets in late 1995.[223] SNET has developed SNET Personal Phone Service. Cellular One has introduced PCSNow in several of its Southwest markets.[224] TeleGo was developed by GTE Mobilnet and allows a subscriber to use a single handheld unit as both a household cordless phone and a cellular phone away from home.[225] In February 1996, Ameritech introduced a new package of low cost, entry level cellular services called ``Pick-Up and Go-Cellular,'' which features a service contract, activation fee, how-to video, and instruction booklet. In July 1996, SBC's Cellular One operation in Washington, D.C./Baltimore launched Speak Easy, a $200 off-the shelf product that includes a Motorola analog cellular handset and a one year free subscription. This service is distinguished by its lack of a service contract, which appears to be a competitive response to Sprint/APC's no-contract

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[219] For example, Bell Atlantic Nynex Mobile has an agreement with BlockBuster Video, a major national video rental and retail store, to offer TalkAlong cellular service through sixteen of the video chain's Pittsburgh-area stores. TA Report, Feb. 12, 1996.

[220] The consumer is prompted for basic billing information at that point.

[221] The price for TalkAlong has varied since its inception, but the phone generally retails for around $30, with the monthly service charge generally between $15 and $20. The package usually includes 15 minutes of free airtime and a flat rate of 35 cents per minute for additional airtime. Outside the local call zone, the per-minute rate jumps to 99 cents.

[222] Bloomberg News Service, *The Bells To Jointly Market Wireless*, Apr. 10, 1996.

[223] GoPhone is packaged as a kit for around $40, which includes an AT&T portable phone, a $19.99 monthly fee for 120 minutes of evening and weekend calling, and, during the day, a 49 cents per-minute fee. GoPhone also requires a one-year contract. TA Report, *AT&T Backs New Cellular Product With Regional Ads*, Dec. 18, 1995.

[224] PCSNow offers a monthly access rate of $14.99 under a two-year contract ($17.99 for a one-year contract) for placing and receiving calls within a specified calling zone. Out of zone calls cost 75 cents per minute. D. Wichner, *Cellular One Service Named For Technology*, The Arizona Republic, Mar. 8, 1996.

[225] TeleGo has been made available in about 15 markets and has about 120,000 subscribers. Advanced Wireless Communications, *GTE's In Hot Pursuit of Residential Consumers*, July 5, 1995.

PCS service in the Washington, D.C./Baltimore market.[226] In October, BANM introduced EZ MAX in the New York/New Jersey area, a package that includes a phone for $149.99 with voice-activated dialing technology, service for $18.99 per month including 15 minutes of local air time, the first minute free for all incoming calls in the local area, and no service contract or activation fee.[227] Finally, on October 2, AT&T announced that it would start offering digital cellular service, called Digital PCS, in 40 major markets.[228]

It would be an oversimplification, however, to state that any recent decrease in cellular service package pricing is a direct result of the advent of broadband PCS alone and not also the result of the generally strong national economy and a continuously evolving and maturing cellular industry that is expanding its market base. Increased demand for wireless telephony can also be attributed to general improvements in cellular phones, such as lighter handsets and longer battery life, and improved service quality. In addition, demographic trends point to a general increase in the demand among consumers for increased mobility and availability to communicate, thus driving upward the overall demand for wireless products.

The speed at which the entry of broadband PCS causes prices to decrease and wireless telephony options to increase is likely to depend in part on how long it takes broadband PCS providers to create service offerings that provide consumers with geographic coverage similar to cellular service and a quality service at competitive prices. A significant part of the answer to that question will depend on the success of broadband PCS operators in building out their digital networks. The example of Sprint/APC in the Washington, D.C., marketplace is an important one. Sprint/APC appears to have stimulated the total wireless marketplace in Washington, as evidenced by its substantial subscriber additions.[229] However, neither cellular operator in the area (Bell Atlantic Nynex Mobile and Cellular One) has reported any decline in expected sub-

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[226] The monthly access charge is $15, and calls made within the customer's chosen ``home zone'' are billed at 39 cents per minute, and 99 cents per minute outside the home zone. J. Blake, *D.C. Cellular Carrier Inaugurates No-Contract Service Package*, RCR, July 22, 1996, at 12.

[227] PR Newswire, *Bell Atlantic NYNEX Mobile Introduces New "EZ" Generation of Wireless Service in New York and New Jersey; EZ MAX Personal Communications Package Responds to Consumers'...*, Oct. 7, 1996.

[228] J. Sandberg and J. Keller, *AT&T Launching New Wireless Service*, Wall Street Journal, Oct. 2, 1996, at A3.

[229] APC estimates that it has attracted over 100,000 subscribers from the date of its entry, November, 1995, to the end of July, 1996. (*See* PR Newswire, *New Sprint PCS Technology Center to be Focal Point for All-Digital Nationwide PCS Network State-of-the-Art Facility Will Serve as Network Control and Testing Center*, Oct. 29, 1996, Reuters, *Sprint Spectrum Seen Self-Financing By 2001*, May 23, 1996.).

scriber additions.[230] The current success of Sprint/APC can be attributed to its aggressive competitive pricing across a broad range of service plans and its value added features, such as a built-in pager, caller ID, voice mail, and service quality.[231] Sprint/APC's current success is also noteworthy in that it is attracting significant numbers of initial subscribers despite its currently limited geographic range as compared to Bell Atlantic Nynex Mobile. Sprint/APC, however, will not always be geographically limited given its partnership with Sprint, which intends to build a national broadband PCS presence.

Sprint/APC's example may be a positive indicator, especially for those broadband PCS licensees that will not have a large regional or national presence, that it is possible to offer a competitive service even if the area in which the licensee can make service available to its customers is smaller than its competitor's. In addition, the Commission's new rules regarding manual roaming may also aid smaller entities in attracting subscribers.[232] This rule requires cellular, broadband PCS, and covered SMR licensees to provide manual roaming service on request to any subscriber whose handset is technically capable of accessing their system.[233]

b. *Cellular vs. SMR*

The only potential for direct competition between cellular and SMR providers is between cellular companies and so-called enhanced or wide area SMR providers. As discussed previously, the principal wide area SMR providers are Nextel and Geotek. Beginning in the early 1990s, Nextel acquired numerous large and small SMR providers in an effort to create a national footprint for its integrated digital service product, which it described as competitive with cellular.[234] In mid-1995, Nextel altered its plans considerably, such that it no longer claims to be targeting the cellular individual subscriber market. Instead, Nextel seeks to target its sales efforts toward business work groups.[235] Nextel began rolling out its PowerFone product in September 1996.[236]

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[230] According to one study, the launch of APC's PCS service has not led to any measurable decline in operating performance of Bell Atlantic Nynex Mobile or Cellular One in terms of customer growth, subscriber usage and mix, or margins. In fact, Bell Atlantic Nynex Mobile reports that average usage per customer has risen. *Salomon Brothers*, Apr. 1996, at 7.

[231] *See* Section III.B.2.a, *supra*.

[232] Manual roaming refers to roaming in which the roamer must establish a relationship with the host system (typically by supplying a valid credit card number) before making or receiving a call.

[233] *See* Section 20.12 (c), 47 C.F.R. § 20.12 (c).

[234] F. Joyce & S. Hamrick, *SMRs: The Little/Big Industry*, Telecom Exchange, Apr./May, 1996, at 22.

[235] The business work groups market is typically seeking the push-to-talk features of traditional SMR service in addition to interconnected service and value-added services such as paging and data delivery. Most analysts tracking the wireless industry expect Nextel, by far the largest SMR service provider with almost 50 percent of the

Nextel's PowerFone product is available in Chicago, Denver, Boston, Las Vegas, Detroit, and Atlanta. PR Newswire reports that, Nextel has 20,000 PowerFone customers, and that the average monthly revenue per unit on new service is $75, compared with a $46 average for conventional cellular customers.

Nevertheless, the technology that Nextel employs provides many of the same features and functions as high-end cellular equipment. For some businesses, Nextel's service offerings may still be perceived as a substitute for cellular service. Therefore, despite Nextel's distancing itself from its previous announcements to compete directly with cellular operators for the broad mobile telephone market, it appears ready to offer a cellular-like service that incorporates features of a cellular phone, pager, and messaging tool, including e-mail and fax.[237] Geotek has also developed a range of integrated services built around a digital standard and directed at business work groups. Therefore, its services may also be perceived as a substitute for cellular service. Geotek, however, has never marketed itself to the mass market for mobile telephony, or as a substitute for cellular.

In addition, although 220 MHz service is generally a dispatch service, interconnection to the PSN can be provided. Current systems appear to be competing in the dispatch market.[238] However, with our Phase II rulemaking having just been completed,[239] it is difficult to predict where this service will fall within the CMRS marketplace. Given the small amount of spectrum allocated to this service compared to the other CMRS providers offering mobile telephony, 220 MHz is unlikely to have sufficient capacity to compete in the consumer mobile telephony market, although it may serve to fill certain unserved niche markets.

In general, therefore, wide area SMR should be considered competitive with cellular, but only in terms of the business market, particularly high volume mobile communications users. Success by wide area SMRs in selling their service offering to businesses, particularly in larger

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total SMR subscribers, to continue to concentrate on the general business market rather than the consumer market. Geotek, another wide-area SMR licensee, is also primarily targeting business subscribers. *See, e.g., Salomon Brothers* at 118; *DLJ* at 38; *Bear Stearns* at 17.

[236] PR Newswire, *Nextel Holds First Major Analyst Conference Since Launching New Wireless Services*, Oct. 29, 1996, and *Nextel Reports Third-Quarter Results, Company Well Positioned for Nationwide Roll-Out of Digital Service*, Nov. 14, 1996. Nextel plans to cover 85 percent of the U.S. population by the end of 1998.

[237] *See* Section III.B.4, *supra*.

[238] Only about 11 percent of 220 MHz licenses are CMRS.

[239] Amendment of Part 90 of the Commissions Rules to Provide for the Use of the 220-222 MHz Band by the Private Land Mobile Radio Service, PR Docket No. 89-552 and Implementation of Sections 3(n) and 332 of the Communications Act, Regulatory Treatment of Mobile Services, GN Docket No. 93-252, Third Report and Order and Fifth Notice of Proposed Rule Making, FCC 97-57, adopted Feb. 19, 1997.

urban areas, could stimulate direct competitive marketing between cellular carriers and wide area SMR providers for lucrative business contracts. It is extremely unlikely, however, that such a degree of competition between cellular carriers and enhanced SMR providers would have a widespread impact on cellular pricing for the consumer market.

