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Washington, D.C. 20554

In the Matter of

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

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I. INTRODUCTION

1. CMRS, or "Commercial Mobile Radio Services," is a category of services that Congress created[1] to encompass all mobile telecommunications services that are provided for profit and make interconnected service available to the public (or to such classes of eligible users as to be effectively available to a substantial portion of

[1] The Omnibus Budget Reconciliation Act of 1993, Pub. L. No. 103-66, Title VI, § 6002(b), amending the Communications Act of 1934 ("Communications Act") and codified at 47 U.S.C. §§ 153(n), 332(c)(1) (hereinafter, the "Budget Act").

the public, as specified by Commission regulation).[2] The creation of CMRS was one of several Congressional actions that have the effect of promoting the consistent regulation of similar mobile radio services. Congress also required the Commission to submit an annual report reviewing competitive market conditions with respect to CMRS.[3] This Report ("*Report*") is the first of the Commission's annual reports.

A. Executive Summary

2. CMRS is a part of the telecommunications business that is undergoing major changes that have resulted in growing competition, convergence and popularity, all under a system of reduced regulation. Traditionally, CMRS was composed 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 this Commission and most states.

3. Major change began in the mid-1980s with the first commercial offering of cellular mobile telephone service. Originally, in the 1970s, the Commission had planned to have only one cellular system, which would be operated by local telephone companies. But in 1981, to ensure competition in the cellular business, the Commission decided to license two competing cellular systems in every area. The Commission determined that one would be operated by a separate subsidiary of a local telephone company and the other would be totally unaffiliated with any local telephone company. At the time, no one predicted that the service would be as popular as it has become. The service has a ten percent penetration rate among American consumers. Cellular service in automobiles and via portable telephones has become a universally recognized business tool, and its providers have recently begun to target their marketing strategies towards the mass consumer market. Paging service has even more subscribers than cellular, and dispatch service has grown steadily in popularity among business and government entities.

4. The duopoly nature of cellular service made it less than fully competitive, however. Therefore, in the early 1990s, the Commission allocated 143 MegaHertz ("MHz") of spectrum, almost three times the spectrum allocation for cellular service, to create Personal Communications Services ("PCS"). The Commission is awarding licenses for PCS by auctions. In June 1995 the Commission issued two licenses of thirty MHz each for the most significant form of PCS, broadband PCS, in every locality in the country (except for three markets in which one license had already been awarded to a technical "pioneer").[4] Broadband PCS is expected to be available on a widespread basis by 1996 and the Commission's spectrum allocation provides sufficient spectrum to ensure at least three, and possibly as many as six, new competitors to the cellular carriers in each market. Broadband PCS will have many times the capacity of today's cellular systems and its offerors will be able to provide any mobile service that consumers demand, free of traditional classifications such as "telephone,"

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[2] *See* 47 C.F.R. § 20.3; *Implementation of Sections 3(n) and 322 of the Communications Act - Regulatory Treatment of Mobile Services, Second Report & Order* ("*Second CMRS R&O*"), 9 FCC Rcd 1411, 1425-42 (¶¶ 39-70) (1994). CMRS providers include "all cellular licensees, common carrier paging licensees and private carrier paging licensees . . . , all wide-area SMR providers and most SMR providers." *Id.* at 9 FCC Rcd at 1468 (¶ 139) (footnote omitted).

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

[4] *See Public Notice, Auctions* (Mar. 13, 1995) and authorities cited *infra* note 90. The three "pioneer" licenses were issued to American Personal Communications (for Baltimore/Washington, D.C.), Cox (for Los Angeles), and Omnipoint (for New York City).

"dispatch," and "paging." Investors believe the prospects for broadband PCS are bright enough that they bid over $7 billion at the recent auctions. Already, the approach of broadband PCS appears to be influencing incumbent wireless providers to lower prices and increase features. The Commission's implementation of PCS is an example of regulation that promotes the private marketplace over government mandates, the most efficient use of the nation's natural resources (in this case, spectrum), and competition (with the attendant benefits for consumers of low prices, high quality, and innovation).

5. The Commission has also systematically removed regulatory barriers, thus allowing dispatch systems to provide mobile telephone service and vice versa. Other regulatory barriers were removed recently when the Commission forbore from regulating CMRS under several sections of Title II of the Communications Act[5] and pre-empted state regulation of entry into and rates for CMRS. This trend towards reduced regulation is continuing, as the Commission is considering the most efficient way to license wide-area dispatch systems that can compete on an equal footing with cellular service and PCS. Finally, the Commission recently licensed several satellite-based systems that, upon commencement of service in future years, may greatly increase the availability of CMRS that is provided by competing carriers and in the forms the Commission believes will meet consumer demand.

6. Under this system of increasing spectrum allocations and flexibility, CMRS has already become a significant part of the nation's economy. CMRS has shown steady growth[6] and double digit annual growth rates should be anticipated for CMRS during the next several years.[7]

7. The combination of these events is leading to several trends that are discernible from the data analyzed in this *Report*. First, the previously discrete categories of services within CMRS are beginning to compete with each other, and CMRS may become a single market for telecommunications for "people on the move." Second, it is predicted that the availability and popularity of CMRS should increase several-fold in the next few years. Third, with the Commission's spectrum allocations for PCS and satellite-based systems multiplying the amount of spectrum available for wireless services, prices to consumers and carriers' profits will be lower, entry by new competitors and services will be easier, and competitive forces will generally be much stronger than they have been in the cellular duopoly and elsewhere in CMRS.

8. The Commission believes that these trends all improve consumer benefits and should be encouraged. At the same time, the Commission will keep intact its regulatory authority to monitor the conduct of incumbent providers for such services as interconnection and resale,[8] to ensure that no abuse of market power occurs that could frustrate or delay the achievement of its goals.

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[5] Communications Act, 47 U.S.C. §§ 201-29.

[6] *See* Tbl. 1.

[7] Last year, the cellular industry by itself added about 8 million subscribers. *Cellular Industry Hits Historic Landmark: One Out of 10 Americans Now Use Cellular, Total Subscribers Reach 25 Million Milestone*, Cellular Telecommunications Industry Association (CTIA) Press Release ("CTIA Press Release"), Feb. 24, 1995, at 3-4.

[8] *Interconnection and Resale Obligations Pertaining to Commercial Mobile Radio Services, Second Notice of Proposed Rulemaking*, CC Docket No. 94-54 (FCC 95-149) (Apr. 20, 1995).

9. This *Report* is organized in four parts. Because this is the Commission's first report, as a frame of reference, Part II describes the various forms of mobile services that exist today in this country or may be offered in the next few years. Most of these services are CMRS. Part II also describes private mobile radio services that are not CMRS. However, private mobile radio services could have some substitutability with CMRS or could be reclassified as CMRS in the future based on the type of service provided. Part III describes competition in CMRS, summarizing conclusions reached by the Commission and other governmental bodies in the past and making some additional tentative findings about CMRS competition. Part IV addresses administrative matters. Because the greatest amount of available data concerns cellular service, the sharpest focus of this *Report* pertains to it.

II. MOBILE RADIO SERVICES

10. This *Report*, being the Commission's first on CMRS, begins with short factual descriptions of each major mobile radio service regulated by this Commission. Currently, there are over seventy-five million mobile radio users, most of which subscribe to CMRS providers.[9]

11. The common element of all mobile radio services is that they use a radio frequency or channel instead of a wire to communicate to and from one or more mobile locations, such as motor vehicles. Beyond that, there are many differences. This Section of the *Report* relates information about each major mobile radio service to the extent it is available. This Section focuses on the key aspects of each service that makes it competitive with or distinct from the others: the capabilities it gives the user (*e.g.*, one- or two-way voice communication, data transmission, *etc.*); the area(s) within which it is provided; the amount of spectrum (capacity) that is available for it; the number of companies that provide it and other basics of market structure; the nature and number of its users; basic facts about prices and rates; any federal and state regulation;[10] and the ease or difficulty of users changing suppliers and of new providers entering the business.

12. Of the mobile radio services described in this Section, the following are CMRS: cellular mobile telephone service, non-private paging service, SMRs that are interconnected to the public switched telephone network ("PSTN"), air-ground service, satellite systems for mobile communications, maritime service, and PCS. Not included within CMRS are SMRs that are not interconnected to the PSTN, and other private mobile radio services unless they are interconnected and offer commercial service.[11]

A. Commercial Mobile Radio Services ("CMRS")

1. Cellular Mobile Telephone Service

13. In 1975, the Commission allocated forty MHz of spectrum to the "Domestic Public Cellular Radio Telecommunications Service" for the

[9] CMRS encompasses approximately 25 million cellular subscribers, 25 million pagers, and 2 million SMR transmitters. Other mobile radio users include approximately 15 million private land mobile radio users.

[10] This discussion omits regulations affecting technical operation, safety, and other matters of marginal importance to competition.

[11] See authorities cited in note 2, *supra*. In addition, Congress has provided that systems that are currently classified as private, such as certain SMR systems (*see infra* paras. 51-55), shall remain so classified until August 10, 1996, whereupon they will be classified as CMRS. Budget Act, § 6002(c)(2)(B).

development of a nationwide cellular mobile radio communications system.[12] The Commission viewed this as an allocation for mobile radio systems with a high capacity to serve subscriber units by the coordinated reuse of a group of radio channels.[13] Cellular service to the public began in late 1983 and has achieved great popularity. Each year, cellular subscriber growth has approached or exceeded fifty percent[14] -- an amazing record of sustained growth. Approximately twenty-five million[15] persons subscribe to cellular service. The Commission recently estimated that "[c]ellular service is expected to reach twenty percent penetration, or approximately 54 million customers, by the year 2000."[16] Service revenues totaled over $14 billion in 1994.[17] Table 1 shows the growth of cellular subscribers and revenues through 1994.

14. For licensing purposes, the Commission designated 734 markets, (306 Metropolitan Statistical Areas ("MSAs") and 428 Rural Statistical Areas ("RSAs")). One of the major early decisions made by this Commission was that cellular service would be competitively provided by two "facilities-based" carriers per market.[18] Since the Commission allocated an additional 10 MHz to cellular service in 1986, a total of fifty MHz has been allocated to cellular service, twenty-five MHz to each carrier.[19] In each market, the cellular system

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[12] *Inquiry Relative to the Future Use of the Frequency Band 806-960 MHz; and Amendment of Parts 2, 18, 21, 73, 74, 89, 91, and 93 of the Rules Relative to Operations in the Land Mobile Service Between 806-960 MHz, Memorandum Opinion & Order* ("*Docket No. 18262*"), 51 FCC 2d 945 (1975). Concerning the evolution of cellular service, *see* John Berresford, *The Impact of Law and Regulation on Technology: The Case History of Cellular Radio*, 44 BUS. LAW. 721 (1989).

[13] *Inquiry Into the Use of the Bands 825-845 MHz and 870-890 MHz for Cellular Communications Systems; and Amendment of Parts 2 and 22 of the Commission's Rules Relative to Cellular Communications Systems, Notice of Inquiry and Notice of Proposed Rulemaking*, 78 FCC 2d 984 (¶ 2) (1980).

[14] *See* Tbl. 1.

[15] CTIA Press Release, *supra* note 7, at 1.

[16] *Implementation of Sections 3(n) and 332 of the Communications Act - Regulatory Treatment of Mobile Services; Amendment of Part 90 of the Commission's Rules to Facilitate Future Development of SMR Systems in the 800 MHz Frequency Band; Amendment of Parts 2 and 90 of the Commission's Rules to Provide for the Use of 200 Channels Outside* (continued...)

[16](...continued)
the Designated Filing Areas in the 896-901 MHz and 935-940 MHz Band Allotted to the Specialized Mobile Radio Pool, Third Report & Order ("*Third CMRS R&O*"), 9 FCC Rcd 7988, 8017-18 n.89 (¶ 54 n.89) (1994).

[17] CTIA Press Release, *supra* note 7, at 2.

[18] *Inquiry Into the Use of the Bands 825-845 MHz and 870-890 MHz for Cellular Communications Systems; and Amendment of Parts 2 and 22 of the Commission's Rules Relative to Cellular Communications Systems, Report & Order*, 86 FCC 2d 469 (1981), *Memorandum Opinion & Order on Reconsideration*, 89 FCC 2d 58 (1982), *petition for review dismissed sub nom. United States v. FCC*, No. 82-1526, Slip Op. (D.C. Cir. Mar. 3, 1983) ("*Cellular R&O*"). Although the Commission had initially planned to license one cellular carrier in each market, which would be a local telephone company, the Commission soon afterward realized that two cellular carriers, splitting the spectrum, would foster a certain amount of competition. *See id.* at 474, 476.

