THIRD ANNUAL CMRS COMPETITION REPORT

Federal Communications Commission

FCC 98-91

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC

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	)

THIRD REPORT

Adopted: May 14, 1998 **Released: June 11, 1998**

By the Commission; Chairman Kennard issuing a separate statement

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I. INTRODUCTION

A. Overview

Congress created the statutory classification of Commercial Mobile Radio Services ("CMRS") in 1993 to promote the consistent regulation of mobile radio services that are similar in nature.[1] At the same time, Congress established the promotion of competition as a fundamental goal for CMRS policy formation and regulation. As a measure of progress toward this goal, Congress required the Federal Communications Commission ("the Commission") to submit annual reports that analyze competitive conditions in the industry.[2] This report is the third of the Commission's annual reports on the state of CMRS competition.

The first two annual reports observed that the convergence of previously disparate wireless services has been an important trend in the CMRS industry.[3] Operators of one service are competing for customers of other types of services with increased frequency. As a result, this report bases its analysis on a consumer-oriented view of wireless services by looking at specific product categories, regardless of their regulatory classification. In some cases this includes offerings outside the umbrella of "services" specifically designated by the Commission as CMRS.[4] However, because licensees in these other spectrum-based services tend to compete with CMRS providers as well as other providers of telecommunications services, it is important to consider them in the analysis.

This report focuses on three established wireless services that are most often associated with CMRS: mobile telephony, paging/messaging, and dispatch. The report also discusses a new service that has recently emerged as an important new wireless telecommunications product,

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[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. § 332(c)(1)(C) ("*1993 Budget Act*").

[2] The Commission is required to review competitive market conditions with respect to commercial mobile services and shall include in its annual report an analysis of those conditions. Such analysis shall include an identification of the number of competitors in various commercial mobile services, an analysis of whether or not there is effective competition, an analysis of whether any such competitors have dominant share of the market for such services, and a statement of whether additional providers of classes or providers in those services would be likely to enhance competition. *1993 Budget Act* codified at 47 U.S.C. § 332(c)(1)(C).

[3] *See* Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, *First Repor*t, 10 FCC Rcd 8844 (1995) ("*First Report*"); Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, *Second Report*, 12 FCC Rcd 11266 (1997) ("*Second Report*").

[4] For example, Metricom, Inc. operates it network on spectrum designated for public use. *See* Section III.C.2.c.

mobile data. These four services are not as clearly delineated as their names would imply. For example, mobile telephone operators are offering paging services and dispatch operators are offering mobile telephone services. Therefore, while these product categories are used to provide structure for this report, the Commission's view of operators is not limited by the categories in which this report places them.

B. Status of Competition

In the year since the release of the *Second Report*, competition in a number of segments of the CMRS industry has grown more than it has ever before. While this positive development is still in its early stages, the signs of competition are clear. During the year, the mobile telephone market experienced a number of service launches by broadband Personal Communications Services ("broadband PCS") and digital Specialized Mobile Radio ("SMR") operators. Consequently, substantial progress has been made towards a truly competitive mobile telephone marketplace. While the paging/messaging market has been highly competitive for a number of years, the past year has seen paging carriers begin to face competition from other wireless sectors, most notably the mobile telephone sector. Other markets, such as the dispatch and mobile data markets, are restructuring or are in a developmental stage, so that a definitive statement as to their competitive status is not possible in this report.