2. Messaging Services

The messaging services market includes paging operators, narrowband PCS operators, and certain SMR providers. It is important to mention at the outset that, depending on equipment, cellular, wide area SMR, and broadband PCS operators can offer numeric and alphanumeric paging. In addition, 220 MHz licensees may offer paging on a primary basis and, therefore, may provide some additional competition to traditional messaging companies.

During the past year, a number of deregulatory steps have been taken to provide paging licensees more flexibility in the use of their channels. These steps were designed to facilitate the introduction of the new generation of enhanced and two-way paging services using narrowband PCS channels as well as cellular and SMR channels, and to encourage even more competition in this CMRS segment. For example, the changes we made in our Rules to permit the auction of over 1,000 MTA licenses to operate in the 900 MHz SMR band resulted in PageNet, the largest paging company in the Nation, obtaining 126 licenses to use at least 250 kHz of spectrum throughout the Nation.[240] Not only does this demonstrate the relative ease of entry into paging, but it also highlights the fact that the flexibility in the Commission's Rules permits SMR spectrum to be used for paging as well as dispatch and mobile telephone services. As a result, the traditional one-way tone, numeric, or alphanumeric paging market has become part of a more broadly defined messaging market that includes such things as digital voice paging, two-way and acknowledgement paging, e-mail, and various value-added information services such as stock market quotes and sports scores.

The paging market is competitive, as evidenced by the large number of paging service providers in most areas of the Nation.[241] It is too early to gauge the success of narrowband PCS providers in the messaging market. Narrowband PCS providers continue to experience technological hindrances, principally in the delivery of two-way service, and therefore have pursued a rather measured entrance into the messaging marketplace.[242] In recent years, much of the growth in paging subscribers has resulted from changes in distribution strategies and the increase in the

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[240] In most major markets, PageNet obtained multiple 250 kHz licenses.

[241] *See* Section III.B.3., *supra*.

[242] *See DLJ* at 29-31.

number of providers, such as resellers and retail distribution centers.[243] In competing with traditional paging operators, narrowband PCS providers can be expected to offer their service at a slight price premium because they will be offering a comparatively enhanced paging service.

Broadband PCS operators and cellular operators employing digital networks will have the ability to offer paging as a value added service. Thus, messaging may develop into a component of a larger set of services while it continues to grow as a stand alone service for a considerable number of subscribers. Approximately 30 percent of cellular customers also use paging service,[244] suggesting that paging and cellular services are not direct substitutes for each other. Industry analysts tend to view basic one-way paging as a complement to, rather than a substitute for, cellular service, based on advantages and practical distinctions between them, such as lower prices, extended battery life, reliability in terms of roaming and in-building coverage and size.[245]

Although cellular and paging can be considered complements, developments in digital technology make it possible to offer a paging-like service, such as Short Message Service (SMS), over a cellular or broadband PCS phone.[246] The incentive for the carrier to offer such a service is that this message is likely to generate additional call traffic over the network by subscribers, thus generating additional per minute revenues. For paging subscribers seeking only an inexpensive messaging service and no voice services, based on current pricing levels, it is unlikely that they will choose cellular or broadband PCS service incorporating this feature as a substitute for their current paging service. The gap between the cost of basic paging service and the lowest priced cellular or broadband PCS service plan inhibits such a leap for the time being. On the other hand, the thirty percent of cellular subscribers who also have pagers may view such a combined offering as a substitute for maintaining separate paging and cellular service. Therefore, the capabilities of newer technological developments may induce increased competition for subscribers seeking a combined voice and messaging service option.

D. Competition with Wireline Telecommunications Providers

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[243] *See Goldman Sachs* at 40.

[244] *Yankee Group* at 15.

[245] *Goldman Sachs* at 44. *See* also *Smith Barney* at 11. *But see CMRS Third Report and Order*, 9 FCC Rcd at 8021 (paras. 60-62).

[246] SMS is essentially short paging style messaging. Broadband PCS operators, Sprint/APC, Western Wireless, and BellSouth Mobility DCS offer SMS at no extra charge to subscribers. The service, as offered by these providers, allows calls that go unanswered by the subscriber to be directed into the subscriber's voice mail. At that point, callers are given the choice of leaving a recorded message or sending a numeric message by keying in their phone number. In either instance, subscribers are informed via the display screen on the handset that there is a message on their voice mail or that they have been paged, in which case the number is displayed on the handset's display screen. Depending on the sophistication of the handset, even if the caller leaves neither a message nor sends a page, these providers do offer Caller ID, which will display the number of the missed call to the subscriber.

The Commission will continue to gauge the extent to which wireless services are a complement to or a substitute for wireline services. Wireless services do not yet approach the ubiquity of wireline telephone service, but there are a number of trends apparent in the increased use of wireless telephony that may point to the eventual use of wireless telephony as not just a supplementary communications tool to traditional wireline telephone service but as a substitute for such service. Our analysis in this Report will focus on the extent to which the mass market is adopting wireless telephony as a substitute for wireline.

Thirteen percent of Americans are using wireless telephony as a complement to wireline communications.[247] Moreover, a recent case decided by the Wireless Telecommunications Bureau illustrates the degree to which cellular service may be treated as a substitute for conventional wireline telephone service, from a technical and operational perspective.[248] In that proceeding US West sought a waiver of the Commission's Rules to enable US West to provide cellular service to customers ``who are without access to dial-tone service while they await installation of landline telephone service."[249] The Bureau, in granting the waiver, found that its ``decision will serve the public interest by permitting subscribers experiencing delays in obtaining landline telephone service to gain access to the public switched network by means of temporary cellular service."[250] Thus, the *US West Order* illustrates a case in which cellular service, in a very limited instance, is being made available, at wireline prices, as a functional substitute for fixed wireline telephone service.[251]

The larger issue is the extent to which mobile telephony is viewed by consumers as a substitute for wireline telecommunications.[252] A key aspect of our analysis of the extent to

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[247] For some consumers, wireless telephony may already compete with wireline service as an alternative means of obtaining a second telephone line in the home. However, we have no information to ascertain the extent, if any, to which this substitution is occurring.

[248] Request of US West Communications, Inc., for a Limited Waiver of Section 22.903 of the Commission's Rules, DA 96-605, Wireless. Telecom. Bur., released Apr. 17, 1996 (*US West Order*).

[249] *Id*. at para. 6.

[250] *Id*. at para. 20.

[251] We note that the Bureau was careful to observe that the waiver ``present[ed] special circumstances because it affects a relatively small number of customers . . . .", *id*., and that the service would be provided on an interim basis. *Id*. at para. 17. The cellular service is also provided to subscribers at landline rates, rather than cellular rates. *Id*.

[252] One analyst has estimated that of all telecommunications minutes, wireline and wireless together, only 2.5 percent of those are from wireless calls. J. Bensche, *Coming Supply Glut*, Bensche-Marks, Vol. 96-07, June 24, 1996. Bensche derives this number based on 160 million landlines, averaging 1,000 minutes per month per line, and 35 million cellular subscribers, averaging 120 minutes per month per subscriber. *Id.*

which wireless services are being used as a substitute for wireline services is to look at the prices for both types of services.[253] In the *First Report*, we stated that, based on available pricing data, there appeared to be a significant premium for mobile service as compared to wireline service, and that wireless telephone service prices will have to fall well over 50 percent for wireless service to be fully price-competitive with traditional telephone service.[254]

This remains the case. Although there are a number of lower priced cellular service packages, such as TalkAlong, as offered by Bell Atlantic and Airtouch, these services are more expensive than other wireless services because the subscriber is subject to a relatively high per minute charge for outgoing and incoming calls. Other services, such as GTE's Tele-Go, which functions as a cordless phone within the subscriber's home, and as a cellular phone outside the subscriber's home, is closer to the model of a fully wireless communications tool. However, it still requires the landline network for calls made from the home. In addition, Tele-Go includes different charges for calls made from home than for those made as a cellular phone.[255]

Thus, the primary obstacle to classifying wireless as a potential substitute for wireline telephony is the per minute charge. Some analysts believe that if cellular providers substantially decrease their per minute charges, they may spur increased usage and, therefore, compensate for the lower charge.[256] The average length of a cellular call in June, 1996 was 2.24 minutes.[257] This would suggest that the measured service of cellular rate plans continues to constrain subscribers' use of the wireless phone because of the per minute charge they must pay for doing so. The overall price for wireless service is still well in excess of wireline telephony. This is likely to change, however, as additional spectrum is allocated for mobile services and more service providers compete for customers.

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[253] In the *First Report*, we stated our interest in comparing wireless telephone service prices to wireline prices because there was some conjecture that wireless services can eventually compete with wireline telephone service, and any such competition would be a major pro-competitive development in the telecommunications business. *See First Report*, 10 FCC Rcd at 8869-70 (para. 75).

[254] *Id.*

[255] *See* Section III.B.1.c., *supra*.

[256] Some analysts posit that more and more carriers, particularly PCS providers, may adopt this approach. *See e.g.*, *DLJ* at 6. For example, *DLJ* states that some C Block PCS providers' plans project multiples of current usage levels as a result of much lower per minute pricing. According to *DLJ*, instead of the 125-150 minutes of use per month common among cellular customers, PCS providers believe that the elasticity of demand to lower pricing can allow them to achieve 1,000 minutes per month generated by residential landline users, on the theory that the differences in usage exist primarily because cellular service is too expensive to use as a landline substitute. *Id.*

[257] CTIA SURVEY.

The services offered by the few operating broadband PCS carriers are currently priced closer to cellular service than to comparable wireline services and therefore it is too early to state that broadband PCS providers' offerings might be perceived as a wireline substitute. Again, the prices on a monthly and per minute basis exceed those of the average wireline monthly telephone service charge.[258] Nevertheless, PCS providers appear to be positioning their service offerings to become similar to wireline service, as evidenced by the fact that APC, Western Wireless, and BellSouth are not charging for the first minute of incoming calls, and by the availability of a significant number of value-added services. Based on the volume of outgoing and incoming calls to PCS subscribers, APC's and Western Wireless's subscribers appear more willing to disclose their PCS phone numbers to other people because of the reduced cost of accepting an incoming phone call. This suggests that these subscribers are more inclined to use their phones as a general communications device and not just for special or emergency communications.

On a more fundamental basis, however, CMRS competition with wireline providers may depend on the extent to which CMRS providers have access to the wireline network. Interconnection between CMRS and LECs is a significant factor in the long term success of CMRS becoming competitive with and a functionally equivalent substitute for wireline communications. Interconnection charges that address the actual costs of interconnection will allow CMRS providers and wireline providers to compete based not on some cost advantage stemming from control of monopoly-based facilities, but on the services they offer.[259] Similarly, the ability to carry a telephone number from one service provider, whether they be wireline or wireless, to another provider is an important element in the transition of CMRS services from a complementary telecommunications service to a competitive equivalent to wireline services. As discussed below in Section IV, the Commission has taken steps during the past year to facilitate interconnection and number portability.