[19] Initially, each cellular carrier was given 20 MHz. *An Inquiry Relative to the Future Use of the Frequency Bands 806-960 MHz and Amendment of Parts 2, 18, 21, 73, 74, 89, 91, and 93 of the Rules Relative to Operations in the Land Mobile Service Between 806-960 MHz, First Report & Order and* (continued...)

using frequency Block B was initially affiliated with a local "wireline" telephone company and the system using Block A (the "nonwireline" system) was licensed to an entity unaffiliated with the local telephone company.[20]

15. Initially the Commission issued licenses using comparative hearings and encouraged competing applicants to settle their differences and form partnerships. In 1982, Congress provided the Commission with the authority to award licenses by lottery.[21] The Commission's initial methods of licensing, which are not as efficient as auctions, had at least two important consequences. First, many licenses are currently held by partnerships that resulted from settlement agreements.[22] Second, because lotteries are not necessarily won by the applicants that value the licenses most, many licenses, particularly for Block A, were initially won by persons who later sold their licenses to more experienced telecommunications providers for substantial sums of money.[23]

16. Until 1987, the Commission required that all cellular systems and telephones meet a specific analog technical standard.[24] This specificity, coupled with the Commission's requirement that cellular telephones be capable of using either licensee's frequencies, made it easy for subscribers to switch carriers without having to buy new equipment, thus enhancing competition between carriers. In 1988, the Commission relaxed

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[19](...continued)
Second Notice of Inquiry, summarized in 35 Fed. Reg. 8644 (June 4, 1970); *Second Report & Order*, 46 FCC 2d 752, 757 (1974), *on reconsideration, Memorandum Opinion & Order*, 51 FCC 2d 945 (1975), *aff'd sub nom. NARUC v. FCC*, 525 F.2d 630 (D.C. Cir. 1976), *cert. denied*, 425 U.S. 992 (1976). Because the demand for cellular service was greater than expected, in 1986 the Commission allocated each cellular carrier an additional 5 MHz. *Amendment of Parts 2 and 22 of the Commission's Rules Relative to Cellular Communications Systems - Amendment of Parts 2, 15, and 90 of the Commission's Rules and Regulations to Allocate Frequencies in the 900 MHz Reserve Band for Private Land Mobile Use - Amendments of Parts 2, 22, and 25 of the Commission's Rules to Allocate Spectrum for, and to Establish Other Rules and Policies Pertaining to the Use of Radio Frequencies in a Land Mobile Satellite Service for the Provision of Various Common Carrier Services, Report & Order*, 2 FCC Rcd 1825, 1826, 1828 (¶¶ 10, 25) (1986).

[20] As originally licensed by the Commission, one cellular system in each area was a corporate affiliate of a local "wireline" telephone company and the other was not. In 1986, the Commission and the courts allowed an affiliate of a local telephone company in one area to buy the "non-wireline" system in another area. *James F. Rill, Order on Reconsideration*, 1 FCC Rcd 918 (1986); *United States v. Western Electric Co.*, 1986-1 Trade Cas. ¶ 66,987 (D.D.C. 1986). This provoked a wave of acquisitions of "non-wireline" systems by non-market telephone companies. *See, e.g., Applications of Metromedia Co. for Consent to Transfer of Control of Metromedia Co., Memorandum Opinion & Order*, 1 FCC Rcd 1227 (1986). This trend towards concentration of the cellular business in the hands of telephone companies was somewhat blunted when, in 1992, Pacific Bell divested its cellular properties to a new entity, AirTouch.

[21] H.R. Rep. No. 765, 97th Cong., 2d Sess. (1982). *See also Amendment of the Commission's Rules to Allow the Selection from Among Certain Competing Applications Using Random Selection or Lotteries Instead of Comparative Hearings, Second Report & Order*, 93 FCC 2d 952 (1983).

[22] *See, e.g., Chicago SMSA Ltd. Partnership, Memorandum Opinion & Order*, 95 FCC 2d 538, 540 (1983); *Advanced Mobile Phone Service, Inc., Memorandum Opinion & Order Granting Application*, 93 FCC 2d 683, 690 (1983).

[23] *See generally, Implementation of Section 309(j) of the Communications Act Competitive Bidding, First Report & Order*, 9 FCC Rcd 7373 (1994).

[24] *Cellular R&O*, 86 FCC 2d at 505-09 (1981).

its requirements and permitted cellular carriers to adopt new technologies, provided the carriers continued to support the current technical standard.[25] This decision encouraged the development of new digital equipment that should enable the industry to increase capacity of existing channels to serve an ever-increasing number of customers on a finite amount of spectrum.

17. Although an individual cellular carrier may hold licenses in many areas, each customer takes service from a carrier with a license for a specific MSA or RSA. While some wide-area service options exist,[26] they are relatively rare. However, for a fee, all cellular customers may use their cellular telephones in markets other than their "home" market through a service known as "roaming."[27] This effectively makes cellular service available nationwide to all customers.

18. A cellular call is initiated by a cellular subscriber when he or she pushes the "send" button on a cellular telephone to place a call. The cellular telephone emits a radio signal on a specific frequency (channel) and automatically transmits information identifying the subscriber, the specific cellular telephone, and the telephone number the subscriber is trying to reach. Nearby cellular base stations (each consisting of an antenna, transmitter, receiver, and other equipment) receive this signal. One base station sends the call to the nearest Mobile Telephone Switching Office, where it is determined, among other things, if the call was placed by a valid subscriber, which base stations will handle the call, and on which of several radio channels the telephone call should be handled. The base station broadcasts information to the subscriber's telephone about which channel the telephone call will be placed on, and ultimately connects the call through the PSTN.

19. A typical cellular system consists of many "cells," each of which contains a base station that provides coverage over a particular geographic service area. Each system's cells are connected to each other and to the PSTN by facilities that are either leased from a local telecommunications carrier or are owned and operated by the cellular system licensee itself. As the call by the subscriber progresses, the base station checks to see if the radio signal remains adequate. If the subscriber moves far enough away from the base station, or if there are obstructing buildings or poor weather conditions, the signal will grow weak. Rather than end the call, the base station hands-off the call to a different frequency on another, closer or more suitable, base station, thus allowing the call to continue.

20. A call from outside the cellular system to a cellular subscriber begins with a caller dialing the telephone number of a cellular subscriber. The PSTN recognizes that the exchange is associated with a particular cellular carrier and routes the call to that carrier's network. The cellular network knows, via a database, if the called party's number is a valid subscriber's telephone number. If it is, base stations covering the entire cellular network emit a signal on the designated control channel with the cellular subscriber's unique identifier. If the user has the cellular telephone turned on, the telephone will receive and respond to

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[25] *Amendment of Parts 2 and 22 of the Commission's Rules to Permit Liberalization of Technology and Auxiliary Service Offerings in the Domestic Public Cellular Radio Telecommunications Service, Report & Order*, 3 FCC Rcd 7033 (1988).

[26] *See, e.g., Application of Craig O. McCaw, Memorandum Opinion & Order*, 9 FCC Rcd 5836, 5852 n.55 (¶ 23 n.55) (1994), *aff'd sub nom. SBC Communications, Inc. v. FCC*, 56 F.3d 1484 (D.C. Cir. 1995), *petition for reconsideration pending on other grounds* ("*Craig O. McCaw*") (cellular carrier offered an option named the "City of Florida," in which customers could have flat-rate calling on all its systems in one state).

[27] Roaming agreements between the "home" carrier and the "serving" carrier are required. Such agreements are common between carriers.

that signal. From that point on, the call is the same as a subscriber-initiated call.[28]

21. Initially, the primary use of cellular service was for voice communications from cars. Currently, however, about half of new service is for portable (hand-held) cellular telephones.[29] One of the major industry trends has been towards lower cost and lighter weight hand-held cellular telephones.[30] In addition, the capabilities of cellular systems have improved significantly, making data and facsimile communications increasingly common.

22. The Commission does not regulate cellular prices.[31] The basic charges for cellular service usually consist of a flat monthly fee for "access" to the cellular system (sometimes including a number of minutes of "free" usage), per minute charges for usage during "peak" day periods, and per minute charges for "off peak" night and weekend usage.[32] Carriers typically offer a variety of pricing packages. For example, one package might be aimed at people who expect to use their cellular telephone for emergencies only. Such a package would have a relatively low monthly fee and high per minute charges. Another package might be aimed at people who want to use their cellular telephones a substantial amount each month. That package will probably have a high monthly access charge in exchange for a large number of "free" minutes or a low per minute charge. Many packages require customers to sign a contract for one year or more.

23. Cellular pricing has begun to reflect in part the impending introduction of PCS.[33]

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[28] *See* GEORGE CALHOUN, *Digital Cellular Radio* (1988), for a fuller explanation of cellular technology.

[29] HERSCHEL SHOSTECK ASSOCIATES, LTD., 11 *The Retail Market of Cellular Telephones* 3, at Fig. 7.2 (Dec. 1994) ("*Shosteck Cellular*").

[30] Small pocket devices and miniature wrist models are currently being tested. Bart Ziegler, *Telecommunications: Future Phones Anytime, Anywhere: The Phone in the Dishwasher and Other Predictions on Where Technology is Heading*, WALL. ST. J., Mar. 20, 1995, at R18.

[31] Some states have exercised their jurisdiction to regulate cellular entry, rates, and terms and conditions of service. More recently, however, Congress generally prohibited states from regulating CMRS entry and rates, except pursuant to special authority granted by this Commission. 47 U.S.C. § 332(c)(3). The Commission recently denied such authority. *See, e.g., Petition of the People of the State of California and the Public Utilities Commission of the State of California to Retain Regulatory Authority Over Intrastate Cellular Service Rates, Report & Order*, PR Docket No. 94-105, (FCC 95-195) (May 19, 1995) ("*California State Petition R&O*"), *reconsideration denied, Order on Reconsideration* (continued...)

[31](...continued)
(FCC 95-345) (Aug. 9, 1995).

[32] For a discussion of the price levels and structure of cellular service, *see* GEN. ACCT'G OFF. REP., *Telecommunications: Concerns About Competition in the Cellular Telephone Service Industry*, GAO/RCED-92-220, at 22-23 (July 1992).

[33] *See, e.g., Cellular Industry Eyes Further Cuts, Adjustments to Challenge PCS*, COMM. DAILY, Apr. 24, 1995. Herschel Shosteck believes that "[t]ariff declines also reflect the initial steps of carriers to counter the impending competition from PCS." *Id. See also* Mike Mills, *Wireless: The Next Generation*, WASH. POST, Feb. 20, 1995, at Wash. Bus. 1 ("most major cellular carriers across the country . . . have been busy neutralizing their future competition by adopting most every perceived advantage that PCS was supposed to bring. Cellular prices have been dropping recently in anticipation of the competition. Phones continue to get lighter and their batteries last longer. New 'wireless data' applications already allow instant credit card verifications . . . . And signal quality is (continued...)

Cellular carriers are reducing prices and beginning to offer packages that resemble expected PCS offerings.[34] For example, Bell Atlantic offers a package with a low monthly fee ($14.99) and relatively modest per minute charges (thirty-five cents) for calls made in, and received from, a relatively small geographic area. However, calls outside the defined area are significantly more expensive (ninety-nine cents per minute).[35]

24. While prices may vary substantially from city to city,[36] a typical monthly cellular bill in 1994 was approximately $60.[37] As discussed in the preceding paragraph, cellular service prices have been decreasing, partly in anticipation of the arrival of PCS. The Commission expects cellular prices to continue to decline.[38]

25. In addition to the cost of cellular service, subscribers must also buy or lease cellular equipment (generally a carphone or portable hand-held cellular telephone). Purchase prices for cellular telephones range from approximately $100 to $500.[39] Bundled sales whereby cellular telephones and service are purchased together are very common,[40] though. This, in turn, makes estimation of the cost of a stand-alone telephone difficult in many cases.

26. As of February 1995, there were approximately 1,581 cellular systems in the United States.[41] Roughly sixty percent of cellular customers are served by systems that are controlled

[33](...continued)
better than ever").

[34] Another effect that the approach of PCS is having on cellular carriers is to hasten the conversion of cellular networks from analog to digital technology. Digital technology, though relatively expensive, is efficient, and is the technology with which PCS will enter the market. *See infra* para. 47.

[35] Mike Mills, *At Bell Atlantic, Bringing Wireless to the Masses*, WASH. POST, Apr. 24, 1995, at WASH. BUS. 9.

[36] *See* Comments of CTIA, Affidavit of Professor Jerry A. Hausman, *Petition of the People of the State of California and the Public Utilities Commission of the State of California to Retain Regulatory Authority over Intrastate Cellular Service Rates*, Tbl. 1, at 4 (Sept. 9, 1994).

[37] *Mid-Year Results Show Wireless Customers Near 20 Million Mark; Monthly Bills Drop*, Cellular Telecommunications Industry Association (CTIA) Press Release, Sept. 6, 1994. Also, Tbls. 3, 4, and 7 provide some data on cellular prices in the State of California and for 29 large markets.

[38] Indeed, one analyst predicts that cellular prices will decrease by about six to eight percent during the next two years, and that if PCS deployment is accelerated, rates could drop even more precipitously in 1996. *Price Elasticity in Cellular Will be Tested by Greater Competition*, WIRELESS BUS. AND FIN., Mar. 29, 1995.

[39] *See Shosteck Cellular*, at Fig. 6.1, and Fig. 14.4.

[40] *Bundling of Cellular Customer Premises Equipment and Cellular Service, Report & Order*, 7 FCC Rcd 4028 (1992).

[41] Commission Cellular Database, Wireless Telecommunications Bureau. The number in the text above is greater than twice the number of license areas stated in paragraph 14, because some licensees chose not to serve their full licensed areas. The Commission's rules include provisions for "fill-ins" by other persons in such circumstances. *See generally, Applications of McElroy Elec. Corp., Memorandum Opinion & Order*, File # 01758-CL-MP-88 (Mar. 23, 1995). Thus, within some Commission-defined areas, there are more than two systems, although in any one place there are only two systems.

by wireline telephone companies.[42] As of the middle of 1994, the top five cellular operators, measured by reported subscribers, were McCaw Cellular (acquired by AT&T in September 1994), GTE/Contel, BellSouth, Southwestern Bell, and Bell Atlantic.[43] Two major horizontal consolidations involving telephone-affiliated cellular companies are underway.[44]

27. Marketing of cellular service occurs in three basic ways. Each cellular carrier operates its own retail division that provides service and cellular equipment to customers directly. Also, many retail outlets that are unaffiliated with any carrier sell cellular telephones and either send customers to a carrier for service or act as a sales agent for one carrier's service. Finally, Commission rules prohibit restrictions on the resale of cellular service, which makes possible cellular "resellers," another class of competitors at the retail level.[45] Resellers may subscribe to any bulk-rate discounts or wholesale rates offered by the two facilities-based carriers, and provide additional retail competition to the two facilities-based carriers.[46] In practice, resellers have little market share except in markets where they are protected by state regulatory commissions.[47]

28. Cellular is generally a highly profitable business in large cities.[48] Carriers may be less successful in some other markets, however.[49] Stand-alone cellular companies generally do not pay dividends, and some firms carry a burdensome debt.[50] Profitability is discussed in more detail in paragraphs 76-81 below.[51]

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[42] *See* authorities cited *supra* note 20.