C. Industry Development

The domestic and global telecommunications industry has experienced sharp increases in revenues and subscribers. In 1996, global revenues from mobile telecommunications approached 18 percent of all telecommunications revenues, an increase of almost 4 percent from 1995 (*See* Figure 1).[5] At the same time, revenues from mobile telecommunications in the U.S. were approaching 12 percent of all domestic telecommunications revenues. Driving this increased economic significance in the U.S. is a marked rise in the subscriber penetration of CMRS communications. By the end of 1997, the combined domestic subscribership of the three established CMRS products mentioned above had grown to over 108 million units.[6] Not only is this an increase of almost 22 percent from 1996, but it is also nearly a threefold

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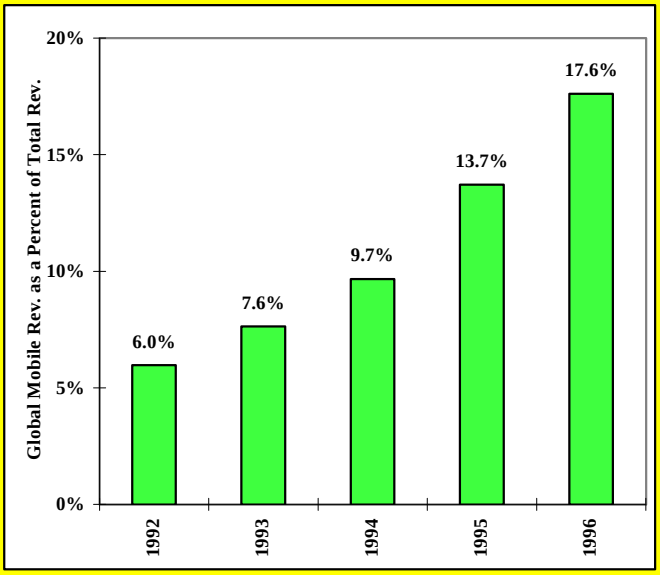
[5] All of the data in this report are taken from publicly available sources. These sources include: trade associations, securities analysts, company releases, filings with the Securities and Exchange Commission, newspaper and periodical articles, and certain materials made available to the Commission that were prepared by research companies and consultants that study various aspects of the wireless industry. The accuracy of the data from these materials, however, was not independently verified by the Commission. The inclusion of these data in this report does not constitute a representation or warranty by the Commission of their accuracy or completeness.

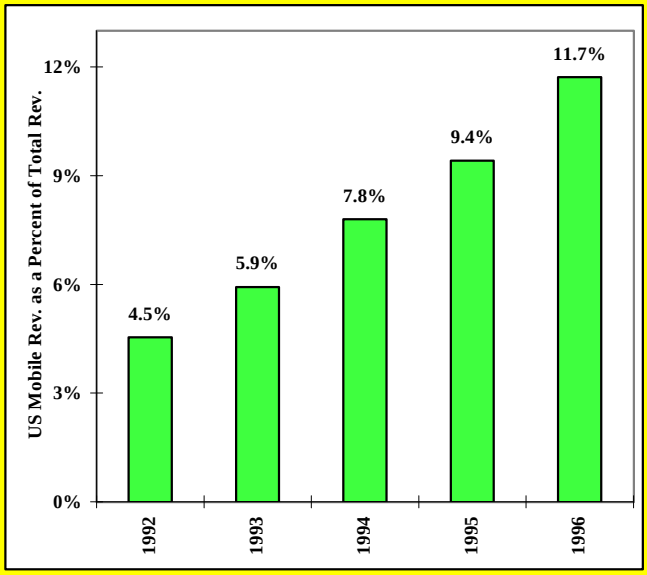
[6] It is likely that there is some amount of overlap in subscribership between and among these three services. This figure is the sum of the subscribership figures for the mobile telephone, paging/messaging, and dispatch segments, taken from Appendixes B, C, and D.