IV. COMMISSION INITIATIVES AFFECTING CMRS COMPETITION

The Commission has commenced or recently completed a number of regulatory initiatives with the objective of promoting CMRS competition and expediting the deployment of CMRS. These actions are expected to facilitate the provision of a wider range of CMRS services of

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[258] In 1995, the average monthly cellular bill was $51, but the average monthly residential wireline rate in 1995 was $19.54. *See* Federal Communications Commission, Statistics of Communications Common Carriers, 1995/1996 Edition, FCC Web Site (FCC-State Link).

[259] Implementation of the Local Competition Provisions in the Telecommunications Act of 1996, CC Docket No. 96-98; and Interconnection between Local Exchange Carriers and Commercial Mobile Radio Service Providers, CC Docket No. 95-185, First Report and Order, FCC 96-325, 11 FCC Rcd 15499 (1996) (*Section 251 and 252 Proceeding*).

greater quality and at lower prices. Along with other Commission actions, they have already stimulated the communications industry and further fueled wireless investment.

The Commission continues to allocate more spectrum that can be used to provide CMRS.[260] In March 1996, we released a *Spectrum Plan* indicating how we plan to make spectrum being transferred from Federal Government use available for private sector use.[261] The process of implementing this Plan is underway and, by the year 2000, could make an additional 70 megahertz of spectrum in the 1.3-1.6 GHz, and the 3.6 GHz bands available for CMRS. These additional spectrum allocations should expand the quantity, quality, and variety of wireless services, increase the number of CMRS providers and, ultimately, lead to lower prices for consumers.

The Commission has made extensive use of its auction authority as the most efficient means of assigning this newly-allocated spectrum to providers who will deploy services for use by the public as quickly as possible, while recovering a portion of the value of the public spectrum for the public. The Commission has approved the use of auctions for 220 MHz service;[262] the contiguous channels designated for 800 MHz SMR Service;[263] 900 MHz SMR Service;[264]

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[260] Chart 3 summarizes CMRS spectrum allocations as of the enactment of the Omnibus Budget Reconciliation Act of 1993, current allocations, and projected allocations in 2000.

[261] The Commission's *Spectrum Plan* discusses the allocation of an additional 185 megahertz of spectrum from the Federal to the private sector, establishes the scope and timing of future rulemaking proceedings to assign this reallocated spectrum, and aggregates into four groups the 12 frequency bands that comprise the total amount of spectrum to be transferred. *See*, Plan for Reallocated Spectrum, FCC 96-125, released Mar. 22, 1996

[262] Amendment of Part 90 of the Commissions Rules to Provide for the Use of the 220-222 MHz Band by the Private Land Mobile Radio Service, PR Docket No. 89-552 and Implementation of Sections 3(n) and 332 of the Communications Act, Regulatory Treatment of Mobile Services, GN Docket No. 93-252, Third Report and Order and Fifth Notice of Proposed Rule Making, FCC 97-57, adopted Feb. 19, 1997.

[263] Amendment of Part 90 of the Commission's Rules to Facilitate Future Development of SMR Systems in the 800 MHz Frequency Band, PR Docket No. 93-144, RM-8030, RM-8029, Implementation of Sections 3(n) and 332 of the Communications Act, Regulatory Treatment of Mobile Services, GN Docket No. 93-252, and Implementation of Section 309(j) of the Communications Act, Competitive Bidding, PP Docket No. 93-253, First Report and Order, Eighth Report and Order, and Second Further Notice of Proposed Rulemaking, FCC 95-501, 11 FCC Rcd 1463 (1996). These rules apply only to the upper 200 channels in the SMR category.

[264] Amendment of Parts 2 and 90 of the Commission's Rules to Provide for the Use of 200 Channels Outside the Designated Filing Areas in the 896-901 MHz and the 935-940 MHz Bands Allotted to the Specialized Mobile Radio Pool PR Docket No. 89-553; Implementation of Section 309(j) of the Communications Act, Competitive Bidding PP Docket No.93-253; Implementation of Sections 3(n) and 332 of the Communications Act, GN Docket No. 93-252; Second Report & Order and Second Further Notice of Proposed Rule Making, FCC 95-159, 10 FCC Rcd 6884 (1995)(*900 MHZ SMR Order*).

currently unserved areas in the cellular service;[265] Location and Monitoring Service;[266] the paging services;[267] broadband PCS in the C-Block,[268] broadband PCS in the D,E,and F-Blocks,[269] narrowband PCS,[270] and the new Part 27 WCS.[271] The Commission has also proposed to auction the lower channels designated for 800 MHz Service.[272] To accelerate the licensing process further, the Wireless Telecommunications Bureau introduced electronic filing for PCS, Private Land Mobile Radio Services, and General Mobile Radio Service license applications in 1996. The new system has the capacity to receive approximately 60 percent of the applications currently filed for these services.

The Commission has also undertaken several additional rulemakings specifically designed to stimulate competition in the developing CMRS market. These regulatory initiatives will give

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[265] Implementation of Section 309(j) of the Communications Act, Competitive Bidding, PP Docket No. 93-253 and Amendment of Part 22 of the Commission's Rules to Provide for the Filing and Processing of Applications for Unserved Areas in the Cellular Service and to Modify Other Cellular Rules, CC Docket No. 90-6, Ninth Report and Order, FCC 96-361, 11 FCC Rcd 14769 (1996).

[266] Amendment of Part 90 of the Commission's Rules to Adopt Regulations for Automatic Vehicle Monitoring Systems, PR Docket No. 93-61, Report and Order, FCC 95-41, 10 FCC Rcd 4695 (1995).

[267] Revision of Part 22 and Part 90 of the Commission's Rules to Facilitate Future Development of Paging Systems, WT Docket No. 96-18, and Implementation of Section 309(j) of the Communications Act, Competitive Bidding, PP Docket No. 93-253, Second Report and Order and Further Notice of Proposed Rulemaking, FCC 97-59, released Feb. 25, 1997.

[268] Implementation of Section 309(j) of the Communications Act, Competitive Bidding, PP Docket No. 93-253, Fifth Report and Order, FCC 94-178, 9 FCC Rcd 5532 (1994). The C Block auction closed in May 1996. The 18 licenses whose winning bidders were deemed in default by the Commission were reauctioned in July 1996.

[269] 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, and Amendment of the Commission Cellular Cross-Ownership Rule, GN Docket No. 90-314, Report and Order, FCC 96-278, 11 FCC Rcd 7824 (1996). *See also* , 47 C.F.R. § 20.6. The DEF Block auction ended on January 14, 1997.

[270] *See* Implementation of Section 309(j) of the Communications Act, Competitive Bidding Narrowband PCS, PP Docket No. 93-253, and Amendment of the Commission's Rules to Establish New Narrowband Personal Communications Services, GEN Docket No. 90-314, Third Memorandum Opinion and Order and Further Notice of Proposed Rulemaking, 10 FCC Rcd 175 (1994); *see also*, Implementation of Section 309(j) of the Communications Act, Competitive Bidding Narrowband PCS, PP Docket No. 93-253, and Amendment of the Commission's Rules to Establish New Narrowband Personal Communications Services, GEN Docket No. 90-314, Third Report and Order, 9 FCC Rcd 2941 (1994).

[271] Amendment of the Commission's Rules to Establish Part 27, the Wireless Communications Service ("WCS"), GN Docket No. 96-228, Report and Order, FCC 97-50, adopted Feb. 20, 1997.

[272] *See 800 MHz SMR Order*, FCC 95-501, at para. 323. Under the pending proposal, General Category 800 MHz channels would also be auctioned.

CMRS licensees more flexibility to respond rapidly to changes in the market and will enable them to tailor their offerings to provide those services most valued by consumers. For example, the Commission has modified its rules to give broadband PCS, cellular, and other CMRS providers the flexibility to expand their service offerings and compete in local exchange telephone markets, through the provision of ``fixed'' wireless local loop services.[273] By enabling CMRS providers to offer fixed services, either separately or as an integrated package with their mobile services, the Commission has established a framework that will stimulate wireless competition in the local exchange market, encourage innovation and experimentation in the development of wireless services, and lead to a greater variety of service offerings to consumers.

The Commission has also adopted new rules that allow PCS licensees to partition and assign geographic portions of their licenses along geopolitical or other boundaries, and to disaggregate and assign discrete portions or blocks of their licensed spectrum to other PCS licensees or qualifying entities.[274] Among other benefits, these measures will expedite the provision of PCS to areas that may not otherwise receive PCS or other wireless services in the near future, and should encourage new entry by enabling more small businesses to participate in PCS, including those that did not participate in the PCS auctions because of the capital requirements.[275]

In addition, the Commission has begun to replace its system of licensing each transmitter and to implement licensing based on geographic service areas.[276] When these rules are implemented, licensees for 800 MHz and 900 MHz SMRs, 220 MHz service, and paging services will not have to apply for additional site locations in order to expand their systems within the geographic area for which they are licensed and can avoid those costs and delays associated with the competitive application process.

The Commission has undertaken several additional deregulatory measures. We have instituted several proceedings to remove regulatory impediments to market entry. These include

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[273] Potential fixed wireless services include not only ``wireless local loop,'' *i.e.*, fixed wireless links to connect residences, apartment houses, office buildings and other structures that are now served only by wireline local exchange networks, but also fixed wireless architectures that can link end users to cellular switches, remote base stations or satellites. Amendment of the Commission's Rules to Permit Flexible Service Offerings in the Commercial Mobile Services, WT Docket No. 96-6, First Report and Order, FCC 96-283, 11 FCC Rcd 8965 (1996).

[274] Geographic Partitioning and Spectrum Disaggregation by Commercial Mobile Radio Services Licensees, WT Docket No. 96-148; Implementation of Section 257 of the Communications Act, Elimination of Market Entry Barriers, GN Docket No. 96-113, Report and Order and Further Notice of Proposed Rulemaking , FCC 96-474, released Dec. 20, 1996.

[275] Section 257 Proceeding to Identify and Eliminate Market Entry Barriers for Small Businesses, GN Docket No. 96-113, Notice of Inquiry, FCC 96-216, 11 FCC Rcd 6280 (1996). As noted above, the proposal to permit PCS licensees to partition and disaggregate their licenses may also facilitate entry of small businesses into the CMRS industry.