[43] SALOMON BROS., *The Wireless Telecommunications Review* ("*Wireless Review*"), Spr. 1994 at 8, Fig. 10.

[44] *Bell Atlantic Mobile Systems, Inc. and NYNEX Mobile Communications Co., Order*, DA 95-1129 (May 19, 1995) (WTB), *application for review pending; Transfer of U S West, Inc. Cellular Licenses to WMC Partners, L.P.*, Public Notice No. 53875, Report No. LB-95-14, May 12, 1995. The other major change in the corporate structure of the cellular business
that occurred in recent years was Pacific Bell's divestiture of its cellular systems into an unaffiliated company, AirTouch, in 1992.

[45] *Petitions for Rule Making Concerning Proposed Changes to the Commission's Cellular Resale Policies, Report & Order*, 7 FCC Rcd 4006 (1992).

[46] While cellular resellers do provide competition on price to facilities-based cellular carriers, they may not be able to mitigate whatever market power such carriers have due to the current duopolistic nature of the Commission's frequency allocation.

[47] For example, California mandates specific margins between retail and wholesale prices. As a result, market share of resellers in the largest California markets exceeds 10%. *See California State Petition R&O* ¶¶ 45-51, 62.

[48] *See* Tbl. 9.

[49] *See* Tbls. 9, and 10.

[50] *See, e.g., Craig O. McCaw*, 9 FCC Rcd at 5856 (¶ 30) (references to the financial situation of McCaw Cellular Communications, Inc., the largest stand-alone cellular company, before it was acquired by AT&T).

[51] Mobile telephone services using technologies which pre-dated cellular service are still available, but in an ever-diminishing number of areas. These older services use approximately two MHz (compared to twenty-five MHz for each cellular system). 47 C.F.R. § 22.561.

2. Paging Service

29. In terms of customers, paging or "beeper" service is currently the most popular segment of CMRS. In 1994, there were 27.3 million paging subscribers, a thirty-eight percent increase over the previous year.[52] In its simplest form, a pager is a small portable receiver that vibrates or beeps when its telephone number has been called. The pager, in effect, alerts the subscriber to call a telephone number in order to receive a recorded message that the caller left or to view on the pager the telephone number of the caller. With more sophisticated pagers, a short written or audio message is conveyed via the portable receiver along with the signal.[53]

30. Paging service is provided by several carriers in most areas. In large metropolitan areas, twelve or more providers are typical. Most paging customers take service in a specific local geographic market, but several licensed regional and nationwide carriers exist. The trend in paging is towards regional and national coverage.[54] While there are between 500 and 600 paging carriers in the United States today, fifteen large companies account for approximately sixty percent of the customers.[55] The largest of them are MobilComm and PageNet, which are not affiliated with other telecommunications companies.[56] A period of consolidation of paging companies has begun.[57] Local telephone companies or their corporate affiliates typically provide paging service where the former provide telephone service, but are not dominant providers of the service.

31. Approximately three MHz of spectrum is assigned to paging service; in addition, approximately 1.5 MHz is now used for paging service that was formerly used for the pre-cellular mobile telephone services.[58] Subcarriers on some FM radio stations also may be used for paging service,[59] providing additional capacity for new entry into this business. In addition, the Commission recently proposed allowing Interactive Video Data Service licensees to use their systems

[52] Telephony, COMM. DAILY, May 15, 1995 (study by Economic & Management Consultants International, Inc. (EMCI)). At approximately $15 per month (*see infra* para. 32), annual paging service revenues would be approximately $5 billion.

[53] Paging and cellular services are related to each other, as competitors or complements or both. For example, approximately 31 percent of cellular customers also use paging service. *Celltrac: Cellular and PCS User and Potential User Profiles*, EMCI Report, March 1995.

[54] *Third CMRS R&O*, 9 FCC at 8019 (¶ 54).

[55] *Wireless Review*, *supra* note 43, at 21.

[56] *The State of the U.S. Paging Industry: 1994*, EMCI ("*EMCI Paging Report*"), June 1994.

[57] *See, e.g.*, Telephony, COMM. DAILY, June 6, 1995 (A+ Communications and Network USA Paging of Fla. plan $77-million cash-stock merger to create A+ Network Inc.); *Cash Flows and Revenues Up at Arch and USA Mobile, Net Income Down*, COMM. DAILY, May 3, 1995 ("USAM had been target of unsolicited takeover by Metrocall last year, and earlier this year agreed to merge with Arch by 3rd quarter"); Telephony, COMM. DAILY, Apr. 13, 1995 ("Arch Communications bought Professional Paging & Radio in Fla. for $3 million"); Telephony, COMM. DAILY, Jan. 13, 1995 (Paging Network acquires ComTech, plans to buy assets of Southern New England Telephone Paging); *Metrocall Makes $400 Million Bid for USA Mobile and Premiere Page*, COMM. DAILY, Dec. 8, 1994, at 2.

[58] *See generally*, 47 C.F.R. § 22.561.

[59] *Second CMRS R&O*, 9 FCC Rcd at 1507 (¶ 260) (1994). Some such subcarriers are being used for paging service.

for limited mobile use, including paging.[60] Since paging service consists mostly of momentary signals rather than continuous two-way conversations, this relatively small amount of spectrum easily accommodates all 27.3 million subscribers and could accommodate several times that.[61]

32. Charges for local paging service usually consist of a flat monthly fee, averaging between $9 and $17, depending on the number of features and functions the customer desires.[62] Regional and nationwide service is more expensive.[63]

33. Regulation by this Commission is minimal, consisting of allocating frequencies and licensing individual carriers. There is no state regulation of paging services.[64] The Commission has never imposed a numerical limitation on paging systems, unlike the cellular market.

34. Prices for paging receivers range from $60 to $200, depending on the sophistication of the receiver,[65] and receivers are sold and rented through carriers and many retail outlets. While the typical paging receiver can use only one or a few of the frequencies allocated to paging service, the receiver's simplicity (and resultant low cost) makes changing carriers inexpensive.

3. Specialized Mobile Radios ("SMRs")

35. SMRs began in the mid-1970s as a commercial dispatch service providing two-way voice communications between business vehicles (*e.g.*, taxicabs, delivery trucks) and central dispatchers.[66] SMRs were initially created to promote a new, spectrum-efficient technology called trunking, which enables customers to share many channels instead of each customer using a channel on an exclusive basis.[67] SMRs are primarily used for voice communications, but there are SMR systems devoted primarily to data communications, including providing facsimile services.[68] The growth of SMRs has been healthy, with consistent double-digit growth rates. At the end of 1994,

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[60] *Amendment of Part 95 of the Commission's Rules to Allow Interactive Video and Data Service Licensees to Provide Mobile Service to Subscribers, Notice of Proposed Rulemaking*, FCC 95-158 (May 5, 1995).

[61] *See* authority cited *supra* note 52.

[62] *See EMCI Paging Report, supra* note 56, at 57; Paul Kagan & Associates, *Wireless Market Stats*, Nov. 30, 1994, at 7.

[63] *See, e.g.*, Telephony, COMM. DAILY, Aug. 2, 1995 (daily rate for nationwide paging service is $5); *Windows Paging System for Auto E-Mail Forwarding*, Newsbytes News Network Newsbytes, Aug. 18, 1994 (monthly rate for nationwide paging is $50); *Notable Technologies Shifts Plans from Penpoint to Paging*, Mobile Data Report Capitol Publications, May 23, 1994 (company's lowest monthly rate for regional paging service is $40, and for national paging service is $50); *Bell Atlantic Adding Skytel Mobile Paging*, AUSTIN AMER.-STATESMAN, May 18, 1994, at F-8 (monthly rate for regional paging is $31).

[64] *See* authorities cited *supra* note 31.

[65] *EMCI Paging Report, supra* note 56, at 106.

[66] *See Docket No. 18262*, 51 FCC 2d 945 (1975).

[67] *See* Dr. Doron Fertig, *Specialized Mobile Radio*, Private Radio Bureau, Federal Communications Commission, at 4 n.2, and App. (Mar. 1991) ("*Commission SMR Report*"). Although SMRs were created to exploit trunking technology, they may be assigned channels to use conventional single-channel technology.

[68] *See Maxon Selected as U.S. Manufacturer of Low-Cost Mobitex OEM Modem*, PR NEWSWIRE, Apr. 25, 1995. For example, RAM Mobile Data provides the most advanced nationwide wireless data communications service in the United States, reaching 92 percent of the urban business population. *Id.*

approximately 1.8 million vehicles and portable units were served by SMR systems.[69]

36. One of the main differences between cellular and SMR is that not all SMRs are connected to the PSTN. Rather, base stations generally serve as "repeaters," permitting multiple mobile units in a group to talk to each other.[70] Unlike cellular, this Commission has never required a specific technical standard for SMRs. 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 (up to $900), inhibits a customer changing from one SMR system to another. Several SMR providers are in the process of adopting a single digital standard.[71] This could have the effect of largely consolidating technical protocols, at least in the 800 MHz band, and of facilitating customers switching from one SMR to another.

37. Traditionally, SMRs were small, independent companies, unaffiliated with larger communications companies. This is rapidly changing. The Commission recently changed its rules to permit telephone companies and their affiliates (*e.g.*, cellular companies) to own SMRs.[72] The Commission is also replacing its traditional licensing of individual base stations by regulations that allow wide-area licensing similar to that for cellular systems.[73] For example, the Commission recently changed its Rules to allow 900 MHz SMRs to be licensed on a Major Trading Area ("MTA") basis.[74] The Commission is also considering changing the 800 MHz SMR licensing rules to facilitate the consolidation of small SMRs into wide-area SMRs.[75] 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 thousands of SMRs in the United States, there is a trend towards consolidation which may

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[69] *The State of SMR and Digital Mobile Radio (1994 and 1995)* at 138, EMCI ("*EMCI SMR Report*"), Jan. 1995.

[70] *Commission SMR Report, supra* note 67, at 6.

[71] *See Nextel Communications, Inc., Order*, DA 95-263 (¶ 5) (Feb. 17, 1995) (WTB), *reconsideration denied, Order*, DA 95-1677 (July 28, 1995) (WTB); *Celsmer, Order*, DA 95-1537 (¶ 2) (released July 10, 1995) (WTB); *Nextel Hopes to Take Lead in Wireless Competition*, SEATTLE TIMES, Nov. 10, 1993, at D-6 ("Nextel and other SMR operators also have learned from cellular's mistakes, Elling said, by adopting a single digital standard").

[72] *Eligibility for the Specialized Mobile Radio Services and Radio Services in the 220-222 MHz Land Mobile Band and Use of Radio Dispatch Communications, Report & Order*, GN Docket No. 94-90 (Mar. 7, 1995).

[73] *Amendment of Part 90 of the Commission's Rules to Facilitate Future Development of SMR Systems in the 800 MHz Frequency Band, Notice of Proposed Rule Making*, 8 FCC Rcd 3950, 3952-53 (¶¶ 11-15) (1993).

[74] *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; Implementation of Section 309(j) of the Communications Act-Competitive Bidding; Implementation of Sections 3(n) and 332 of the Communications Act, Second Report & Order and Second Further Notice of Proposed Rule Making*, FCC 95-159 (Apr. 17, 1995).

[75] *Amendment of Part 90 of the Commission's Rules to Facilitate Future Development of SMR Systems in the 800 MHz Frequency Band, Further Notice of Proposed Rule Making*, 59 Fed. Reg. 60,111 (Nov. 22, 1994).

leave one to three large SMRs per market, plus a fringe of smaller SMRs.[76]

38. A total of approximately nineteen MHz of spectrum is available for use by SMRs, fourteen MHz in the 800 MHz band and five MHz in the 900 MHz band.[77] Most of these frequencies were entirely occupied in the larger markets years ago.

39. Although charges are often on a flat monthly fee basis, some SMRs have rate structures similar to those of cellular carriers. Almost all customers buy a telephone or other transceiver from their SMR provider, with typical purchase prices ranging between $600 and $900.[78] Average monthly service fees are approximately $15 for dispatch service, and $50 extra for interconnection to the PSTN.[79]

4. Air-Ground Service

40. Air-ground service is telephone service on airplanes. It started in the mid-1960s as a service on private airplanes. A more recent and more popular form of the service has been introduced on commercial airplanes, which allows air travellers to place calls by using a credit card, but not to receive calls. This latter service currently is provided by GTE/Airfone, Claircom (affiliated with AT&T/McCaw), and In-Flight (affiliated with MCI).[80]

41. Approximately 4.5 MHz of spectrum is allocated to these two types of air-ground service. Service arrangements on commercial planes are akin to those for pay telephones in stores and restaurants. The premises owner (in this case, the airline) chooses one of the three carriers for some or all of its planes. The individual passenger has no choice of carrier or the associated telephone and pays on a per call basis. A typical charge is $1.50 per minute for this service from an airplane to any point in the United States, regardless of distance.[81] The overwhelming use of air-ground service is for voice communications, but data and facsimile applications are being introduced.[82] Regulation by this Commission consists of frequency allocation and licensing of the carriers; there is no state regulation. Of six available licenses, only three are in use, so there is room for entry by three new carriers.

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[76] The largest SMR, Nextel, would like to consolidate SMRs into a nationwide system whose technology will be similar to digital cellular and PCS. *See, e.g., Nextel Communications, Inc., Order*, DA 95-263 (¶ 6) (Feb. 17, 1995) (WTB), *reconsideration denied, Order*, DA-95-1677 (July 28, 1995) (WTB).