Figure 1: The Growth of Mobile Telecommunications

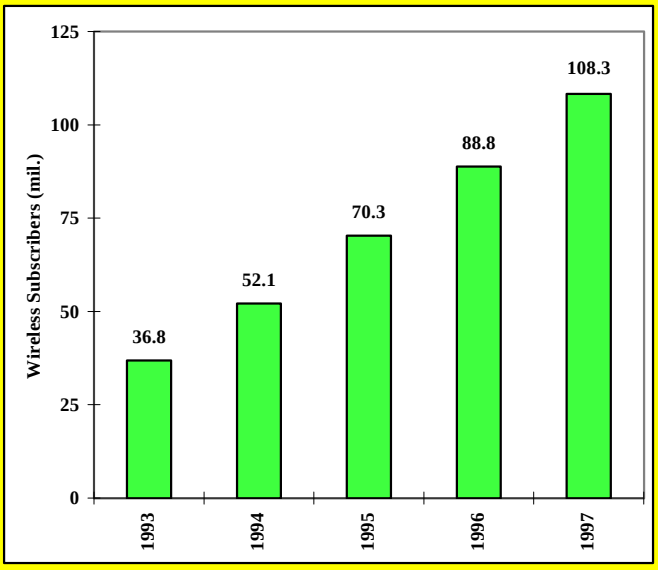
Global Mobile Revenues as a Percentage of Total Telecommunications Revenues



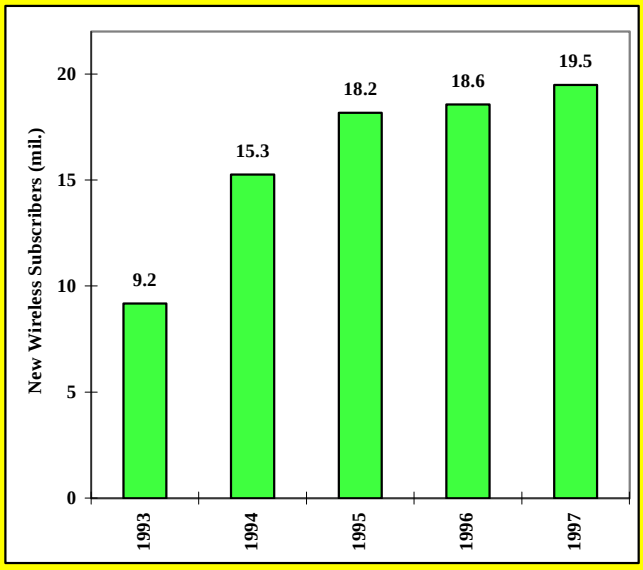
U.S. Mobile Revenues as a Percentage of Total Telecommunications Revenues



Total U.S. Mobile Subscribers - 1993 to 1997



New U.S. Mobile Subscribers - 1993 to 1997



Sources: Global Revenue - *World Telecommunications Development Report,* International Telecommunications Union, March 1997. U.S. Revenue - *Telecommunications Industry Revenue: TRS Fund Worksheet Data* , Industry Analysis Division, Common Carrier Bureau, Federal Communications Commission, November 1997. U.S. Subscribers - Sum of figures from Appendixes B, C, and D.

increase since the end of 1993. As a part of reaching these new highs of subscribership, the CMRS industry has added over 18 million new subscribers in each of the past three years.

Mobile Telephony. The year since the release of the *Second Report* has been another one of growth and competitive development in the mobile telephone segment of CMRS.[7] In the twelve months ending December 1997, the mobile telephone sector generated over $27 billion in revenues.[8] At the end of 1997, the mobile telephone sector had reached new highs in subscribership (55 million subscribers)[9] and in national penetration (20 percent of the nation's population).

Perhaps the most dramatic change in the mobile telephone sector since the *Second Report* is the entrance of new wireless competitors[10] in numerous markets across the country. When the *Second Report* was released, the deployment of broadband PCS and digital SMR networks was still in its early stages.[11] While network buildout and coverage has not caught up to cellular, broadband PCS and digital SMR operators have achieved a significant presence in most major markets across the country. (*See* Figure 2 for a map detailing nationwide mobile telephone deployments.) There are at least three mobile telephone providers in each of the 50 largest Basic Trading Areas ("BTAs") and 97 of the 100 largest BTAs. Currently, three or more mobile telephone operators are providing service in BTAs containing approximately 219 million people.[12]

It appears from the data available that prices have been falling as competition has increased. It is difficult to measure the overall change in mobile telephone prices brought about by this entry. Pricing plans are complex and diverse, and no authoritative source exists from which one can obtain an average price or comprehensive price index. However, there are a number of reports on pricing trends available.[13] Taken together, these reports suggest that prices have

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[7] This report defines the mobile telephone segment to include cellular, broadband PCS, and digital SMR operators.