[276] *See e.g, 800 MHz SMR ,900 MHZ SMR , 220 MHz, and Paging Orders.*

proposing to phase out, as market conditions warrant, or to eliminate entirely the requirement that BOCs provide cellular service through structurally separate subsidiaries.[277] We have also adopted rules to expedite the entry of registered public utility holding companies into the telecommunications industry,[278] and, as of December 31, 1996, had granted 18 applications permitting these companies to offer a broad variety of telecommunications services.[279] We have also commenced a proceeding to identify and eliminate market entry barriers for entrepreneurs and other small businesses and have identified several initiatives to increase opportunities for small business in telecommunications markets, including incentives for small business in the spectrum auctions, and the Telecommunications Development Fund.[280] In addition, the Commission is considering initiatives to help eliminate market entry barriers for small businesses, including those owned by women or minorities.

In order to help new entrants to overcome the advantages of incumbency, the Commission has implemented regulatory safeguards against market failure by imposing certain requirements on CMRS providers and LECs. We have adopted a resale rule requiring cellular, broadband PCS, and geographic area SMR providers to permit unrestricted resale of their services

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[277] Amendment of the Commission's Rules to Establish Competitive Service Safeguards for Local Exchange Carrier Provision of Commercial Mobile Radio Services, WT Docket No. 96-162; Implementation of Section 601(d) of the Telecommunications Act of 1996, and Sections 222 and 251(c)(5) of the Communications Act of 1934; Amendment of the Commission's Rules to Establish New Personal Communications Services, GN Docket No. 90-314; and Requests of Bell Atlantic-NYNEX Mobile, Inc., and U S WEST, Inc., for Waiver of Section 22.903 of the Commission's Rules, Notice of Proposed Rulemaking, Order on Remand, and Waiver Order, FCC 96-319, 11 FCC Rcd 16639 (1996).

[278] Implementation of Section 24(a)(1) of the Public Utility Holding Company Act of 1935, as added by the Telecommunications Act of 1996, GC Docket No. 96-101, Report and Order, FCC 96-376, 11 FCC Rcd 11377 (1996).

[279] *See, e.g.*, Application of CSW Communications, Inc. for Status as an Exempt Telecommunications Company under the Public Utility Holding Company Act of 1935, as Amended by Section 103 of the Telecommunications Act of 1996, File No. ETC-96-1, Order, FCC 96-152, 11 FCC Rcd 16512 (1996) (granting CSW Communications, Inc., ETC application and leasing spare capacity on its fiber optic network). *See also* Application of Allegheny Communications Connect, Inc., for Determination of Exempt Telecommunications Company Status under Section 34 of the Public Utility Holding Company Act of 1935, as added by Section 103 of the Telecommunications Act of 1996, File No. ETC-96-11, Order, DA 96-953, 11 FCC Rcd 12204 (1996) (approving ETC application of Allegheny Communications Connect, Inc., to offer services to PCS license holder for the establishment and construction of PCS networks).

[280] *See* Section 257 of the Communications Act, 47 U.S.C. § 257. *See also*, Section 257 Proceeding to Identify and Eliminate Market Entry Barriers for Small Businesses, GN Docket No. 96-113, Notice of Inquiry, FCC 96-216, 11 FCC Rcd 6280 (1996).

during a transitional period, while this market is developing to a more competitive state.[281] This requirement will also help new entrants to ``jump start'' their services before they have built out new networks. In addition, the Commission has extended its cellular roaming rule to require cellular licensees to provide manual roaming service upon request to any cellular, broadband PCS, or geographic area SMR subscriber that is using mobile equipment that is technically compatible with a licensee's base stations, and has extended this rule to broadband PCS and geographic area SMR licensees.[282]

The Commission has also issued regulations aimed at anticompetitive practices that will help to ensure the continued development of wireless services as a potential competitor to LEC services.[283] We have issued regulations implementing the requirement in Sections 251 and 252 of the Communications Act that incumbent LECs offer interconnection and access to their network elements on an unbundled basis to CMRS providers and to other potential competitors and that they establish reciprocal compensation arrangements with these new entrants for the transport and termination of calls at prices that are cost-based and just and reasonable.[284] The Commission has established minimum national rules and has granted the states discretion to accommodate the special characteristics of their regions and the needs of their local markets in applying these rules. We have also established baseline terms and conditions for interconnection agreements between LECs and new entrants subject to the state's arbitration process, in order to reduce delay and lower the transaction costs of that process. Because the ability to keep one's telephone number will eliminate a significant disincentive to change carriers, the Commission has also adopted rules requiring LECs, cellular, broadband PCS, and geographic area SMR providers to offer their customers number portability.[285] This will promote competition among

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[281] Interconnection and Resale Obligations Pertaining to Commercial Mobile Radio Services, CC Docket No. 94-54, First Report and Order, FCC 96-263, 61 FR 38399 (July 24, 1996).

[282] Interconnection and Resale Obligations Pertaining to Commercial Mobile Radio Services, CC Docket No. 94-54, Second Report and Order and Third Notice of Proposed Rulemaking, FCC 96-284, 11 FCC Rcd 9462 (1996). The Commission is considering sunsetting this requirement in five years, at which point we anticipate that buildout of PCS networks and competitive forces in the CMRS market will have rendered continued regulation unnecessary.

[283] These rules will help those broadband PCS, cellular, and other CMRS providers that have been granted the flexibility to provide ``fixed'' wireless local loop services, to compete with LECs in local exchange telephone markets.

[284] *Implementation of the Local Competition Provisions in the Telecommunications Act of 1996, CC Docket No. 96-98, Report and Order, FCC 96-325, 11 FCC Rcd 15499 (1996) (Section 251 and 252 Proceeding*). The Commission's pricing and pick and choose rules were stayed by the Court on October 15, 1996.

[285] Telephone Number Portability, CC Docket No. 95-116, RM-8535, First Report and Order and Further Notice of Proposed Rulemaking, FCC 96-286, 11 FCC Rcd 8352 (1996).

service providers and will facilitate entry by providers of new and innovative service offerings, such as wireless local loop.

V. ADMINISTRATIVE MATTERS

This Report is issued pursuant to authority contained in Section 332 (c)(1)(C) of the Communications Act of 1934, as amended, 47 U.S.C. § 332 (c)(1)(C).

It is ORDERED that the Acting Secretary shall send copies of this Report to the appropriate committees and subcommittees of the United States House of Representatives and the United States Senate.

FEDERAL COMMUNICATIONS COMMISSION

William F. Caton
Acting Secretary

APPENDIX - Other CMRS Services

Air-to-Ground Service

Air-to-ground service involves the provision of in-flight telephone service on airplanes. Despite its availability on private aircraft since the mid-1960s, the first commercial airline phone system was not installed until 1984.[1] Customer complaints over unreliability and excessive charges,[2] however, have led several aircraft carriers to remove their onboard telephones in 1995.[3]

No industry-wide technical standards exist among the various carriers. However, a new generation of air-to-ground service seems to have corrected many of the earlier technical problems. Telephone carriers are replacing outmoded analog phones with higher quality digital systems capable of transmitting voice, e-mail, data files, and facsimiles.[4] Some telephone carriers also provide fliers with a temporary phone number,[5] in-flight paging service,[6] or voice mail[7] so they may be reached while in the air. Other air-to-ground systems claim they are developing airborne local area networks, allowing a plane's dedicated audio, video, and data communications servers to offer business and leisure travelers video-on-demand,[8] shopping,[9] and even casino-style gambling.[10] Industry analysts predict that the most notable improvements in reliability and

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[1] L. Woods, *Airphones Still Give Some People Static*, Wall Street Journal, Feb. 16, 1996, at B5.

[2] *Id*.

[3] USAir has cancelled its contract with In-flight Phone Corp. to provide telephone service; UAL (GEC-Marconi PLC) and Northwest (Hughes Avicom International) have taken similar measures. *See* D. Field, *Grounded by Reality; In-flight Gadgetry Falls Short of Dreams*, Washington Times, May 22, 1996, at B7 (Field).

[4] E. Williams, *Ready to Ware: GTE Eases Air-Call Fears*, Orange County Register, May 12, 1996, at K9.

[5] K. Hunt, The Hartford Courant, May 23, 1996, at E1.

[6] In-Flight Phone Corp. has found passengers are not overly receptive to the in-flight paging feature of its Flightlink system. *In-Flight Phone Corp. Tests Debugged IFE System with Continental*, Airline Mktg. News, Sept. 27, 1995, *available in* WESTLAW 10252895.

[7] Aviation Daily, Apr. 12, 1996, at 83.

[8] *Mobile Data Report*, Jan. 15, 1996, *available in* WESTLAW 5801736.

[9] *Id.*

[10] *See Field*.

quality of service are likely to come from the advent of ground microwave stations[11] and the increasing availability of satellite communications as a substitute for ground-based systems.[12]

The largest obstacle confronting the industry is overcoming consumer hesitancy related to pricing for air-to-ground service. The average cost for an inflight domestic call or fax is $2.50 per minute.[13] GTE/Airfone has increased the number of promotions to increase air-to-ground use. GTE/Airfone became the first company to shift to a flat-rate price of $15 per call for all domestic calls (voice, data, or facsimile), dropping all connection charges and per-minute fees.[14] GTE/Airfone has reduced the price of short duration calls by charging $2.99 for each call and a $2.99 per minute with a maximum charge of $15.00 after 4 minutes, and has reduced the monthly charge from $14.95 to $5.00 for Florida cellular subscribers who enroll in a 99 cents a minute plan for domestic voice, data, or fax Airfone calls.[15] Finally, GTE has an Airfone Service Unlimited Calling Card for $24.95 for the month of December. Corporate volume discounts and monthly rate plans may further encourage the use of fax and data transmission services by business travelers, since current calling volume is far below network capacity.[16]

There are six available air-to-ground licenses, only three of which are in use. The current service providers are GTE/Airfone, AT&T Wireless Services (purchasers of Claircom Communications), and In-Flight Phone Corp (acquired by MCI in 1995). However, In-Flight Phone Corporation filed a Chapter 11 bankruptcy petition on January 24, 1997.[17] Approximately 4.5

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[11] In-Flight's ground microwave stations are touted as improving the quality of call handoffs by providing near real-time remote built-in diagnostics on major components of the system. *See USAir Ends Inflight Phone Service; Cites Poor Performance*, Airline Mktg. News, Feb. 28, 1996, *available in* WESTLAW 8330290.