[77] Due to technical reasons, 800 MHz and 900 MHz systems tend to be independent of each other. *Commission SMR Report, supra* note 67, at 13-14.

[78] *See EMCI SMR Report, supra* note 69, at 73. In contrast to the general rule in cellular service, rental and financing of telephones by service providers is the exception with SMRs.

[79] *Id.*

[80] For technical and safety reasons, regulations of the Commission and the Federal Aviation Administration forbid the operation of cellular telephones on airplanes that are airborne. 47 C.F.R. § 22.925(a)(1).

[81] This charge is for both the "radio link" and for completing the call over the "landline" network.

[82] Robert E. Calem, *A New Digital Air-to-Ground Link Gets an In-Flight Test*, N.Y. TIMES, Jan. 15, 1994, at Sec. 3, p.7.

5. Satellite Systems for Mobile Communications

42. Mobile telecommunications service is provided by several satellite-based systems throughout the United States. The existing systems are mostly oriented towards unpopulated or lightly populated areas, where cellular service is often unavailable. The primary use of these systems is for voice communications, although data and facsimile communications are possible. Customers subscribe to a particular service, which is provided on a specific satellite. Subscribers to these satellite-based services are few at present. Charges are relatively high, which is one reason why the present satellite-based mobile telephone service is attractive only in rural areas.[83] Most telephones for satellite-based systems can use only the frequencies assigned to one satellite; this, combined with the cost of a new telephone, inhibits a customer changing from one service to another.

43. The Commission has recently licensed several systems of "Low Earth Orbit" satellites ("Little LEOs" and "Big LEOs"), which the licensees have asserted will provide a variety of mobile voice and data services.[84] Little LEOs have been allocated approximately three and one-half MHz of primary spectrum. They are expected to be more oriented towards non-voice communications for businesses and government entities.[85] Big LEOs are expected to be competitive for voice and other services in all geographic markets (rural and urban), and have been allocated thirty-three MHz of spectrum. Both kinds of LEO systems are not expected to provide service until the late 1990s, which makes their impact on the present marketplace minimal.

6. Maritime Services

44. 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 mentioned in the preceding section. Public coast stations use approximately fifteen MHz of spectrum and satellites use nineteen MHz of spectrum, for a total of almost thirty-four MHz. Both provide the full range of voice, data, and other capabilities featured in services for land-based units. While these services are necessary for the protection of life and property on the water, much of their actual use is for business and personal communications.[86] Federal regulation consists of frequency allocation, licensing, and various rules to promote safety.

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[83] As the Commission stated in the *Third CMRS R&O*, 9 FCC Rcd at 8112 (¶ 269), "[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."

[84] The Commission recently licensed Orbital Communications Corp. to operate a Little LEO system. In addition, the Commission recently issued Big LEO licenses to Motorola ("Iridium"), TRW ("Odyssey"), and Loral/Qualcomm ("Globalstar"). *See, e.g., Application of Orbital Communications Corp. for Authority to Construct, Launch and Operate a Non-Voice, Non-Geostationary Mobile Satellite System, Order & Authorization*, 9 FCC Rcd 6476 (1994) ("*ORBCOMM*"); *Amendment of the Commission's* (continued...)

[84](...continued) *Rules to Establish Rules & Policies Pertaining to a Mobile Satellite Service in the 1610-1626.5/2483.5-2500 MHz Frequency Bands, Report & Order*, 9 FCC Rcd 5936 (1994).

[85] *See, e.g., ORBCOMM*, 9 FCC Rcd at 6476-77 (¶ 4).

[86] *See generally, Amendment of the Commission's Rules Concerning Maritime Communications, Notice of Proposed Rule Making & Notice of Inquiry*, 7 FCC Rcd 7863 (1992).

7. Personal Communications Services ("PCS")

45. The Commission has allocated 153 MHz of spectrum for PCS, which is divided into three broad categories, broadband, narrowband, and unlicensed. The general philosophy of this major allocation is to allow the market, rather than the Commission, to determine the best use of this spectrum. The Commission defined PCS as a "wide array of mobile, portable and ancillary communications services to individuals and businesses."[87] It is expected however, that broadband PCS providers will initially offer primarily mobile telephone service, starting later this year in a few places;[88] that narrowband PCS providers will offer advanced paging-like and messaging services; and that unlicensed PCS will accommodate a wide variety of services within small areas, such as data networking within office buildings. The Commission also expects that PCS generally will inject major new competition into the mobile telecommunications services market by creating at least three new major competitors to cellular and other current CMRS providers in each area.

46. The Commission has allocated 120 MHz to broadband PCS, which has been licensed in six bands; three bands each containing thirty MHz (Blocks A, B and C), and three bands each containing ten MHz (Blocks D, E and F).[89] The Commission recently licensed Blocks A and B for forty-seven large territories (MTAs),[90] and the other four blocks each will be licensed for 493 territories called Basic Trading Areas or "BTAs".[91] Table 2 lists the licensees in Blocks A and B and other pertinent data. Most of these licensees are companies, or joint ventures of companies, that are already established in the cellular business. In the auctions for Blocks C and F, the Commission has limited bidder eligibility to "entrepreneurs" with less than $125 million in gross revenues and $500 million in total assets. Winning bidders for these entrepreneurs' blocks may pay for their licenses in installments and small businesses (under $40 million in gross revenues), including small businesses owned by minorities and women and small rural telephone companies, are eligible for bidding credits and enhanced installment payments.[92] Rural telephone companies are eligible

[87] *See, e.g., Implementation of Section 309(j) of the Communications Act -- Competitive Bidding, Notice of Proposed Rule Making*, 8 FCC Rcd 7635, 7654 (¶ 116) (1993).

[88] *Spectrum-Sharing Unit Wins Patent; PCS Operator to Start Service This Year*, COMM. DAILY, May 11, 1995.

[89] *Amendment of the Commission's Rules to Establish New Personal Communications Services, Memorandum Opinion & Order*, 9 FCC Rcd 4957, 4963, 4970-71 (¶¶ 17, 26-27) (1994) ("*PCS MO&O*").

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

[91] *PCS MO&O*, 9 FCC Rcd at 4969 (¶ 24 n.23).

[92] Pursuant to Section 309(j)(4)(D) of the Communications Act, 47 U.S.C. § 309(j)(4)(D), the Commission also established higher bidding credits, enhanced installment payments, and other auction measures specifically to assist entrepreneurial businesses owned by members of minority groups and women. *See Implementation of Section 309(j) of the Communications Act - Competitive Bidding, Fifth Report and Order in PP Docket No. 93-253*, 9 FCC Rcd 5532 (1994), *on reconsideration, Fifth Memorandum Opinion and Order*, 10 FCC Rcd 403 (1994). For the upcoming C Block auction, the Commission has proposed to eliminate the race- and gender-based measures to avoid further delay and legal uncertainties raised by the Supreme Court's recent decision in *Adarand Constructors, Inc. v. Peña*. 63 U.S.L.W. 4523 (U.S. June 12, 1995). This proposal was based on the unique circumstances of the C Block auction, which was scheduled to commence in August

(continued...)

to obtain smaller, geographically partitioned broadband PCS licenses in order to provide service in their rural, wireline service areas.

47. The spectrum allocation for broadband (and unlicensed) PCS was a reallocation of fixed point-to-point microwave service frequencies (used to provide services to railroads, utilities, and the police).[93] This spectrum is currently encumbered and must be cleared before it can be used effectively. The introduction of PCS in most of the country is not expected until 1996.[94] Therefore, market structure, geographic scope, popularity, economics, rate structure and level and terminal equipment are not yet determined.[95] Generally, the system design will be similar to cellular, except that these systems will operate in a digital format upon their inception (in contrast to the relatively inefficient analog systems still prevalent in the cellular business). Also, 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 unless there are significant economies of scale in the production of base stations for broadband PCS. On the other hand, the hope is that broadband PCS will have hand-held telephones that will be relatively light and inexpensive.

48. Several of the Commission's rules for broadband PCS are designed to promote competition. For example, broadband PCS licenses will be useable for any mobile service, in contrast to the Commission's earlier allocations, which tended to be specifically for telephone, dispatch, paging, *etc.* This flexibility will allow carriers to respond to market demand without needing to surmount regulatory hurdles. Also, the Commission has imposed "spectrum caps" which limit the amount of spectrum that any one entity may control in the same area. There is a 10 MHz limit on broadband PCS spectrum for cellular carriers in their cellular service areas,[96] a 40 MHz limit on all entities for broadband PCS,[97] and a 45 MHz limit on all entities for broadband PCS, cellular and SMR spectrum.[98]

49. Narrowband PCS received an allocation of three MHz from the Commission, all of which is expected to be used for advanced messaging. Auctions have been held and licensing has begun. Ultimately the Commission will issue ten national licenses, thirty regional licenses, and more than 3,500 licenses for smaller areas.[99] Most

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[92](...continued)
1995 when the Court's decision in *Adarand* was announced. The Commission 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. *See Further Notice of Proposed Rule Making* in PP Docket No. 93-253, GN Docket No. 90-314, GN Docket No. 93-252, FCC 95-263 (released June 23, 1995).

[93] *Amendment of the Commission's Rules to Establish New Personal Communications Services, Second Report & Order*, 8 FCC Rcd 7700, 7725 n.52, 7738 (¶¶ 56 n.52, 88) (1993) ("*Second PCS R&O*").

[94] One licensee expects to begin service by the end of 1995. See authority cited *supra* note 88.

[95] PCS systems are operational in several countries in Europe.

[96] *PCS MO&O*, 9 FCC Rcd at 4983-84 (¶ 67). Also, pursuant to the Commission's rules, cellular carriers may acquire an additional 5 MHz after Jan. 1, 2000. *Id.*

[97] *Second PCS R&O*, 8 FCC Rcd at 7728 (¶ 61); *PCS MO&O*, 9 FCC Rcd at 4983-86 (¶¶ 66-71).

[98] *Third CMRS R&O*, 9 FCC Rcd at 8109-10 (¶ 263). *See also PCS MO&O*, 9 FCC Rcd at 4983-85 (¶¶ 66-68).

[99] Auctions for nationwide narrowband licenses began in July 1994 and began for regional licenses in (continued...)

of these licensees are already providing paging or other mobile telecommunications services. Like broadband PCS, the service is embryonic and the market structure, popularity, economics, rate structure and levels and terminal equipment are currently unknown. There is a spectrum cap limiting each carrier to hold no more than three narrowband PCS licenses in a market.[100]

50. Unlicensed PCS received an allocation of thirty MHz from the Commission.[101] 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 has adopted a spectrum etiquette intended to avoid interference problems between users sharing the frequencies.[102] The spectrum etiquette requires actions such as limiting the duration of transmissions, and listening to make sure no one else is operating before transmitting. The Commission also established procedures for broadband and unlicensed PCS operators to pay for microwave system relocation to avoid interference and other problems on the spectrum.[103]

B. Private Mobile Radio Services ("PMRS")

51. Cellular carriers and other CMRS providers face some competitive pressures from services that are not themselves included in the CMRS category. Specifically, the Commission has made frequency allocations for an array of "private" mobile radio communications systems, collectively called the private mobile radio services ("PMRS"). Typically, these systems serve the internal needs of a specific business or state or local government entity.[104] Alternatively, a private system can provide service to others on a for-profit basis and still be classified as PMRS as long as it is not connected to the PSTN. Most PMRS are used for voice dispatch communications, but data, facsimile,

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[99](...continued)
October 1994. Of the 29 bidders that began the nationwide auctions, 6 have won licenses, with the bids totaling $617 million. Twenty-eight (28) bidders began the regional auctions. As of May 30, 1995, the Wireless Telecommunications Bureau has granted 25 of the 30 licenses; the winners' bids totaled $489 million (which certain credits reduced to $393 million). The next narrowband auctions will be for 561 licenses for MTAs and 2,958 licenses for BTAs.

[100] The Commission believed this would allow narrowband PCS providers the flexibility to combine channels to accommodate specific service needs and would ensure that it is offered on a competitive basis. *Amendment of the Commission's Rules to Establish New Narrowband Personal Communications Services, Memorandum Opinion & Order*, 9 FCC Rcd 1309, 1312-13 (¶¶ 20, 24, 25) (1994).

[101] *PCS MO&O*, 9 FCC Rcd at 4990 (¶ 84). *See also Allocation of Spectrum Below 5 GHz Transferred from Federal Government Use, First Report & Order and Second Notice of Proposed Rule Making* ("*Government Re-Allocation*") (¶¶ 1, 6, 16-19) FCC No. 95-47 (Feb. 17, 1995).

[102] *Second PCS R&O*, 8 FCC Rcd at 7776-78 (¶¶ 181-86): *PCS MO&O*, 9 FCC Rcd at 5042-49 (¶¶ 224-44).

[103] *Second PCS R&O*, 8 FCC Rcd at 7736-38 (¶¶ 83-88). The Commission is also considering a proposal by Pacific Bell Mobile Services, which would require future PCS licensees who benefit from the relocation of a microwave system to bear a share of the costs of relocating that system. *See* Petition for Rulemaking of Pacific Bell Mobile Services Regarding a Plan for Sharing the Costs of Microwave Relocation, RM-8643, (filed May 5, 1995).

[104] Examples include communications within a large factory or building complex or on a construction site, along a railroad track or pipeline, or between the headquarters and mobile units of a police force.

remote control and other communications make up a substantial minority of total usage.[105] Allocations for such systems total approximately seventy MHz. Some of these allocations are for specific types of licensees (such as public utilities, transportation companies, and public safety entities); other allocations are for general business use.[106]

52. Private mobile radio systems were in existence before the first "public" systems, and today approximately fifteen million transmitters are in use.[107] Estimates of the value of equipment used in private systems range up to $30 billion.[108] The coverage provided by these systems is a mixture of local, regional and national. By definition, "rates" are not charged by private systems. Federal regulation consists of frequency allocation, individual licensing, and overseeing usage to ensure, for example, that police allocations are being used only for police business. There is no state regulation of private systems.