[8] *See* Appendix B, Table 1, p. B-2.

[9] *Id.* p. B-2.

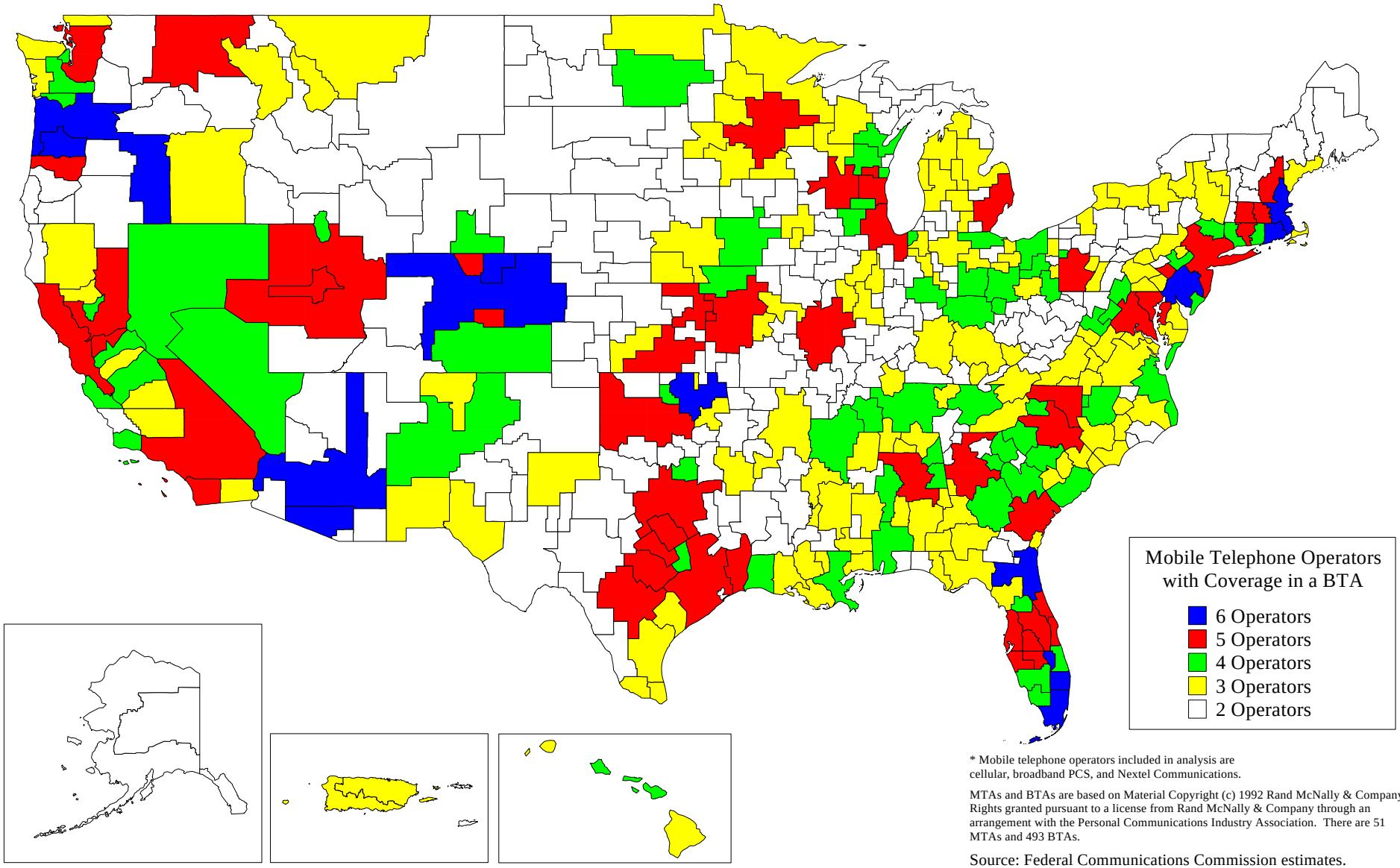
[10] For the purposes of this analysis, the new entrants in the mobile telephone market are defined as being either operators using any of the six blocks of broadband PCS spectrum or Nextel Communications in the areas where it has launched its new digital mobile telephone product.