[12] While higher in cost, Inmarsat and Sita's satellite communications offer greater transmission quality, functionality *(e.g.*, Internet access), and geographic availability than comparable ground-based systems. *More Than Phoning Home: Airlines Move to Digital, Satcom*, Airline Mktg. News, Dec. 20, 1995, *available in* WESTLAW 10253027. One advantage claimed by these systems is their capacity to transmit live multi-channel television and audio broadcasts (including meetings and conference calls) by satellite. *See In-Flight Phone Corp. Tests Debugged IFE System with Continental*, Airline Mktg. News, Sept. 27, 1995, *available in* WESTLAW 10252895.

[13] *Field* at B7, n.3. AT&T Wireless charges $2.50 per call to connect plus $2.99 per minute for domestic calls (AT&T Wireless Services Web Site, Dec. 11, 1996).

[14] TA Report, *GTE Kicks Off Ad Blitz For Airfone That Highlights Reduced Price*, May 6, 1996.

[15] Chicago Tribune, *Transportation Notes*, Oct. 6, 1996; GTE AirFone Web Site (Sept. 26, 1996); (GTE Headlines Oct. 1, 1996).

[16] A widebody aircraft typically has eight phone lines, while smaller planes have four. R. Riccitiello, *Sky's the Limit for Air Phones*, Crain's Chicago Business, Jan. 22, 1996, at 1. This seems to be more than enough capacity. *See* Mobile Data Report, Jan. 15, 1996, *available in* WESTLAW 5801736.

[17] PR Newswire, *In-Flight Phone Corporation Files Petition to Reorganize Under Chapter 11 of the U.S. Bankruptcy Code*, January 24, 1997.

megahertz of spectrum has been allocated to air-to-ground service. All of the carriers share this spectrum, since none has exclusive use of a frequency. Regulation by the Commission consists of frequency allocation and licensing of telephone carriers; there is no state regulation.

Satellite Systems for Mobile Communications

The primary use of mobile telecommunications services provided by satellite-based systems (MSS) is for voice communications, although data and facsimile communications are possible. Customers subscribe to a particular service, which is provided on a specific satellite or network of satellites. Because charges are relatively high, MSS subscribers are few at present and are mostly located in lightly populated areas, where cellular service is often unavailable.[18] Subscribers also use MSS to obtain nationwide coverage from remote locations. Industry analysts predict that MSS will not compete with cellular or PCS but will be used to fill in the geographical gaps in terrestrial mobile services.[19] However, we expect MSS providers to compete among themselves to provide these complementary services to cellular and PCS. Competition among MSS providers will be constrained by the fact that most telephones for satellite-based systems can use only the frequencies assigned to that satellite and by the high cost of a new telephone, both of which make it difficult for customers to change from one service provider to another.

The Commission has licensed several systems employing ``Low Earth Orbit'' satellites (Little LEOs and Big LEOs), which will provide a variety of mobile voice and data services. We expect the Little LEOs to be oriented towards non-voice communications for businesses and government entities, such as low-speed data transmission, tracking, and monitoring.[20] Because they orbit close to the earth, these systems can use low-power handheld devices similar in size to cellular phones. We expect customer equipment to cost between $100 and $400; message

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[18] As the Commission stated in the *CMRS Third Report and Order*, ``[c]urrently, providers of MSS (mobile satellite systems) expect to serve as a complement to terrestrial services for the most part since their service will be relatively expensive and therefore generally will not be a constraining factor on the price of terrestrial services.'' Terrestrial mobile services are not economical in areas that are sparsely populated because the number of subscribers is insufficient to justify construction costs for the towers necessary to transmit the signal. *CMRS Third Report and Order*, 9 FCC Rcd at 8112 (para. 269).

[19] K. Corbley, *Accessing Satellite and Cellular Systems*, Via Satellite, Feb. 1996 at 78, *citing* C. A. Ingley & Co., Big Leo Market And Financial Review, Aug. 1995. *See also VA Firm Debuts National Wireless Phone System*, Washington Post, Jan. 25, 1996, at D11.

[20] *See* U.S. CONGRESS, OFFICE OF TECHNOLOGY ASSESSMENT, Wireless Technologies And The National Information Infrastructure, OTA-ITC-622, Washington DC: U.S. Government Printing Office, July 1995 (*OTA Report*) at 122, *citing Orbcomm Gets First ``Little LEO'' License for Satellite Data Service*, Telecommunications Reports International, Oct. 29, 1994.

delivery is expected to cost about 25 cents per message. Little LEOs have been allocated approximately 3.5 megahertz of primary spectrum.[21]

We expect the Big LEOs to be used for voice and other services in both rural and urban geographic markets. Each of the Big LEO providers plans to offer a dual capacity handset phone that will transmit either to a cellular network or to a satellite, if outside the range of cellular coverage. We have allocated a total of 833 megahertz of spectrum to Big LEOs.[22] The cost of handsets is expected to range from $500 to $3,000; service costs will range from $0.40 to $3.00 per minute. The cost will depend, in part, on whether fees to local service providers have already been included in the per-minute charge.[23] As Big and Little LEOs are still in the planning and implementation stage, their impact on the present CMRS market is minimal.[24]

Geostationary or geosynchronous satellites orbit at the same speed as the earth, at a significantly greater altitude than the LEOs, and thus appear to remain fixed over the particular coverage area for which they provide service. Like the Big LEOs, they will offer dual capacity phones that will augment existing cellular and PCS coverage. These phones are larger than those for the LEOs due to the distance the signal must travel. American Mobile Satellite

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[21] The Commission has licensed Orbital Communications Corp., Starsys Global Positioning Inc., and Volunteers in Technical Assistance to operate Little LEO systems. *See* Application of Starsys Global Positioning Inc. for Authority to Construct, Launch, and Operate a Satellite System in the Non-Voice, Non-Geostationary Mobile Satellite Service, DA Docket No. 95-2343, 11 FCC Rcd 1237 (1995), Application of Volunteers in Technical Assistance for Authority to Construct, Launch, and Operate a Satellite System in the Non-Voice, Non-Geostationary Mobile Satellite Service, DA Docket No. 95-1360, 11 FCC Rcd 1358 (1995), and Application of Orbital Communications Corp. for Authority to Construct, Launch and Operate a Non-Voice, Non-Geostationary Mobile Satellite System, FCC 94-268, Order and Authorization, 9 FCC Rcd 6476, 6476-77 (para. 4) (1994) (*ORBCOMM*).

[22] The Commission has issued Big LEO licenses to Motorola (``Iridium''), TRW (``Odyssey''), and Loral/Qualcomm (``Globalstar''). *See* Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610-1626.5/2483.5-2500 Megahertz Frequency Bands, CC Docket No. 92-166, Report and Order, 9 FCC Rcd 5936 (1994). See also Rule Making 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 (LMDS) and for Fixed Satellite Services, CC Docket No. 92-297, First Report and Order and Fourth Notice of Proposed Rule Making, FCC 96-311, released July 22, 1996. The Commission allocated uplink spectrum for MSS Feeder Links of 150 megahertz at 29.1-29.25 GHz on a co-primary basis with LMDS, and 250 megahertz at 29.25-29.5 GHz on a co-primary basis with the geostationary orbit/fixed satellite service. *Id.*. (paras. 57-74). The Commission also allocated 400 megahertz of downlink spectrum on a primary basis for MSS Feeder Links at 19.30- 19.70 GHz. *Id.* (para. 80).

[23] *OTA Report* at 77-80. K. Corbley, *Accessing Satellite and Cellular Systems*, Via Satellite, Feb. 1996 at 80-88.

[24] We expect both the Little LEOs and the Big LEOs to provide service in the late 1990s. For MSS growth estimates *see* FEDERAL AVIATION ADMINISTRATION, LEO Commercial Market Projections, Apr. 5, 1996; C. A. Ingley & Co., Big LEO Market and Financial Review, August 1995.

Corporation (AMSC) inaugurated its SkyCell service for North America in January 1996.[25] It offers a range of mobile services including telephone, facsimile, data, and position monitoring on its 30 megahertz of spectrum. Service had been limited to car phones, which cost about $3,000, but AMSC has developed a more portable briefcase phone.[26] As with the LEOs, we anticipate that these services will augment, rather than compete with, cellular service, and PCS.

Maritime Services

Communications services to ships and fixed offshore installations such as oil rigs are provided by stations on land (public coast stations) and by satellites other than those discussed in the preceding section. Public coast stations use approximately 15 megahertz of spectrum, and satellites use 19 megahertz of spectrum, for a total of almost 34 megahertz. Both provide the full range of voice, data, and other capabilities featured in services for land-based units. Public coast stations fall into two groups: (1) four long-range stations that provide service hundreds of miles from shore; and (2) approximately 300 short-range stations, operating in the VHF band, that provide service up to 30 miles from shore. Satellites serve as a substitute for long-range marine communications, particularly for those involving emergencies or those that are particularly time-critical. For shorter-range marine communications, cellular systems have served as a substitute for VHF public coast stations. In the more congested cellular markets, however, cell splitting has often resulted in a reduction of the system coverage area over water in order to improve terrestrial service capabilities.[27]

Business Radio and 220-222 MHz Land Mobile Radio Services

The Business Radio Service (BRS) has very broad eligibility rules that permit, among other things, a licensee to provide service to others on a for-profit basis to serve any business entity as well as educational, philanthropic, or ecclesiastical institutions, and hospitals, clinics, or medical associations. We cited this broad eligibility in determining that BRS licensees who offer for-profit interconnected service should be classified as CMRS providers.[28] Similarly, we have defined the eligibility for 220 MHz service broadly to enable licensees to provide service to anyone. Therefore, the Commission classified such licensees as CMRS if they offer service that is interconnected to the PSN on a for-profit basis. It appears as though a relatively small number of BRS are likely to meet the definition of CMRS.[29] In the 220 MHz service, only a small number of systems have been constructed thus far, with the American Mobile

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[25] CTIA, THE WIRELESS FACTBOOK at 30.

[26] K. Corbley, *Accessing Satellite and Cellular Systems*, Via Satellite, Feb. 1996 at 90.