53. Competition may exist between commercial and private systems at the procurement stage, when a business may have a mobile communications need that could be met either by subscribing to a commercial system (*e.g.*, cellular, SMRs) or by investing in a private system of its own. For example, in 1993, United Parcel Service committed to a large purchase of cellular service and data terminals to serve its fleet of vehicles and delivery persons nationwide. The company had considered building its own private network, as well as SMR offerings.[109]

54. There may also be later competition. A private licensee that needs to use an additional mobile unit might, if a significant amount of the new mobile's usage will be for voice communication with the general public, choose to subscribe to cellular service instead of adding another unit onto its private system. Many businesses use a mixture of their own private systems and common carrier services (usually cellular and paging) to meet their total need for mobile telecommunications. Telephones and other terminal equipment for private systems are usually sold as part of a total system "package," so there is no market for terminals independent of the systems. The spectrum for private systems is being used in all urban areas.[110]

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[105] For a description of the communications uses of PMRS by public safety agencies, see *Report and Plan for Meeting State and Local Government Public Safety Agency Spectrum Needs Through the Year 2010, Report & Plan*, 1995 WL 259663 (Feb. 9, 1995).

[106] Private systems are generally regulated by Part 90 of the Commission's Rules and are described in the *Second CMRS R&O*, 9 FCC Rcd at 1442-54 (¶¶ 71-99). The largest among them are the Industrial Radio Services (which includes the Business Radio Service), the Land Transportation Radio Services, the Public Safety Radio Services, and the Special Emergency Radio Service.

[107] *Spectrum Efficiency in the Private Land Mobile Radio Bands in Use Prior to 1968, Notice of Inquiry*, 6 FCC Rcd 4126-28 (¶¶ 8, 17) (1991); *Commission Final Land Mobile Radio Service Summary*.

[108] *See* letter from User Associations to William F. Caton, Commission Acting Secretary, dated Jan. 13, 1995, at 5 ($25 billion value for PMRS systems not including ones using 800 MHz and 900 MHz bands).

[109] *UPS Tells Why It Chose Cellular for New National Data Network*, Advanced Wireless Comm. Telecom Pub., Feb. 17, 1993.

[110] *See Spectrum Efficiency in the Private Land Mobile Radio Bands in Use Prior to 1968, Notice of Inquiry*, PR Docket No. 91-170, 1991 WL 641004; *Replacement of Part 90 by Part 88 to Revise the Private Land Mobile Radio Services and Modify the Policies Governing Them, Notice of Proposed Rule Making*, 7 FCC Rcd 8105 (1992), *Report and Order and Further Notice of Proposed Rule Making*, FCC

(continued...)

55. PMRS frequencies are also used by commercial systems that are not connected to the PSTN.[111] These systems are primarily used for voice communications of a dispatch nature ("simple dispatch"), although data communications are increasing rapidly. Coverage is generally local. There is no numerical rule about how many systems for such service there may be, but in most areas, several small companies operate such systems. These companies are generally not affiliated with other telecommunications service providers. Almost all customers buy a receiver from their service provider. Monthly service charges are mostly flat-rate and typically range between $10 and $20. Changing suppliers generally involves modifying or changing the radio equipment. The simple dispatch business is widely believed to be stable, with companies surviving as "niche" or "low end" competitors.[112]

III. FINDINGS

56. This Section reviews previous findings about CMRS markets and competition and discusses the Commission's current views. These views are evolving based both on dynamic industry changes and the additional data that the Commission receives during regulatory proceedings. Because the cellular business is currently by far the largest element of CMRS in dollar volume, this Section focuses primarily on it. The Commission is also very interested, however, in the degree of competition between cellular and the other elements of CMRS. Following standard competitive analysis, this Section begins by discussing what the "relevant market(s)" might be,[113] followed by a discussion of such data concerning competition as the Commission has available.

A. Relevant Market Definition

57. The facts and previous findings by the Commission and others can support differing views about which mobile radio services compete with each other (and with "wireline" service) and thereby have a constraining effect on pricing and other conduct. These assertions are often stated in terms of defining "product" or "geographic" markets -- which are, generally, the services that are competitive with each other and the areas in which they are available. Markets have been alleged that contain some or all services within the CMRS category, and some services outside it.

58. The Department of Justice ("the DOJ") has posited a relevant market consisting of only cellular service[114] and another consisting only of "trunked SMR service in the 800 MHz, 900 MHz and 220 MHz bands."[115]

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[110](...continued)
95-235, 1995 WL 373694 (released June 23, 1995). In those proceedings, the Commission is relieving spectrum congestion and expanding the availability of channels on existing private land mobile radio allocations.

[111] *Second CMRS R&O*, 9 FCC Rcd at 1446 (¶ 77).

[112] For a general description of PMRS, *see generally* authorities cited *supra* in notes 105-07, 109-10.

[113] *United States v. Continental Can Co.*, 378 U.S. 441, 447 (1964); *United States v. E.I. du Pont de Nemours & Co.*, 353 U.S. 586, 592 (1957); *Standard Oil Co. v. United States*, 337 U.S. 293, 299-300 n.5 (1949).

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

[115] *United States v. Motorola, Inc.*, Competitive Impact Statement at 6, No. 1:94CV02331 (D.D.C. filed Oct. 27, 1994).

59. Another view would conclude that the product market is broader. The Commission's *Third CMRS Report and Order* contained an analysis of trends in CMRS and found that the direction is away from a "balkanized view" that sees cellular, SMRs, paging, *etc.*, competing in separate markets:[116]

> 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.[117]

The Commission found evidence suggesting growing substitution (a) between cellular service and wide-area SMRs,[118] (b) between cellular and paging services,[119] (c) between SMRs, paging, and Business Radio Service,[120] and (d) between nominally private mobile radio systems on the one hand and common carrier systems such as cellular, paging, and SMRs on the other.[121] The Commission also found that traditional distinctions, such as between voice and data services and between one-way and two-way services (and terminal equipment), are collapsing.[122]

60. The principal force driving this convergence, the Commission noted, was the desire of carriers to meet the demand of their customers for "one-stop shopping," the ability to buy at one place a mixture of different mobile services.[123] For its part, the Commission emphasized that its policy is to allow such convergence. "[A]ll CMRS providers should have the potential to utilize any CMRS spectrum in a manner that can adapt the nature of the service they provide to meet specific customer needs. . . . [E]ven if CMRS providers offer differing services today, if consumers desire particular services or combinations of services in the future, a variety of CMRS providers should have the opportunity to use different technological configurations to meet this customer demand in competition with other CMRS carriers."[124]

61. The convergence noted by the Commission would support broader product markets than those found by the DOJ. One such broader view, emphasizing functionality, would divide CMRS and related services into three categories: telephone service, dispatch, and paging. Another broad view, emphasizing market power, would see mobile two-way voice service, which now

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[116] *Third CMRS R&O*, 9 FCC Rcd at 8020-21 (¶ 57).

[117] *Id.*, 9 FCC Rcd at 8020 (¶ 56) (footnotes omitted). *See also id.*, 9 FCC Rcd at 8020-26 (¶¶ 57-68). In addition to technical developments that blur the distinction between services, companies providing different services are affiliating so that they may offer, in one package, services that were traditionally distinct. *See, e.g.*, Mike Mills, *MCI Deals Itself a Niche in Growing Paging Market*, WASH. POST, Jan. 7, 1995, at D-2.

[118] *Third CMRS R&O*, 9 FCC Rcd at 8026, 8028-29, 8109 (¶¶ 67, 72, 261-62).

[119] *Id.*, 9 FCC Rcd at 8023-24 (¶ 62).

[120] *Id.*, 9 FCC Rcd at 8021 (¶ 58).

[121] *Id.*, 9 FCC Rcd at 7996 (¶ 12).

[122] *Id.*, 9 FCC Rcd at 8030-34 (¶¶ 74-75).

[123] *Id.*, 9 FCC Rcd at 8022-23 (¶ 61).

[124] *Id.*, 9 FCC Rcd at 8026-27 (¶ 69).

includes cellular service and interconnected SMRs (both wide-area and local), as the center of power in mobile telecommunications. These services form a core, around which there is a ring of other services that may exert varying degrees of constraint on the core services (and which may be constrained by the core services to some extent). The ring consists of non-interconnected SMRs, paging service,[125] some private systems, and air-ground, satellite-based and maritime services. Government systems,[126] other private systems, and perhaps even "low end" services such as Citizens Band and walkie-talkies[127] might also be included. Finally, market definition must include consideration of PCS, which is virtually certain, eventually and significantly, to blur pre-existing market boundaries and to intensify competition at all levels.[128] Already, there is evidence of declining cellular prices and increasing features, which has been attributed to PCS's approach.[129] Also adding to the blurring and intensity would be any Commission action that facilitates the consolidation of small SMRs into wide-area systems providing mobile telephone service.[130]

62. Eventually, these services could converge to the extent that there could be a single product market of communications services for all "people on the move."[131] This would include the services mentioned in the two preceding paragraphs as full participants and also a certain amount of pay telephone and other wireline usage.[132]

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[125] This view would hold that paging service, although highly popular, does not constrain cellular service to a significant extent.

[126] The federal government uses a large amount of spectrum for its mobile communications needs, independent of the Commission's regulatory authority. Some of the communications provided on these frequencies are similar to mobile telephone service, the services provided by SMRs, and the capabilities afforded by private systems. There is evidence of some substitution occurring between government and these latter systems. Concerning competition between government and commercial systems, *see, e.g.*, COMM. DAILY, Sept. 22, 1994, at 9 (U.S. Army is examining use of cellular radio and Direct Broadcast Service to supplement its private radio systems) and National Telecommunications and Information Administration, *Spectrum Efficiency*, NTIA Report No. 93-300, at 32 (Oct. 1993).

[127] Citizens Band ("CB") radio service is a short-distance voice communications service. Generally, CB and walkie-talkies have the advantages of convenience and low cost and the disadvantages of lacking privacy and interconnection. *See generally*, 47 C.F.R. § 95.401.

[128] The Commission stated in the PCS Allocation Order that it was creating PCS to be "competitive with existing services such as cellular, SMRs and others." *Second PCS R&O*, 8 FCC Rcd at 7715 (¶ 31).

[129] *See* authorities cited *supra* note 33.

[130] *See supra* notes 74-75 and accompanying text.

[131] *See also Third CMRS R&O*, 9 FCC Rcd at 8021 (¶ 58) ("[t]he common characteristic of mobile services customers is their need to communicate electronically on a real-time basis (or virtually real-time basis) while they are 'on the move'").

[132] Coin or "pay" telephones use the "wireline" public switched telecommunications network and are particularly accessible to persons who are away from their normal locations. The Commission's Memorandum Opinion and Order concerning the acquisition of a large cellular carrier, McCaw Cellular Communications, Inc., by AT&T, noted "anecdotal evidence that there appears to be some substitution occurring between interexchange calls from cellular units and some kinds of interexchange calls from "wireline" telephones (operated-assisted and credit card calls)." *Craig O. McCaw*, 9 FCC Rcd at 5847 n.36 (¶ 14 n.36).

63. The geographic scope of CMRS competition is less open to disagreement. Satellite-based, air-ground, and some paging services are clearly provided on a nationwide basis. The providers of the other mobile radio services mentioned above, however, offer service primarily on local or metropolitan bases, not on regional or national ones.[133]

64. Broader geographic markets have been asserted on several grounds. First, some carriers are offering "regional" service options, which give customers flat-rate calling areas as large as a whole state. At the present time, however, such plans (and customers using them) are the exception, not the rule.[134] Second, most mobile radio services are provided by large regional or national corporations, and there is case law holding that the relevant geographic market is nationwide when a service, even a local one, is provided uniformly across the nation by centrally managed companies.[135] Third, the industry and some analysts speak increasingly of customers demanding "seamless service."[136] However, this may show simply that some customers want a recognized national brand name on a product that remains essentially local. In sum, while there is evidence that regional and national markets may be emerging, it appears that the vast majority of mobile radio services are provided in local and metropolitan geographic markets under current conditions.[137]

B. Evidence of Competition

1. General Discussion

65. Although the cellular business, with two facilities-based carriers starting at approximately the same time and no known case of a cellular system ceasing operation, is more competitive than many telecommunications markets have traditionally been, it is not the model of perfect competition. The DOJ has found little competition within its "cellular only" product market.

> The Department's extensive investigations into the cellular industry . . . indicate that cellular duopolists have substantial market power . . . . The basic structural problem with cellular markets is well known -- the fact that they are and have been duopolies with (at least until very recently) absolute

[133] Each provider's local area is not the same as the others', however. In one area, a cellular carrier and an SMR, or two paging carriers, may have service areas that overlap only partially.

[134] For example, McCaw once offered toll-free calling virtually throughout Florida as one service option for its customers there; GTE Mobilnet in California offers a similar option that covers nine MSAs. *See* authority cited *supra* note 26. *See also* R. Harris & D. Rubinfeld, *An Economic Analysis of Tomcom-Primeco: The AirTouch-US West/Bell Atlantic-NYNEX Joint Venture in Wireless Communications* at 4 n.1, Univ. of Calif., Berkeley, and the Law & Econ. Consltg. Grp. Inc. (1994) ("*Harris & Rubinfeld*").

[135] *United States v. Grinnell Corp.*, 384 U.S. 563, 575-76 (1966).

[136] *See, e.g., Craig O. McCaw*, 9 FCC Rcd at 5859-60 (¶ 33); *Harris & Rubinfeld, supra* note 134, at 17 & n.12.

[137] The foregoing discussion in the text is focused on nationwide trends over time. An individual proceeding in which the Commission finds product and geographic markets, such as a certain proposed merger, may present facts pointing clearly to one or another of the alternatives discussed above as the appropriate market(s) within which to analyze the competitive effects of the merger.