[11] *Second Report*, 12 FCC Rcd at 11290-11293.

[12] This figure includes the BTAs' entire populations. The actual coverage is likely to be lower.

[13] *See* Section III.A.1.c.(2) for details.

Estimated Mobile Telephony Service Deployment: Number of Operators* in Each BTA with Some Level of Coverage



* Mobile telephone operators included in analysis are cellular, broadband PCS, and Nextel Communications.

Source: Federal Communications Commission estimates.

Figure 2

been falling and that the reductions are at least partly the result of entry by new competitors.[14]

Paging/Messaging. The paging/messaging sector[15] has continued to grow since the release of the *Second Report*. In 1997, the total number of pagers in service was estimated to increase by over 17 percent to 49.8 million units.[16] This growth helped push the industry's estimated annual revenue past the five billion dollar mark.[17]

Paging carriers are in the process of expanding or enhancing their product offerings to include two-way messaging and acknowledgement, voice messaging, and data transmissions such as e-mail and stock quotes. What has traditionally been called the "paging industry" is using these new products to redefine itself for the information age as the messaging industry.

Traditional Dispatch. While the dispatch sector[18] continued to grow over the past year, the major trend of the past year has been Nextel Communications, Inc.'s ("Nextel") transformation from being primarily a dispatch provider into a mobile telephone service provider. Consequently, increasing amounts of spectrum traditionally used for dispatch services have been switched from providing inexpensive analog services to more costly digital services. While this change has helped provide new competition in the mobile telephone industry, it may also create more demand for services provided by operators using licenses in the Commission's upcoming 220 MHz and Lower 800 MHz SMR auctions, as well as by the remaining analog SMR operators.

D. Current Industry Trends

There are three important industry trends discussed throughout this report: convergence, digitization, and consolidation.

Convergence. The convergence of product and service offerings continues to be a driving

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[14] For example, in Washington D.C., the average price for mobile telephone service decreased 25 percent between the first launch of broadband PCS service in November 1995 and April 1997. *See* The Yankee Group, *Competition Begins to Have an Impact on Wireless Pricing*, YANKEEWATCH: MOBILEFLASH, Apr. 18, 1997, at 3. *See also* Elizabeth Jensen, *For Wireless Services, Talk Gets Far Cheaper As Competition Rages*, THE WALL STREET JOURNAL, Apr. 27, 1998, at A1.

[15] This report defines the paging/messaging segment to include paging and narrowband Personal Communications Services ("narrowband PCS") operators.

[16] *See* Appendix C, Table 1, p. C-2.

[17] *Id.* p. C-2.

[18] This report defines the dispatch segment to include 800 MHz and 900 MHz SMR and 220 MHz operators.

force in the wireless industry. Markets are defined by services, not legal or regulatory terms. One of the most easily recognizable results of this process is the increased use of "bundles" (i.e., multiple services from the same device) as a marketing tool. For example, a consumer might purchase a mobile telephone with paging services or a pager that offers voice-messaging or data transmission.

Digitization. Digital technology increases system capacity and allows transmission of different types of information. Wireless operators have begun to deploy digital technology throughout their networks. Broadband PCS operators have been among the most prominent users of digital technology, but virtually every sector of the wireless industry is affected by this trend.