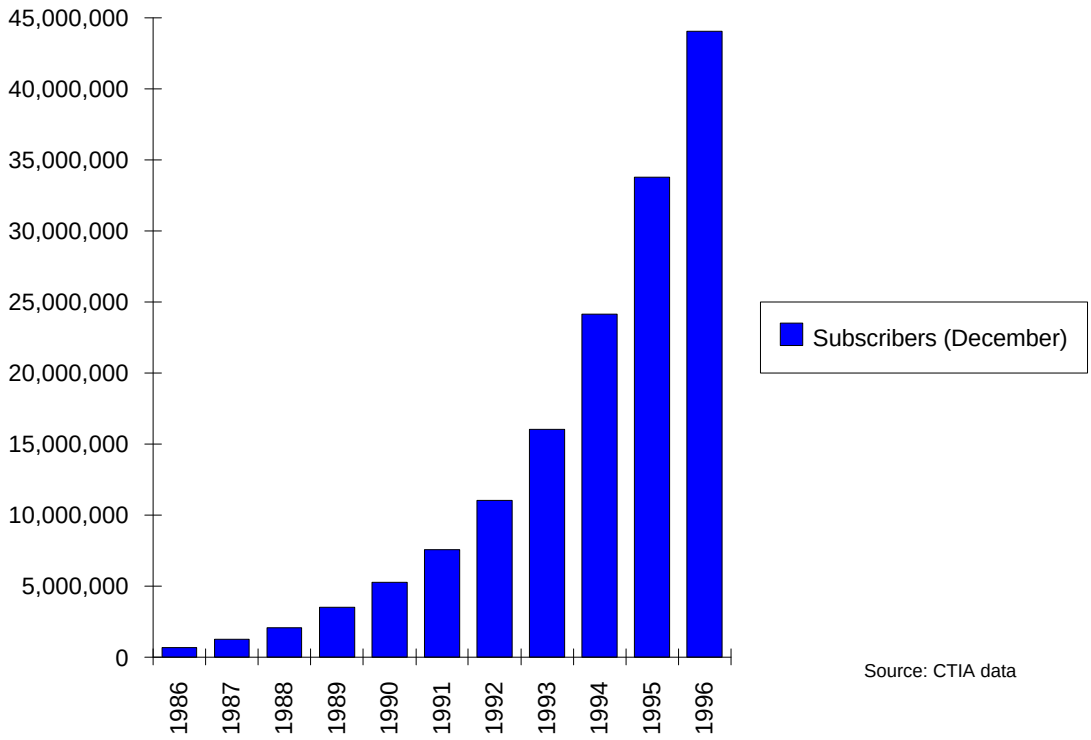
[27] Cell splitting is the subdivision or splitting of cells into two or more smaller cells in order to increase the capacity of a cellular system.

[28] *See CMRS Second Report and Order*, 9 FCC Rcd. 1411 at 1449 (para. 87).

[29] Approximately three percent of all BRS licenses are CMRS.

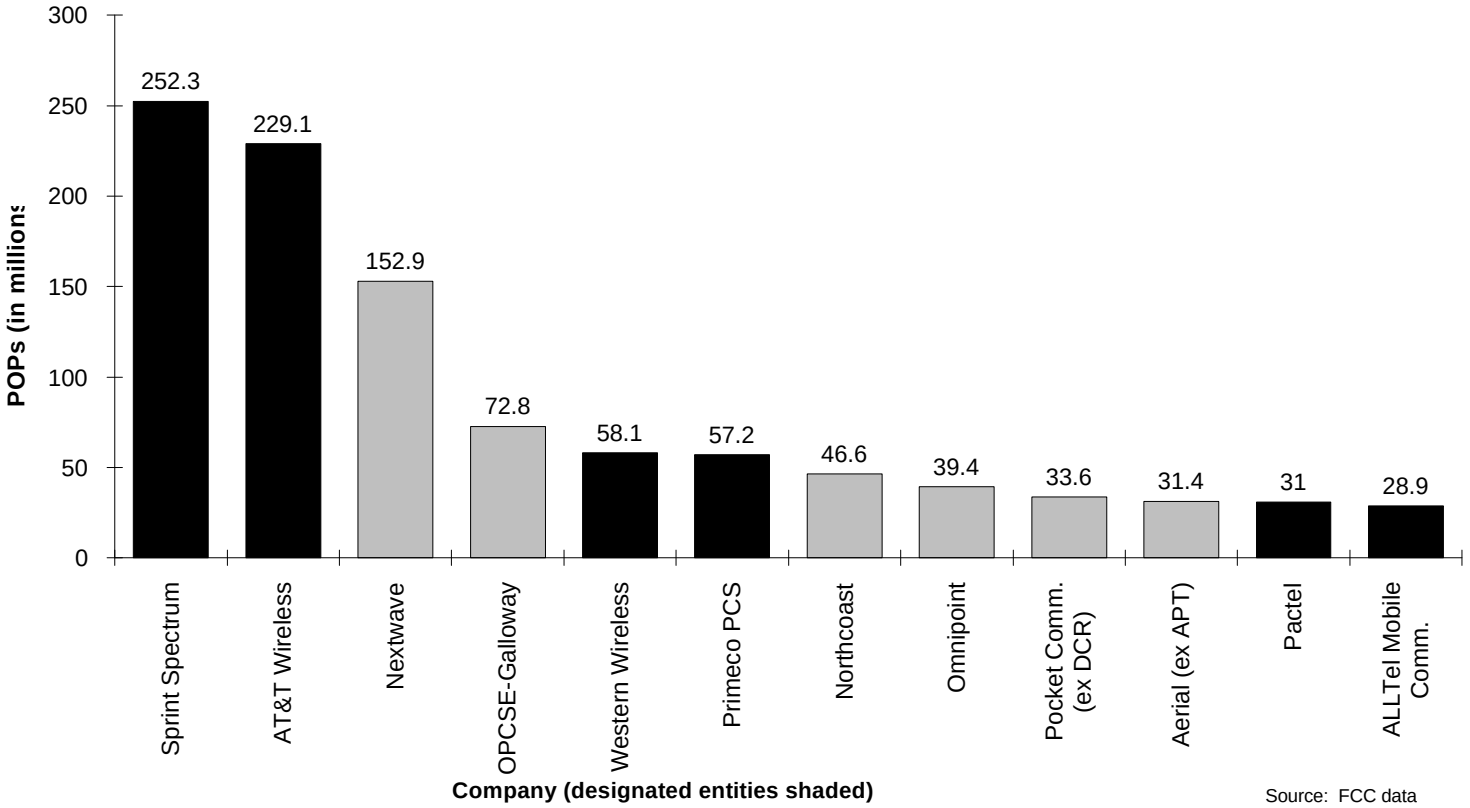
Telecommunications Association projecting that approximately 800 systems will be constructed by the end of August 1996. At this point, we do not expect BRS to have a significant impact on CMRS competition. On the other hand, we have proposed to revise the rules for 220 MHz Service to grant licensees more flexibility and anticipate that, as we grant the next phase of geographic area licenses, the 220 MHz Service may have an effect on CMRS competition. We will continue to monitor both the BRS and 220 MHz Service and will report on noteworthy changes in future annual reports.

Chart 1: Cellular Subscriber Growth



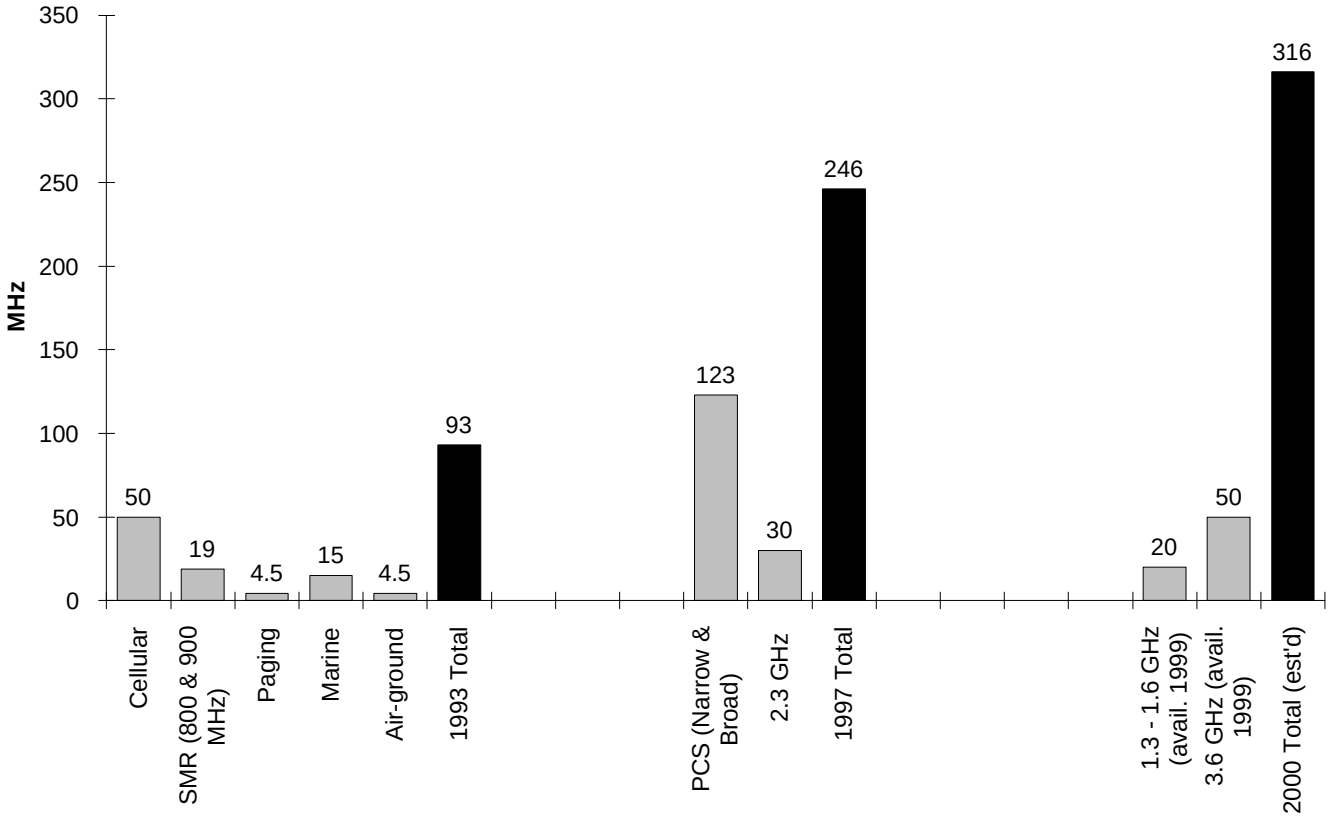
Source: CTIA data

Chart 2: Major Broadband PCS Licensees by POPs



Source: FCC data

Chart 3: Spectrum Available for CMRS



Source: FCC data

Table 1: Cellular Growth

Year	Subscribers (December)	% Subscriber Growth	Revenues*	% Revenue Growth
1986	681,825		$750,960	
1987	1,230,855	81%	$1,013,661	35%
1988	2,069,441	68%	$1,656,423	63%
1989	3,508,944	70%	$2,694,028	63%
1990	5,283,055	51%	$3,480,352	29%
1991	7,557,148	43%	$4,191,279	20%
1992	11,032,753	46%	$5,575,713	33%
1993	16,009,461	45%	$7,537,830	35%
1994	24,134,421	51%	$9,601,835	27%
1995	33,785,661	40%	$12,514,413	30%
1996	44,042,992	30%	$15,063,716	20%

Source: CTIA Semi-Annual Data Survey Results (3/3/97) and Bureau of Labor Statistics Consumer Price Index - All Urban Consumers Base Year 1982-1984

*CTIA revenue data is adjusted to account for inflation.