> barriers to entry. While the FCC's decision to issue two cellular licenses -- rather than only one -- was motivated by a desire to stimulate competition, . . . two firm markets are not particularly competitive. The noncompetitiveness of two-firm markets is exacerbated here by the overlapping alliances of the cellular carriers, so that firms that "compete" with each other in one market are partners in another.[138]

The DOJ buttressed its conclusion with extensive quotations from documents in the Bell companies' files that showed consciousness of their own power in the marketplace.[139]

66. The DOJ's view is consistent with the 1992 finding of the United States Government Accounting Office ("GAO"). GAO stated that "the two-carrier (duopoly) market system that the FCC created may provide only limited competition in cellular telephone markets."[140] Nor has the Commission's view of cellular competition been to the contrary. In the *Second CMRS Report and Order*, the Commission found that "while competition in the provision of cellular services exists, the record does not support a conclusion that cellular services are fully competitive."[141] It is widely expected that broadband PCS will be major new competition for cellular systems. Indeed, a major reason that the Commission created all forms of PCS was to add more competition to CMRS in general.

67. With respect to other elements of CMRS, the Commission has found that all of these lack market power[142] and are competitive.[143] In particular, the Commission found that:

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[138] *Memorandum of the United States in Response to the Bell Companies' Motions for Generic Wireless Waivers* at 14-15, *United States v. Western Electric Co.*, Civ. Action No. 82-0192 (HHG), D.D.C., filed July 25, 1994 (quotation marks, citations, and punctuation omitted).

[139] *Id.* at 15-18. The Bell companies have disputed the DOJ's conclusions, claiming that "[t]here is no 'bottleneck' in wireless services" and that "[t]he cellular services market shows no signs of domination by a small group of suppliers." *Memorandum of the Bell Companies in Support of their Motion for a Modification of Section II of the Decree to Permit Them to Provide Cellular and Other Wireless Services Across LATA Boundaries*, at 6, in *United States v. Western Electric Co.*, No. 82-0192 (D.D.C. filed June 20, 1994); *Memorandum of Bell Atlantic Corp., BellSouth Corp., Nynex Corp., and Southwestern Bell Corp. in Support of their Motion to Vacate the Decree*, at 45, *United States v. Western Electric Co.*, ("*BBNS Memorandum*") No. 82-0192 (D.D.C. filed July 6, 1994). The Bell companies' principal evidence is the success in each market of the cellular company that is not affiliated with the local telephone company. The remainder of the Bell companies' evidence is the future (continued...)

[139](...continued) competition that Nextel and PCS are expected to offer. In 1994, PCS was described as "imminent." *BBNS Memorandum* at 45, 60-61.

[140] July 1992 Gen. Acct'g Off. Rep., Telecommunications: Concerns About Competition in the Cellular Telephone Service Industry, GAO/RCED-92-220 at 2 ("*GAO Report*"). GAO's analysis of limited data on prices in the cellular telephone industry showed similar pricing by the carriers in most of the major markets; but it did not yield much information about the competitiveness of the industry. GAO noted that such an analysis "would require considerable information, including revenue and cost data, for carriers' operations in each market. The FCC has not obtained these data, . . ." *Id.* at 2-3.

[141] *Second CMRS R&O*, 9 FCC Rcd at 1467 (¶ 138).

[142] *Id.*, 9 FCC Rcd at 1467 (¶ 137).

[143] *Id.*, 9 FCC Rcd at 1468 (¶ 139).

a) "the paging industry is highly competitive";[144]

b) the 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;[145] and

c) no air-ground service provider is dominant.[146]

68. With respect to CMRS (and cellular service in particular) in seven states that wished to continue regulating rates, the Commission found that the states had not shown that doing so was necessary to protect consumers from unreasonable or unreasonably discriminatory rates.[147]

69. The Commission's goal is for next year's *Report* to build on this one by providing a base-line with which to begin the evaluation of competition in the markets in which CMRS providers compete and to define those markets more specifically than the current data allow. *Reports* in future years may be able to reach more definitive conclusions about markets and degrees of competition, both within CMRS and between CMRS and other services. This *Report* will analyze data that is now available, which comes from two sources, financial analysts' reports and data submitted in various recent Commission proceedings. This data allows this *Report* to draw certain conclusions about prices, profitability and entry, three subjects that are frequently analyzed in standard competitive analyses.[148]

2. Prices of Offerings

70. The goal of promoting competition is largely an attempt to promote good value for consumers, *i.e.*, a reasonable price for the level of quality. Thus, price is an essential indicator of competitive performance. For mobile radio services, price is a complicated factor. As discussed in paragraph 22 above, cellular prices have at least three main elements. These are monthly access, per minute peak-use period, and per minute off-peak-use period charges. In addition, there may be fees for activation, termination, and roaming. In some bundled offerings, monthly access charges are combined with a certain number of "free" minutes of usage. Further, contract length may be a factor. It is also useful to know definitions such as what is the peak period and what are billing increments. Further complicating the analysis, cellular contracts often include bundled terminal equipment. In the future, cellular services may add pricing factors, such as message units aimed at data rather than at voice services. Finally, cellular service providers typically offer several pricing options, each aimed at a different type of customer.

71. Given this level of complexity, prices for mobile services can be summarized in the

144 *Id.*, 9 FCC Rcd at 1468 (¶ 140).

145 *Id.*, 9 FCC Rcd at 1468-69 (¶¶ 141-43).

146 *Id.*, 9 FCC Rcd at 1469-70 (¶ 144).

147 *See, e.g., California State Petition R&O* ¶ 141 (the "evidence does not . . . unambiguously demonstrate that market conditions fail to protect consumers adequately from unjust and unreasonable rates, or from unjustly and unreasonably discriminatory rates"), *applying* 47 U.S.C. § 332(c)(3)(A)(i).

148 *See, e.g., Implementation of Section 19 of the Cable Television Consumer Protection and Competition Act of 1992 - Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming, First Report*, 9 FCC Rcd 7442 (¶¶ 201-46) (1994).

form of price indices. This is a common practice.[149] For example, a price index might consist of the best (lowest) available monthly price for 160 peak period and 40 off-peak period minutes. This number would be calculated using the monthly charge, number of free minutes and per minute charges for each price offering. The index would be the lowest such cost. Several indices can be developed for different numbers of minutes.

72. The Commission does have some price data from PR Docket No. 94-105, which concerns the rate regulation of certain CMRS services in the State of California. In that proceeding, the California Public Utilities Commission ("CPUC") submitted price and cost data that it had gathered from eleven carriers over a five year period (1989-1993) and from three more carriers over the last four of those years.[150] Using this data, the Commission developed weighted best price indices for 60, 120 and 480 minutes per month. Similarly, a weighted cost index was developed, using confidential data on the actual number of subscribers in 1991 as weights. Thus, two sets of aggregations were created, a four-year fourteen-carrier version and a five-year eleven-carrier version. These aggregations are displayed in Tables 3 through 6 hereto.[151]

73. In addition to the data provided by the CPUC, several commenters in PR Docket No. 94-105 submitted their own price data. Table 7 contains data submitted by AirTouch Communications to show how prices vary from market to market.[152] Table 8 contains data submitted by AirTouch and BellSouth on cellular prices in Los Angeles.

74. The two main findings to be derived from these data are that prices vary significantly across markets and that they are falling. The aggregations indicate that, at least in California, depending on the number of minutes used, cellular prices fell approximately ten to fifteen percent between December 1989 and December 1993. This shows lower costs being passed on to consumers. Some consultants and observers in the news media assert that more recent price decreases can be attributed to the impact of impending competition from PCS.[153]

75. The Commission is also interested in comparing wireless telephone service prices to wireline prices. There is 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.[154] The numbers in Tables 3-8 indicate a significant premium for mobile service today as compared to wireline service. It therefore appears that wireless telephone service prices will have to fall well over fifty percent (or that wireline prices will have to rise to meet them) for wireless service to be fully price-

[149] *See, e.g.*, William B. Shew, *Regulation, Competition, and Prices in Cellular Telephony*, Am. Entrpr. Inst. for Pub. Pol'y Res. Working Paper, at 49-50 (1994).

[150] *See Petition of the People of the State of California and the California Public Utilities Commission of the State of California to Retain Regulatory Authority Over Intrastate Cellular Service Rates*, PR Docket No. 94-105, at Apps. H and J, filed Aug. 8, 1994.

[151] Individual companies' confidential data are aggregated in the Tables and, therefore, are not revealed.

[152] This data was associated with an affidavit by Prof. Jerry A. Hausman.

[153] *See* authorities cited *supra* in note 33.

[154] *Accord, Harris & Rubinfeld, supra* note 134 at 13-14.

competitive with traditional wireline telephone service.[155]

3. Profitability

76. The operating profits of a firm are an important indicator of competition for two reasons. First, high profits are generally a sign of high prices (relative to cost). Second, economic theory predicts that high rates of return will induce additional investment, including additional entry, in the absence of barriers to entry.

77. There are two complementary indicators used to determine whether profits in excess of economic costs ("economic rents") exist, economic rates of return and accounting rates of return. Economic rate of return measures the return to an investment, in a particular asset or for a company, over its full life. Accounting rate of return is generally at the company level and measures the return in a specific year.[156] Economic rates of return are preferable; accounting rates of return, however, are often easier to obtain, and are generally correlated with economic rates of return.[157]

78. In analyzing profits in parts of the CMRS industry such as cellular, paging and SMRs, the appropriate standard is for a growth industry, rather than for a mature industry. There are at least three important differences between growth and mature industries. First, growth industries tend to have higher profits.[158] Second, growth industries need cash from high profits to fund investment in additional plant and equipment.[159] Third, the profits of growth industries typically follow a pattern in which firms incur start-up losses, followed by rising profitability, which is followed by declining profitability as entry by newcomers becomes relatively imminent, and a further decline when such entry finally occurs.[160] Viewed through this paradigm, at this stage in its development, higher than average operating profits may reflect where

[155] Even if the prices were comparable, the limited capacity of wireless networks might constrain the competitive threat they could pose to wireline service. It may be that so much traffic is carried on the wireline network that it will be many years before wireless companies could divert more than a small percentage of total wireline usage, even if wireless service is priced competitively and wireless networks are fully "digitized." *See* Merrill Lynch & Co., Global Securities Research & Economics Group, *Wireless in the United States: Making Inroads*, at 2 (even if wireless rates fell by two-thirds in the ten years after 1994, their rates would still be three times higher than for existing wireline services) (July 25, 1994). For a more optimistic analysis of the ability of wireless networks to divert significant capacity from wireline ones, see Robert G. Harris, Gregory L. Rosston, and David J. Teece, *Competition in Local Telecommunications: Implications of Unbundling for Antitrust Policy*, paper presented to the Telecommunications Policy Research Conference, at 8-15 (Oct. 3, 1994).

[156] These two indicators also differ somewhat in their treatment of certain costs.

[157] *See* Franklin M. Fisher and John J. McGowan, *Firm Interdependence in Oligopolistic Markets*, 73 AM. ECON. REV. 82 (1983); William F. Long and David Ravenscraft, *Misuses of Accounting* Rates *of Return: Comment*, 74 AM. ECON. REV. 494 (1984); Stephen Martin, *Misuses of Accounting Rates of Return: Comment*, 74 AM. ECON. REV. 501 (1984).

[158] David Ravenscraft, *Structure-Profit Relationships at the Line of Business and Industry Level*, REV. OF ECON. AND STATS., at 22-31 (Feb. 1993).

[159] JEFFREY K. MACKIE-MASON, *Do Firms Care Who Provides Their Financing?*, in Asymmetric Information, Corporate Finance, and Investment (R. Glenn Hubbard ed., 1990), at 63-103.

[160] SHARON M. OSTER, *Modern Competitive Analysis* 9-12 (Oxford University Press, 2d ed. 1994).

these elements of CMRS are on the growth curve, without necessarily implying the existence of supra-competitive returns and market power.

79. Currently, there is available evidence on accounting rates of return from two types of sources. First, three states included detailed information in their petitions to continue rate regulation of certain CMRS providers. Table 9 contains after-tax rates of return for twenty-three cellular carriers between 1989 and 1993 as reported to the CPUC.[161] The base is net plant and equipment. Interest expenses are excluded. Table 10 contains after-tax, pre-interest rates of return on the regulated portion of five cellular carriers (one, GTE, is present in four markets) as reported by the Hawaii Public Utilities Commission. Table 11 contains ranges and averages of return on common equity as reported by the New York State Public Service Commission.

80. Second, a number of stock analysts publish reports that include financial data about "wireless companies," a category including many providers discussed in this *Report*. Table 12 shows the operating cash flow margins of several companies for fourteen quarters as reported by Merrill Lynch. Table 13 shows returns on revenues, assets and equity as reported by Standard and Poor's.

81. In general, Tables 9 through 13 show contradictory results, which indicates a rather heterogenous industry. Many firms, especially ones serving large metropolitan areas, are earning economic rents of significant proportions. At the same time, some providers in those same markets fare quite poorly. More broadly, no cellular system is known to have ceased operations. This indicates a business worth being in, *i.e.*, a profitable business. On the other hand, the Commission is unaware of any "stand-alone" cellular company that has paid a dividend, which indicates that any profits are being re-invested for growth and that the industry has not yet achieved stability.

4. Entry

82. The possibility of entry by new competitors is widely recognized as a constraint on monopolistic conduct (high prices, low quality, failure to innovate) by incumbent providers.[162] Previous Sections of this *Report* discuss the possible emergence of interconnected SMRs as competitors for cellular in two-way mobile telephone service. In addition, the first competition from broadband PCS is almost certain to take the form of mobile telephone service. The *GAO Report* noted that PCS, if it were not dominated in each market by the existing cellular providers there, "would seem to serve the public interest by providing additional competition and potentially lower prices for consumers."[163] Estimates of the eventual downward impact of broadband PCS entry on cellular prices range as high as forty percent in the next two years.[164] Due to the flexibility of the Commission's definition of PCS, the broadband licensees will also be able to follow whatever incentives the market gives them to compete in other areas, such as dispatch, paging, and combinations of the service categories discussed in this *Report*. Narrowband PCS, with its advanced messaging services, is likely to increase the present degree of competition between cellular service and paging

[161] Tbl. 9 contains average rates of return for the State as a whole. To calculate these, two regressions were used, both shown in Tbl. 14.

[162] *See, e.g., United States v. Waste Management, Inc.*, 743 F.2d 976, 982-83 (2d Cir. 1984). *See also* American Bar Association, *I Antitrust Law Developments* 307-11, and cases cited therein (Third ed. 1992); and *California State Petition R&O* at ¶ 32 & nn.85-86.

[163] *GAO Report, supra* note 140, at 4.

[164] *See, e.g.*, authority cited *supra* note 38; COMM. DAILY, Apr. 24, 1995.

service. Unlicensed PCS and, somewhat further in the future, satellite-based systems will also create more potential for competition in CMRS.

83. Finally, the federal government is in the process of re-allocating 200 MHz from government use to private sector uses.[165] The Commission has allocated the first fifty of those MHz, including allocations of twenty-five MHz for unspecified fixed and mobile radio services.[166] The Commission has proposed that the latter allocation be for a General Wireless Communications Service, which may be CMRS.[167] This type of flexible allocation attempts to allow the free market to determine the best use of spectrum. Thus, the Commission expects long term allocations to permit relatively free entry into and exit from any segment of CMRS, placing further competitive pressures on existing CMRS providers.

5. Conclusions

84. The evidence described in the preceding paragraphs points to several findings and conclusions, which are consistent with those in the preceding Section of this *Report*. While the mobile telephone service segment of the CMRS business is not fully competitive, it generally appears that such economic rents as are being earned are being re-invested to continue the growth of a service that consumers clearly want. Entry by several new layers of competition for all existing providers is certain, and more such entry is feasible in the following years. The rise of competitive forces is now being achieved largely by the private sector. It has been made possible, however, by the Commission's deliberate dismantling of an old regulatory structure, which emphasized service classifications, and the creation of a new structure whose hallmark is flexibility, with regulation focused on protecting consumers by stimulating competitive forces.

IV. ADMINISTRATIVE MATTERS

85. Consistent with the requirement that the Commission annually report to Congress on the status of competition, the Commission plans to submit future *Reports* to Congress by June 30th of each year.

86. 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).

87. It is ORDERED that the 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

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[165] Budget Act, § 113(b), (e)(2)(A).

[166] *See Government Re-Allocation*, cited *supra* note 101.

[167] Another service that might be used in the future for CMRS is Local Multipoint Distribution Service, which is now proposed principally for fixed broadband video, telecommunications, and data communications. *See generally, Rulemaking to Amend Part 1 and Part 21 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band and to Establish Rules and Policies for Local Multipoint Distribution Service, Notice of Proposed Rulemaking, Order, Tentative Decision and Order on Reconsideration*, 8 FCC Rcd 557, 561 & n.10 (¶ 26 & n.10) (1993); and *Second Notice of Proposed Rulemaking*, 9 FCC Rcd 1394 (1994).

TABLES

Table 1
Cellular Growth

Year	Subscribers at Year End	% Subscriber Growth	Revenues	% Revenue Growth
1984	91,600		$178,085,000*	
1985	340,213	271.41%	$482,428,000	170.90%
1986	681,825	100.41%	$823,052,000	70.61%
1987	1,230,855	80.52%	$1,151,519,000	39.91%
1988	2,069,441	68.13%	$1,959,548,000	70.17%
1989	3,508,944	69.56%	$3,340,595,000	70.48%
1990	5,283,055	50.56%	$4,548,820,000	36.17%
1991	7,557,148	43.05%	$5,708,522,000	25.49%
1992	11,032,753	45.99%	$7,822,726,000	37.04%
1993	16,009,461	45.11%	$10,892,165,000	39.24%
1994	24,134,421	50.75%	$14,229,921,000	30.64%

* Six month revenues.

Source: Cellular Telecommunications Industry Association, *1994 Wireless Industry Survey Results: "American Success Story" Continues* (1995).

Table 2
Licensees for Broadband PCS Blocks A and B

Market	Block	Licensee	Population (millions)	Bid ($millions)
New York	B	WirelessCo, LP	26.4	443
Los Angeles-San Diego	B	Pacific Telesis	19.1	494
Chicago	A	AT&T Wireless PCS	12.0	373
Chicago	B	PCS PRIMECO	12.0	385
San Francisco-Oakland-San Jose	A	WirelessCo, LP	11.9	207
San Francisco-Oakland-San Jose	B	Pacific Telesis	11.9	202
Detroit	A	AT&T Wireless PCS	10.0	81
Detroit	B	WirelessCo, LP	10.0	86
Charlotte-Greensboro-Greenville-Raleigh	A	AT&T Wireless PCS	9.8	67
Charlotte-Greensboro-Greenville-Raleigh	B	BellSouth	9.8	71
Dallas-Ft. Worth	A	PCS PRIMECO	9.7	88
Dallas-Ft. Worth	B	WirelessCo, LP	9.7	88
Boston-Providence	A	AT&T Wireless PCS	9.5	122
Boston-Providence	B	WirelessCo, LP	9.5	127
Philadelphia	A	AT&T Wireless PCS	8.9	81
Philadelphia	B	PhillieCo	8.9	85
Washington-Baltimore	B	AT&T Wireless PCS	7.8	212
Atlanta	A	AT&T Wireless PCS	6.9	198
Atlanta	B	GTE Macro	6.9	185
Minneapolis-St. Paul	A	WirelessCo, LP	6.0	40
Minneapolis-St. Paul	B	APT	6.0	37
Tampa-St. Petersburg-Orlando	A	APT	5.4	90
Tampa-St. Petersburg-Orlando	B	PCS PRIMECO	5.4	99
Houston	A	APT	5.2	84
Houston	B	PCS PRIMECO	5.2	83
Miami-Fort Lauderdale	A	WirelessCo, LP	5.1	132
Miami-Fort Lauderdale	B	PCS PRIMECO	5.1	126

Table 2
(continued)

Market	Block	Licensee	Population (millions)	Bid ($millions)
Cleveland	A	Ameritech	4.9	87
Cleveland	B	AT&T Wireless PCS	4.9	86
New Orleans-Baton Rouge	A	WirelessCo, LP	4.9	94
New Orleans-Baton Rouge	B	PCS PRIMECO	4.9	89
Cincinnati-Dayton	A	AT&T Wireless PCS	4.7	42
Cincinnati-Dayton	B	GTE Macro	4.7	43
St. Louis	A	AT&T Wireless PCS	4.7	119
St. Louis	B	WirelessCo, LP	4.7	114
Milwaukee	A	WirelessCo, LP	4.5	85
Milwaukee	B	PCS PRIMECO	4.5	86
Pittsburgh	A	WirelessCo, LP	4.1	29
Pittsburgh	B	APT	4.1	32
Denver	A	WirelessCo, LP	3.9	64
Denver	B	GTE Macro	3.9	65
Richmond-Norfolk	A	AT&T Wireless PCS	3.8	34
Richmond-Norfolk	B	PCS PRIMECO	3.8	33
Seattle (Excluding Alaska)	A	GTE Macro	3.8	106
Seattle (Excluding Alaska)	B	WirelessCo, LP	3.8	105
Puerto Rico-U.S. Virgin Islands	A	AT&T Wireless PCS	3.6	57
Puerto Rico-U.S. Virgin Islands	B	Centennial Cellular	3.6	55
Louisville-Lexington-Evansville	A	AT&T Wireless PCS	3.6	49
Louisville-Lexington-Evansville	B	WirelessCo, LP	3.6	47
Phoenix	A	AT&T Wireless PCS	3.5	78
Phoenix	B	WirelessCo, LP	3.5	76
Memphis-Jackson	A	Powertel PCS	3.5	43
Memphis-Jackson	B	Southwestern Bell	3.5	43
Birmingham	A	WirelessCo, LP	3.2	36
Birmingham	B	Powertel PCS	3.2	35

Table 2
(continued)

Market	Block	Licensee	Population (millions)	Bid ($millions)
Portland	A	Western PCS	3.1	34
Portland	B	WirelessCo, LP	3.1	34
Indianapolis	A	WirelessCo, LP	3.0	70
Indianapolis	B	Ameritech	3.0	71
Des Moines-Quad Cities	A	Western PCS	3.0	22
Des Moines-Quad Cities	B	WirelessCo, LP	3.0	21
San Antonio	A	WirelessCo, LP	3.0	54
San Antonio	B	PCS PRIMECO	3.0	52
Kansas City	A	WirelessCo, LP	2.9	24
Kansas City	B	APT	2.9	24
Buffalo-Rochester	A	WirelessCo, LP	2.8	19
Buffalo-Rochester	B	AT&T Wireless PCS	2.8	20
Salt Lake City	A	Western PCS	2.6	46
Salt Lake City	B	WirelessCo, LP	2.6	46
Jacksonville	A	Powertel PCS	2.3	46
Jacksonville	B	PCS PRIMECO	2.3	45
Columbus	A	AT&T Wireless PCS	2.1	22
Columbus	B	APT	2.1	22
El Paso-Albuquerque	A	Western PCS	2.1	9
El Paso-Albuquerque	B	AT&T Wireless PCS	2.1	9
Little Rock	A	Southwestern Bell	2.1	13
Little Rock	B	WirelessCo, LP	2.1	12
Oklahoma City	A	Western PCS	1.9	11
Oklahoma City	B	WirelessCo, LP	1.9	13
Spokane-Billings	A	Poka Lambro	1.9	6
Spokane-Billings	B	WirelessCo, LP	1.9	6

Table 2
(continued)

Market	Block	Licensee	Population (millions)	Bid ($millions)
Nashville	A	WirelessCo, LP	1.8	16
Nashville	B	AT&T Wireless PCS	1.8	16
Knoxville	A	AT&T Wireless PCS	1.7	11
Knoxville	B	BellSouth	1.7	11
Omaha	A	AT&T Wireless PCS	1.7	5
Omaha	B	Cox Cable	1.7	5
Wichita	A	AT&T Wireless PCS	1.1	4
Wichita	B	WirelessCo, LP	1.1	5
Honolulu	A	Western PCS	1.1	22
Honolulu	B	PCS PRIMECO	1.1	22
Tulsa	A	Southwestern Bell	1.1	18
Tulsa	B	WirelessCo, LP	1.1	17
Alaska	A	APT	.6	1
Alaska	B	GCI Communication	.6	2
Guam-Northern Mariana Islands	A	Poka Lambro	.2	.1
Guam-Northern Mariana Islands	B	APT	.2	.1
American Samoa	A	South Seas Satellite	.05	.2
American Samoa	B	Communications Intl	.05	.2

Table 2
(continued)

Pioneer's Preference Holders				
Market	**Block**	**Pioneer**	**Population (Millions)**	**Required Payment ($Millions)**
New York	A	Omnipoint Corp.	26.4	347
Los Angeles	A	Cox Communications	19.1	251
Washington-Baltimore	A	American Personal	7.7	102

Notes: PCS PRIMECO is a joint venture of Nynex, Bell Atlantic, AirTouch and US West.
WirelessCo is a joint venture of Sprint and the cable television system operators Comcast, Cox, and TCI.

Source: *FCC Auction, December 5, 1994, Broadband Personal Communications Services, Major Trading Area Licenses Frequency Blocks A & B, Bidder's Information Package; Public Notice, Auctions*, FCC (Mar. 13, 1995).

Table 3*
California 14 Carrier Monthly "Best Price" Indices

Year	1990	1991	1992	1993
Best Price				
60	$63.03	$63.03	$62.95	$58.48
120	$85.09	$84.95	$84.87	$76.93
480	$219.42	$218.05	$216.76	$191.06

Table 4*
California 11 Carrier Monthly "Best Price" Indices

Year	1989	1990	1991	1992	1993
Best Price					
60	$64.72	$63.12	$63.12	$63.10	$58.60
120	$87.89	$85.19	$85.06	$85.04	$77.05
480	$226.64	$219.67	$218.29	$217.17	$191.31

Table 5*
California 14 Carrier Annual Operating Expense Indices

Year	1990	1991	1992	1993
Annual Per Subscriber Operating Expense	$701.53	$699.51	$662.11	$589.63

Table 6*
California 11 Carrier Annual Operating Expense Indices

Year	1989	1990	1991	1992	1993
Annual Per Subscriber Operating Expense	$685.43	$669.79	$680.01	$654.76	$586.10

*Source: *Petition of the People of the State of California and the Public Utilities Commission of the State of California to Retain Regulatory Authority Over Intrastate Cellular Service Rates, Report & Order,* PR Docket No. 94-105, (FCC 95-195) (May 19, 1995), App. B at 2-3 ("*California State Petition R&O*"), *reconsideration denied, Order on Reconsideration* (FCC 95-345) (Aug. 9, 1995). Averages are weighted by number of subscribers in 1991. Prices assume eighty percent of minutes are peak-use minutes.

Table 7
Los Angeles "Best Prices"

	Single User			Best Volume Discount Price		
	60 minutes	120 minutes	480 minutes	60 minutes	120 minutes	480 minutes
12/31/93	69.84	85.08	201.60	56.86	75.96	198.72
12/31/94	56.39	85.08	201.60	56.86	75.96	198.72
2/28/95	56.39	84.03	200.72	49.49	69.98	185.90

The technique used to develop this table is similar to that used by the State of California and the cellular carriers commenting on California's petition to continue rate regulation of cellular carriers. These are best available prices for a new user on the given day. The best price is not necessarily the same for both carriers. The price shown is the best available from some carrier for a new customer. This table shows that prices have fallen since the data provided by California. For example, the best price for sixty minutes fell nineteen percent between December 31, 1993, and December 31, 1994. This was due to a new rate plan and a temporary promotional plan that was available for the first few months the new rate plan was available.