Table 2: Major Cellular Carriers
(based on U.S. subscribers)

Carrier	Subscribers (December 1996)	Subscribers (December 1995)	Percentage Increase
AT&T Wireless	5,200,000	3,950,000	32%
BAM/NYNEX	4,410,000	3,356,000	31%
SBC	4,398,000	3,659,000	20%
GTE	3,749,000	3,011,000	25%
BellSouth	3,612,000	2,847,000	27%
AirTouch	3,403,000	2,262,000	50%
Ameritech	2,500,000	1,891,000	32%
360 Communications	2,023,923	1,408,924	44%
US West	1,900,000	1,357,143	40%
US Cellular	1,073,000	710,000	51%
AllTel	795,136	624,542	27%
Comcast	762,000	665,000	15%
Vanguard	513,000	381,000	35%
SNET	391,789	323,403	21%
Century Telephone	368,233	290,075	27%
Western Wireless	359,700	214,400	68%
Palmer Wireless	279,816	211,985	32%
Commnet Cellular	229,879	168,465	36%
Total	35,968,476	27,330,937	32%

Source: Company Data

Table 3: Average Monthly Bill per Cellular Subscriber

Year	Bill
December 1987	$96.83
December 1988	$98.02
December 1989	$83.94
December 1990	$80.90
December 1991	$72.74
December 1992	$68.68
December 1993	$61.48
December 1994	$56.21
December 1995	$51.00
December 1996	$47.70

Source: CTIA Semi-Annual Data Survey Results (3/3/97)

Table 4: PCS Licensees: A and B Blocks*

Rank	MTA	POPS	A block	B block
1	New York	26,410,597	***Omnipoint***	***Sprint Spectrum***
2	L.A.-San Diego	19,145,232	***Cox Cable/Sprint Spectrum***	***PacTel***
3	Chicago	12,069,700	AT&T	***PCS PrimeCo***
4	San Francisco	11,891,177	***Sprint Spectrum***	PacTel
5	Detroit	10,001,009	AT&T	Sprint Spectrum
6	Charlotte	9,752,317	AT&T	***BellSouth***
7	Dallas-Ft. Worth	9,694,157	***PCS PrimeCo***	Sprint Spectrum
8	Boston-Providence	9,452,712	AT&T	Sprint Spectrum
9	Philadelphia	8,927,748	AT&T	PhillieCo
10	Washington-Baltimore	7,777,875	***APC/Sprint Spectrum***	AT&T
11	Atlanta	6,942,084	AT&T	Intercel
12	Minneapolis-St. Paul	5,986,039	Sprint Spectrum	APT
13	Tampa	5,417,788	APT	***PCS PrimeCo***
14	Houston	5,190,849	APT	***PCS PrimeCo***
15	Miami-Ft. Lauderdale	5,136,581	Sprint Spectrum	***PCS PrimeCo***
16	Cleveland	4,945,749	Ameritech	AT&T
17	New Orleans	4,925,269	Sprint Spectrum	***PCS PrimeCo***
18	Cinncinnati-Dayton	4,716,665	AT&T	***GTE Mobilnet***
19	St. Louis	4,663,926	AT&T	Sprint Spectrum
20	Milwaukee	4,541,432	***Sprint Spectrum***	***PCS PrimeCo***
21	Pittsburgh	4,102,766	***Sprint Spectrum***	APT
22	Denver	3,880,637	Sprint Spectrum	Western Wireless
23	Richmond-Norfolk	3,846,210	AT&T	***PCS PrimeCo***
24	Seattle	3,827,176	GTE Mobilnet	Sprint Spectrum
25	Puerto Rico	3,623,846	AT&T	Centennial Cellular
26	Louisville	3,556,648	AT&T	Sprint Spectrum
27	Phoenix	3,510,140	AT&T	Sprint Spectrum
28	Memphis-Jackson	3,465,228	***Intercel***	SBC Communications
29	Birmingham	3,244,076	Sprint Spectrum	***Intercel***
30	Portland	3,059,948	***Western Wireless***	***Sprint Spectrum***
31	Indianapolis	3,017,475	Sprint Spectrum	Ameritech
32	Des Moines	3,008,139	***Western Wireless***	***Sprint Spectrum***
33	San Antonio	2,986,524	***Sprint Spectrum***	***PCS PrimeCo***
34	Kansas City	2,913,304	Sprint Spectrum	APT
35	Buffalo-Rochester	2,777,046	Sprint Spectrum	AT&T
36	Salt Lake City	2,573,372	***Western Wireless***	***Sprint Spectrum***
37	Jacksonville	2,274,933	***Intercel***	***PCS PrimeCo***
38	Columbus	2,145,561	AT&T	APT
39	El Paso-Albuquerque	2,113,890	***Western Wireless***	AT&T
40	Little Rock	2,051,667	SBC Communications	***Sprint Spectrum***
41	Oklahoma City	1,877,478	***Western Wireless***	***Sprint Spectrum***
42	Spokane-Billings	1,863,335	GTE Mobilnet	***Sprint Spectrum***
43	Nashville	1,767,391	Sprint Spectrum	AT&T
44	Knoxville	1,721,911	AT&T	***BellSouth***
45	Omaha	1,659,273	AT&T	Cox Cable
46	Wichita	1,124,174	AT&T	Sprint Spectrum
47	Honolulu	1,108,229	***Western Wireless***	***PCS PrimeCo***
48	Tulsa	1,096,396	SBC Communications	***Sprint Spectrum***
49	Alaska	550,043	APT	GCI Communications
50	Guam	176,000	Poka Lambro	Guam Commun.
51	American Samoa	47,000	South Seas Cable/W'less	Comm. International

**** Bold Italic,*** & Shading indicates start of service in an MTA (as of 3/6/97)

Source: FCC data and company news releases

Table 5a: PCS C-Block Licensees*

Licensee	POP Coverage
Nextwave	103,578,674
Pocket Comm. (ex-DCR)	33,550,622
GWI PCS	17,945,559
Omnipoint	12,966,335
PCS 2000	8,864,476
Chase Telecom	5,938,950
21st Century JV	4,215,879
Wireless PCS	3,211,055
Cook Inlet Western Wireless	3,050,185
Urban Comm-North Carolina	3,035,334
Carolina PCS 1 Limited Partnership	3,002,133
Aer Force	2,995,608
R & S PCS Inc	2,697,834
Mercury PCS, L.L.C.	2,345,573
Magnacom Wireless, L.L.C.	2,252,992
Mobile Tri-States L.P. 130	2,057,608
Meretel Communications, LP	1,792,029
Indus, Inc.	1,751,525
Mountain Solutions	1,686,132
Fortunet Wireless Communications, L.P.	1,667,457
Personal Communications Network, Inc.	1,486,359
MCG PCS, Inc.	1,477,849
Devon Mobile Comm., L.P.	1,337,447
Anishnabe Comm. Enterprise, Inc.	1,223,620
Poka Lambro PCS, Inc.	1,161,496
Polycell Communications, Inc.	1,111,806
Americall International, L.L.C.	1,098,346
Comm. Venture PCS, L.P.	1,007,930
SouthEast Telephone L.P., Ltd.	940,229
Chillicothe Telephone Co.	939,583
Wireless 2000, Inc.	863,955
Alpine PCS, Inc.	791,026
Roberts-Roberts & Associates, LLC	745,515
Enterprise Communications Partnership	723,310
High Country Communications, L.P.	704,465
BRK Wireless Co., Inc.	642,365
PCS Plus, L.L.C.	642,077
Southern Wireless, L.P.	630,180
Savannah Independent PCS Corporation	620,856
RLV-PCS I Partnership	592,260
Georgia Independent PCS Corporation	589,208
Wireless Ventures, Inc.	539,779
New England Wireless Comm., L.P.	537,997
Central Alabama Partnership L.P. 132	515,202
North Dakota PCS Limited Partnership	511,947

Table 5a: PCS C-Block Licensees (cont'd)

Licensee	POP Coverage
PCS Mobile America, Inc.	481,387
Eldorado Communications, L.L.C.	479,957
OnQue Communications, Inc.	427,025
PCS One, Inc.	422,822
Kansas Personal Comm. Services, Ltd.	416,930
Northern Michigan PCS Consortium L.L.C.	363,167
Virginia PCS Alliance, L.C.	327,677
USA Micro-Cellular, Inc.	324,629
NOVERR Publishing	290,463
Brookings Municipal Utilities	282,271
Quantum Communications Group, Inc.	277,294
Redwood Wireless Corp.	243,888
Miccom Associates, Ltd.	239,546
Longstreet Communication International, Inc	222,625
Integrated Comm. Group Corp.	207,595
Western Minnesota PCS L.P.	198,632
Reserve Telephone Communications	180,512
Comtel PCS Mainstreet Limited Partnership	177,830
Rosas Inc.	158,497
SOWEGA Wireless Communications, L.P.	139,226
Third Kentucky Cellular Corp	128,186
Poka LAMBRO/PVT Wireless	126,789
Southwest Minnesota PCS L.P.	123,749
Windkeeper Communications	102,000
Wireless Telecommunications Company	101,954
MFRI Inc.	95,709
Southern Communications Systems, Inc.	87,355
National Telecom Holdings, Inc.	85,998
MBO Wireless, Inc.	72,552
KMTel LLC	71,130
PVT Wireless Ltd Partnership	70,068
Loralen Corp.	68,989
TWS, LLC	65,059
PCSouth, Inc.	59,250
R.F.W. Inc.	55,563
Global Info. Technologies, Inc.	53,960
New Wave PCS, Inc.	51,177
Mark M. Guest	48,056
Westel, Somoa, Inc.	47,000
RT Communications, Inc.	46,859
Fams & Associates	40,779
Cellutech	37,454
Vincent D. McBride	27,512

* Action is still pending on several applications from CH PCS, Inc., a high bidder in areas containing over 3 million pops.