Sources: *California State Petition R&O*, App. B at 4, and *ex parte* presentations of AirTouch (Mar. 17, 1995) and BellSouth (Mar. 23, 1995).

Table 8
Cellular Prices for 160 Minutes in 29 Top Markets

MSA	Population	1985 Price	1994 Price	% Change
Los Angeles	13,862,513	$111.24	$99.99	-10.11
New York	13,698,478	$104.00	$110.77	6.51
Chicago	7,261,176	$70.10	$58.82	-16.09
Philadelphia	4,856,881	$97.60	$80.98	-17.03
Boston	4,029,662	$84.02	$82.16	-2.21
Dallas	3,949,075	$90.68	$59.78	-34.08
San Francisco	3,686,592	$109.00	$99.47	-8.74
Washington, DC	3,660,758	$78.94	$76.89	-2.60
Houston	3,493,644	$91.32	$80.33	-12.03
Miami	3,192,582	$114.00	$94.76	-16.88
Atlanta	2,695,480	$110.80	$86.73	-21.72
San Diego	2,498,016	$93.88	$83.85	-10.68
Minneapolis	2,438,203	$102.83	$75.98	-26.11
St. Louis	2,423,560	$80.74	$67.97	-15.82
Baltimore	2,348,219	$77.74	$76.89	-1.09
Detroit	2,265,818	$57.22	$66.76	16.67
Phoenix	2,122,101	$108.27	$79.52	-26.55
Pittsburgh	2,097,447	$103.14	$69.87	-32.26
Seattle	1,972,961	$108.27	$83.06	-23.28
Tampa	1,966,844	$91.32	$87.95	-3.69
Denver	1,851,389	$108.27	$73.74	-31.89
Cleveland	1,831,122	$88.74	$79.11	-10.85
San Jose	1,497,577	$109.00	$99.47	-8.74
Portland	1,457,344	$89.49	$66.36	-25.85
Kansas City	1,447,336	$76.16	$75.37	-1.04
Milwaukee	1,432,149	$71.59	$57.04	-20.32
Sacramento	1,355,107	$56.80	$61.36	8.03
San Antonio	1,302,099	$85.68	$59.97	-30.01
Cincinnati	726,322	$74.40	$65.67	-11.73

Price is best available package for 160 minutes (eighty percent peak).
Sources: *Ex parte* presentation of Prof. Jerry Hausman for AirTouch, PR Docket 94-105 (Mar. 9, 1995); and Cellular Telecommunications Industry Association, *The Wireless Marketbook.*

Table 9
Average After Tax Rates of Return on Cellular (in %) in California on Net Plant and Equipment

Company	Starting Date	Population	1989	1990	1991	1992	1993
Bakersfield Cellular	3/88	543,477					61.5
Bay Area Cellular	9/86	5,184,169	43.7	48.1	43.5	31.1	49.5
Cagal Cellular	1/89	388,222		1.2	17.6	17.0	35.8
California 2 Cellular	8/91	57,015			-49.0	-55.0	
Contel Cellular of CA (RSA # 7)	10/90	109,303		-32.2	-19.5	6.0	35.4
Fresno Cellular	10/87	979,411	-19.6	11.9	24.0	31.3	25.7
Fresno MSA LP	4/86	1,624,357		8.0	7.6	11.2	10.7
GTE Mobilnet of California	3/85	6,826,133	22.8	15.8	16.4	20.0	18.1
GTE Mobilnet of Santa Barbara	11/87	369,608	2.6	2.0	8.5	6.7	7.5
Los Angeles Cellular	12/86	13,862,513	71.4	58.5	52.4	51.6	47.0
LA SMSA LP	6/84	14,531,529	49.4	43.3	34.8	28.0	33.8
McCaw Communications of Stockton	12/87	857,150		31.4	27.0	26.0	32.2
Modoc RSA LP	10/90	57,015		-15.0	-24.4	-19.2	-6.2
Napa Cellular	4/88	451,186		7.4	19.5	32.7	32.5
PacTel Cellular	8/85	2,498,016	33.0	32.9	23.9	21.4	30.4
Redding Cellular	3/89	237,734					3.1
Sacramento Cellular	10/87	1,477,750	-2.9	21.4	22.1	22.2	17.4
Sacramento Valley LP	7/85	2,836,582	17.6	10.1	2.8	0.8	6.4
Salinas Cellular	3/89	355,660		-21.6	-8.3	5.2	7.2
Santa Barbara Cellular	12/87	369,608	-39.4	-10.4	-9.7	5.0	10.5
Santa Cruz	1/89	229,734			-2.7	9.5	14.0
US West Cellular	4/86	2,498,016	5.2	9.0	-4.3	-7.4	2.9
Ventura Cellular	7/87	669,016		39.3	27.1	21.5	24.5
Weighted Sum			34.4	33.2	28.7	26.7	30.2

Weighted sum is by gross investment. Regressions 1 and 2 in Table 14 were used to provide estimates for the missing markets.

Source: Cellular Communications Licensees (Wholesalers) Annual Reports to the Public Utilities Commission, State of California, for the Years 1989, 1990, 1993; *California State Petition R&O*, App. B at 1.

Table 10
Hawaii After-Tax Rates of Return

Company-Market	1989	1990	1991	1992	1993
GTE Mobilnet, Inc. - Hilo	NA	NA	5.10%	-10.06%	-12.20%
GTE Mobilnet, Inc. - Maui	NA	NA	22.82%	1.01%	3.93%
GTE Mobilnet, Inc. - Oahu	NA	NA	-18.40%	-2.25%	8.55%
GTE Mobilnet, Inc. - Kauai	NA	NA	6.87%	-8.78%	-4.79%
USCOC of Hawaii 3, Inc - Island of Hawaii	NA	NA	-22.76%	-4.20%	2.59%
Maui Cellular Telephone Co. - Maui	NA	NA	NA	NA	-10.11%
Honolulu Cellular Company - Oahu	8.95%	12.53%	24.14%	43.12%	43.73%
Cybertel Cellular - Kauai	NA	NA	-28.66%	5.45%	36.97%
Average After-Tax (Weighted By Average Net Plant and Equipment)				14.15%	19.64%

Sources: *Petition on Behalf of the State of Hawaii, Public Utility Commission, for Authority to Extend Its Rate Regulation of Commercial Mobile Radio Services in the State of Hawaii, Report & Order*, PR Docket No. 94-103, (FCC 95-194) at App. B at 1 (May 19, 1995). Hawaii provided pre-tax rates of return. The average net plant is average over full year. The effective tax-rate used for this table is 38.22% (34% Federal, 6.4% State).

Table 11
New York State Return on Common Equity

Year	Low	High	Average
1991	-42%	142%	47%
1992	-118%	85%	39%
1993 (est.)	0%	79%	38%

Source: *Petition to Extend Rate Regulation*, New York State Public Service Commission, PR Docket No. 94-108, at 8-9 (filed Aug. 8, 1994).

Table 12
Selected Company Operating Cash Flow Margins

Cash Flow Margin	Q1 91	Q2 91	Q3 91	Q4 91	Q1 92	Q2 92	Q3 92	Q4 92	Q1 93	Q2 93	Q3 93	Q4 93	Q1 94	Q2 94
BellSouth	31.4%	30.4%	31.7%	27.5%	40.5%	43.6%	42.3%	39.4%	41.4%	42.8%	41.3%	42.5%	42.8%	44.6%
Cellular Comm.	39.9%	45.3%	41.6%	37.2%	39.4%	44.5%	44.6%	41.8%	44.3%	48.9%	44.3%	40.9%	40.6%	46.0%
Cellular Comm. of PR		-624%	-113%	-93.0%	-49.6%	-20.8%	-29.6%	-30.4%	-38.4%	-19.6%	-14.1%	3.4%	17.0%	27.2%
CommNet Inc.	-277%	-102%	-145%	-79.1%	-91.9%	-40.5%	-13.5%	-20.9%	-22.6%	12.9%	21.3%	13.2%	8.6%	26.0%
Centennial Cellular	8.8%	21.6%	16.5%	20.0%	14.7%	32.5%	37.0%	35.5%	35.1%	47.8%	45.4%	41.3%	42.3%	49.0%
Century Telephone	-15.8%	5.5%	13.0%	16.7%	15.4%	22.3%	32.6%	23.9%	26.7%	30.2%	30.9%	13.9%	32.1%	34.3%
Contel Cellular	6.5%	21.7%	20.9%	9.4%	15.2%	19.4%	21.8%	12.9%	22.2%	30.4%	29.7%	11.2%	24.4%	32.5%
GTE Mobilnet	20.6%	29.0%	29.0%	20.7%	24.7%	22.6%	34.2%	27.5%	30.2%	35.0%	36.1%	20.2%	31.0%	35.9%
LIN Broadcasting	47.2%	49.6%	48.9%	44.6%	44.5%	49.1%	51.2%	46.9%	47.7%	48.8%	49.2%	43.6%	38.1%	44.6%
McCaw Cellular	38.2%	42.0%	42.0%	39.1%	40.9%	45.8%	46.8%	43.8%	45.1%	46.9%	47.7%	40.6%	40.9%	41.5%
McCaw Cellular Only	35.0%	39.3%	39.7%	37.1%	39.6%	44.6%	45.4%	42.9%	44.2%	46.3%	47.2%	39.7%	41.8%	40.5%
Nynex	26.1%	33.1%	31.2%	24.4%	29.1%	41.3%	36.0%	36.0%	31.0%	32.7%	32.2%	-25.7%	20.7%	19.0%
AirTouch	44.9%	43.3%	41.8%	40.0%	44.5%	38.3%	40.1%	37.2%	40.9%	44.9%	46.4%	38.7%	46.1%	46.9%
Sprint	9.3%	15.7%	16.5%	11.5%	11.3%	17.9%	18.0%	20.2%	23.2%	25.2%	17.2%	24.5%	24.5%	27.5%
US Cellular									16.1%	23.3%	20.9%	16.1%	21.6%	27.4%
Vanguard Cellular	-4.0%	2.2%	14.1%	12.3%	9.8%	22.0%	22.5%	20.4%	22.6%	27%	31.1%	20.7%	22.5%	27.5%

Source: Merrill Lynch, *United States: Telecommunications/Cellular*, Table 7 (1994).

Table 13
Rates of Return After Taxes and Interest Payments

	Return on Revenues (%)					Return on Assets (%)					Return on Equity (%)				
Wireless Service Company	1989	1990	1991	1992	1993	1989	1990	1991	1992	1993	1989	1990	1991	1992	1993
Airtouch Communications Inc.	NA	NA	NA	NM	3.8	NA	NA	NA	NM	1.2	NA	NA	NA	NM	3.8
Lin Broadcasting	22.9	NM	NM	NM	NM	9.1	NM	NM	NM	NM	12.5	NM	NM	NM	NM
McCaw Cellular Communications	NM	35.8	NM	NM	NM	NM	6.3	NM	NM	NM	NM	23.0	NM	NM	NM
Mobile Telecommunications Tech	NM	NM	NM	NM	12.9	NM	NM	NM	NM	5.8	NM	NM	NM	NM	9.0
Nextel Communications	NA	NM	NM	NM	NA	NA	NM	NM	NM	NA	NA	NM	NM	NM	NA
US Cellular Corp	NM	NM	NM	3.8	NM	NM	NM	NM	0.8	NM	NM	NM	NM	1.5	NM
Vanguard Cellular Sys.	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM

Source: Standard and Poor's, *Industry Surveys:Telecommunications, Basic Analysis* (1994); *see also California State Petition R&O*, App. B at 7.

Table 14

Technical Appendix

To obtain an estimate for the rate of return for the whole State of California, we used the following two regressions to estimate rate of return and gross plant:

Regression No. 1

Dependent Variable is Ln (GROSS PLANT)

	Coefficient	Std. Error	T-Statistic	Prob.
Constant	0.379602	1.642788	0.231072	0.8178
Ln (YEAR-1983)	1.553820	0.474709	3.273203	0.0015
Ln (POPS)	0.957653	0.059366	16.13130	0.0000
RSA	-0.819740	0.231829	-3.535974	0.0006
Ln (Age)	-0.359661	0.296603	-1.212601	0.2284
Ln (Age)2	0.089599	0.067273	1.331876	0.1862
Wireline	-0.142455	0.096554	-1.475390	0.1436

Observations:	98
R-squared	0.963382
Adjusted R-squared	0.960967

Regression No. 2

Dependent Variable is Ln (Rate Of Return+100)

	Coefficient	Std. Error	T-Statistic	Prob.
Constant	0.962987	0.613016	1.570900	0.1196
Ln (Pops)	0.162373	0.023126	7.021266	0.0000
Wireline	0.039833	0.028285	1.408258	0.1624
Min (0,Age-48)	-0.010266	0.001800	-5.703254	0.0000
Max (0,48-Age)	-0.000992	0.001927	-0.514704	0.6080
ln (High Income)	0.045439	0.052989	0.857512	0.3933
ln (Year - 1983)	0.821929	0.149831	5.485705	0.0000

Observations:	101
R-squared	0.639238
Adjusted R-squared	0.616210

"Age" is the number of months since construction of the system. "Pops" is the population based on the 1990 census. "High Income" is the percent of households with income greater than $50,000 in 1991. Sources: *California State Petition R&O*, App. B at 14; 1992 Survey of Buying Power Demographic USA, 1990 US Census and Cellular Communications Licensees (Wholesalers) Annual Reports to the Public Utilities Commission, State of California.