Table 5b: PCS DEF-Block Auction Winners

Bidder Name	POP Coverage	Number of Licenses	Number of BTAs
AT&T Wireless	124762918	222	195
OPCSE*	72754750	109	90
SprintCom	69885001	160	139
NextWave *	49299742	32	32
NorthCoast *	46585770	49	49
Western	40111462	100	98
Rivgam	33085351	12	9
AllTel	28927812	73	73
AerForce *	19990673	5	5
USWest	19800661	53	53
Telecorp *	12006779	8	8
BellSouth	11806107	39	37
Comcast	9614436	12	12
Mercury *	8301357	32	32
CookInlet *	8281522	7	7
Devon *	8212062	19	19
McLeod	6502933	26	24
Powertel	6272094	25	13
ACCPCS	4971208	9	9
Radiofone	4839268	4	4
MercuryM	4774542	22	22
Magnacom *	4694796	13	13
Triad	4241015	20	20
DCCPCS *	4227866	9	9
UrbanCom *	4116342	13	13
MVI	4050093	28	26
PAccess	3975321	12	12
PuertoR	3521846	2	2
21Century *	3304855	10	10
AirGate *	3273230	4	4
Oregon *	2979014	5	5
PCSouth	2819221	14	14
Poka *	2816412	12	12
WestCoast	2710828	4	4
Central *	2657271	8	8
Touch	2210948	12	12
Alpine *	2169772	9	9
SWBell	2014064	8	8
Virginia2 *	2001035	10	9
CinBell	1990451	1	1
MinnPCS *	1782831	11	10
VtelWire *	1743165	5	5
ComScape *	1643927	4	4

*Designates small or very small bidder status.
POPs Coverage and BTAs have been adjusted to account for multiple licenses in a geographic area.

able 5b: PCS DEF-Block Auction Winners (con't)

Bidder Name	POP Coverage	Number of Licenses	Number of BTAs
Point *	1442084	5	5
Devco *	1408929	2	2
RedWood *	1391668	11	11
Unlimited *	1355820	5	4
Pegasus *	1351600	1	1
Americall *	1339561	6	6
TennLP *	1286137	3	3
CMPCS *	1226748	4	4
BRKWire *	1221851	7	7
IntCom *	1194191	8	8
Montana *	1189267	10	10
Southern	1114847	1	1
Polycell *	1076297	7	7
Denver *	1072656	2	2
LiteWave *	1029262	7	7
NHWire *	1012318	2	2
MetroSW *	971357	7	7
Conestoga *	838466	4	4
ComVent *	832011	3	3
BaySprings	815545	2	2
PublicServ*	809350	3	3
Iowa136 *	796067	3	3
Eldorado *	790448	4	4
HighPlains*	773242	2	2
TroupEMC *	721342	6	6
NENebTel *	649161	3	3
WireOne *	631551	2	2
Pheonix *	602760	4	4
PCSWI *	593145	1	1
Express *	579925	2	2
MCGPCS *	571381	2	2
OnQue *	566878	4	4
Westel *	552793	6	6
NDNet *	544384	5	3
PCPCS	542838	3	3
MidMaine *	538535	2	2
BTAII *	510860	1	1
Whidbey *	477178	5	4
MFRI *	435656	3	3
SeaBreeze *	420433	2	2
RLVPCS *	401608	4	4
PacComAK *	388943	1	1

*Designates small or very small bidder status.
POPs Coverage and BTAs have been adjusted to account for multiple licenses in a geographic area.

able 5b: PCS DEF-Block Auction Winners (con't)

Bidder Name	POP Coverage	Number of Licenses	Number of BTAs
3Kentucky *	360890	3	3
Technicom *	350083	3	3
WireTel	336395	2	2
Holland *	316633	1	1
PCSOne *	310435	1	1
WebTel *	276857	3	3
SJI	263681	1	1
WirelessII*	254067	2	2
TeleServ *	249734	1	1
Wireless *	243888	1	1
Airadigm *	242010	2	2
RTCom *	239111	4	4
Global *	204218	4	4
Pioneer *	204218	8	4
WIRSA7	201240	1	1
2Roberts *	190536	1	1
Valley *	190267	1	1
GuamTel	176000	2	2
IT&E	176000	2	2
Longstreet*	176000	2	2
GSTWire *	167576	1	1
Elitel *	152881	1	1
MBOWire *	148267	1	1
Tracy *	138572	2	2
Shenandoah*	137549	2	1
Virginia1 *	128910	2	1
Delaware *	107742	1	1
Vitelcom	102000	1	1
LeongHarve*	94097	1	1
SCUtah *	83263	1	1
PineBelt *	79145	1	1
Cellutech *	75833	2	2
ConsoCom	62314	1	1
Pinnacle *	59250	1	1
SilverStar*	56981	1	1
PanHandle *	53960	2	1
PVTWire *	48605	2	1
ConsoTel *	38001	3	1
Cambridge *	36618	1	1
NDPCS *	27512	3	1
	Total	**1472**	**1364**

*Designates small or very small bidder status.
POPs Coverage and BTAs have been adjusted to account for multiple licenses in a geographic area.

Table 6: Regional and Nationwide NPCS Auction Winners

Region	Regional NPCS Licensees
Northeast	PageMart
	PCS Devt. Corp.
	MobileMedia
	Adv. Wireless Messaging
	AirTouch
	Page Call, Inc.
Southern	PageMart
	PCS Devt. Corp.
	MobileMedia
	Adv. Wireless Messaging
	Insta-Check Systems
	Page Call, Inc.
Midwest	PageMart
	PCS Devt. Corp.
	MobileMedia
	Adv. Wireless Messaging
	Ameritech
	Page Call, Inc.
Central	PageMart
	PCS Devt. Corp.
	MobileMedia
	Adv. Wireless Messaging
	AirTouch
	Benbow PCS Venture
Western	PageMart
	PCS Devt. Corp.
	MobileMedia
	Adv. Wireless Messaging
	AirTouch
	Benbow PCS Venture

Nationwide NPCS Licensees (Lic. #)
PageNet (N-1)
PageNet (N-2)
AT&T (N-3)
AT&T (N-4)
Mtel (N-5)
AirTouch (N-6)
MobileMedia (N-7) *
Mtel (N-8)
Mtel (N-9) **
PageNet (N-10)
PageMart (N-11)

* purchased from BellSouth
** pioneer's preference

Source: Company data

Table 7: Major Paging Carriers
(based on U.S. subscribers)

Carrier	Subscribers (December 1996)	Subscribers (December 1995)	Percentage Increase
Pagenet	8,966,535	6,737,907	33%
Mobile Media	4,400,000	4,300,000	2%
Arch Communications	3,295,000	2,006,000	64%
Airtouch	2,850,000	2,338,000	22%
Metrocall	2,142,351	944,013	127%
Pagemart	1,851,445	1,240,024	49%
ProNet	1,270,954	856,302	48%
Ameritech	1,140,000	745,098	53%
Mobile Tele Tech(Skytel)	1,113,000	922,600	21%
AT&T Wireless	1,150,000	770,145	49%
American Paging	777,400	784,500	-1%
BellSouth*	0	1,777,000	-100%
Total	28,956,685	23,421,589	24%

Source: Company Data
* BellSouth sold its paging business to MobileMedia in January, 1996

Table 8: 900 MHZ SMR MTA LICENSEES

LICENSEE	No. of Licenses
A&B ELECTRONICS INC	18
ADVANCED COMMUNICATION SOLUTIONS INC	6
ADVANCED RADIO COMMUNICATION SERVICES OF FLORIDA INC	1
AMERICAN NATIONAL COMMUNICATIONS COMPANIES	7
AUTOPHONE OF LAREDO INC	1
BANKS TOWER COMMUNICATIONS LTD	1
C&E INC 2282 PARTNERSHIP JOINT VENTURE	2
CELLULAR DESIGN CORP	6
CELSMER	3
CENTENNIAL COMMUNICATIONS CORP	43
CHM INC	2
CLEVELAND MOBILE RADIO SALES INC	25
COMMENCO INC	2
COMMNET 900 INC	2
COMMNET COMMS NETWORK INC	2
COMMUNICATIONS ENGINEERING COMPANY	1
COMTEC COMMUNICATION INC	16
COMTEL II INC	1
CORDELL ENGINEERING INC	6
COX, JAMES S	1
CREATIVE AIRTIME SERVICES LLC	3
D & D COMMUNICATIONS INC	2
DAVIS ELECTRONICS COMPANY INC	2
DW COMMUNICATIONS INC	1
EASTERN COMMUNICATIONS LTD	1
EVEREST COMMS INC & CAPITAL TWO WAY COMMS I	2
FCI 900, INC. (NEXTEL)	177
FLEET TALK INC	63
GEOTEK LICENSE HOLDING CO INC	181
HENDERSON, LARRY D:BENZ, ROBERT A. DBA QUAD C	2
HINDS & CAMPBELL PROPERTIES	5
INDUSTRIAL COMMUNICATIONS & ELECTRONICS INC	13
JANSSEN, KATHLEEN L	4
LANCASTER COMMUNICATIONS INC	24
MAJESTIC COMMUNICATIONS INC	3
MCCART, WILLIAM G	1
METRO NET 900	3
MICHIGAN 900 MHz INC	1
MIDWEST PCS INC	1
MOBEX 900 INC	7
MOBILE COMMUNICATIONS INC	2
MORRIS COMMUNICATIONS INC	12
MOTOROLA SMR INC	36
PAGING NETWORK OF AMERICA INC	126

Table 8: 900 MHz SMR MTA LICENSEES (cont'd)

LICENSEE	No. of Licenses
PALMER COMMUNICATIONS INCORPORATED	3
PETERSON, BARNEY	1
PRO TEC MOBILE COMMUNICATIONS INC	1
RADIO COMMUNICATIONS OF VA INC	1
RADIO COMMUNICATIONS SERVICE INC	3
RAM MOBILE DATA USA LIMITED PARTNERSHIP	83
SAIA COMMUNICATIONS INC	2
SAN ANTONIO PCS INC	2
SEGNO COMMUNICATIONS INC	1
SGI COMMUNICATIONS INC	24
SOUTHERN CALIFORNIA EDISON COMPANY	3
SPECTRUM RESOURCES INC	2
T&T LEASING	3
TE MCG CONSORTIUM	2
TRUNKING ONE USA INC	2
VICTOR COMMUNICATIONS INC	2
WESTERN AIRWAVE INC	1
WESTERN NY SMR NET LLC	1
WWC HOLDING CO INC	13
X W CORPORATION	1
TOTAL LICENSES*	969

* 51 licenses that remain to be granted have been delayed because of petitions for reconsideration or auction payment problems

Source: FCC data