Consolidation. As many industries mature, a process of consolidation often occurs. This process can be observed in various CMRS services as licensees acquire new licenses to gain the efficiencies of larger footprints[19] and the marketing possibilities of multiple product offerings. This process is most evident in the paging/messaging industry. Furthermore, it is possible that there will be a period of increased consolidation activity among broadband PCS licensees as competitive forces act upon the mobile telephone industry. At this point in time, consolidation appears to be part of the process of efficiently re-allocating resources and developing efficient and competitive markets because the consolidation has been largely across markets not within markets. Consolidation has not significantly reduced the number of providers of a given service within a geographic market.

E. Current Regulatory Trends

The regulatory framework section of this report describes the important regulatory developments that affect the CMRS industry. Cutting across these various developments are three broad goals: facilitating market entry, increasing flexibility, and mainstreaming CMRS.

Facilitating Market Entry. The Commission has a strong commitment to maximize the number of viable new entities providing wireless services, thereby increasing competition in the marketplace. Since the *Second Report*, the Commission has continued this work by completing five new spectrum auctions and preparing for many more, thus facilitating competition across a broad range of mobile and fixed wireless services.

Increasing Flexibility. Telecommunications devices exist today that were not imagined only a few years ago. The Commission does not wish to impose regulations that will slow the emergence of new, innovative technologies. As a result, the Commission has been moving forward with policies that afford licensees the flexibility necessary for the marketplace to

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

determine the appropriate spectrum uses and immediate buildout schedules.

Regulatory Parity. Many analysts believe that CMRS, especially mobile telephony, may become a direct competitor to wireline telephone service.[20] Therefore, as CMRS services become more prominent in the telecommunications marketplace, questions concerning public policy responsibilities have arisen. The Commission, along with the CMRS industry, is currently addressing issues related to public service obligations for CMRS providers that wireline carriers are required to provide. This process involves crafting regulations that minimize burdens but still act to encourage CMRS providers to enhance their services in ways that serve the public. These important issues include the provision of emergency 911 service and participation in the Universal Service Fund.

F. Report Structure

The body of this report is divided into two sections. The first section summarizes Commission proceedings that may affect the competitive landscape within the CMRS industry or between wireless and wireline operators. The second section contains detailed analyses of the four services mentioned above.

II. THE EVOLVING REGULATORY FRAMEWORK

Changes in the regulation of CMRS providers can have an effect on competition in the market. Therefore, any complete analysis of CMRS competition must include a discussion of changes in regulation. The regulatory analysis below briefly summarizes some of the important legal and regulatory actions which have taken place over the past year and how these actions might affect competition in and the general development of the CMRS industry. These actions are grouped by their relation to the Omnibus Budget Reconciliation Act of 1993, the Telecommunications Act of 1996 ("1996 Act"), and other actions by the Commission that affect CMRS.

A. Omnibus Budget Reconciliation Act of 1993: Auction Authority and Transfer of Government Spectrum

As part of the 1993 Budget Act,[21] Congress authorized the Commission to use competitive bidding to award certain licenses for the right to use the electromagnetic spectrum.[22] The

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[20] *See* Section III.A.1.e below for more discussion.

[21] Pub. L. No. 103-66, § 6002, 107 Stat. 312, 387-392.

[22] The 1993 Budget Act allowed the Commission to auction licenses for which it had received mutually exclusive applications and when the principle use of the spectrum would involve the licensee receiving compensation from subscribers. The past year has seen Congress extend the Commission's auction authority

Commission has used this authority to facilitate entry by new service providers in an expedited manner by making spectrum licenses more readily available to those entities who will put them to their most efficient use. Since the *Second Report*, the Commission has completed auctions for five wireless services, some of which are not CMRS: Cellular Unserved, Digital Audio Radio Service, Wireless Communications Service ("WCS"), Upper 800 MHz SMR, and Local Multipoint Distribution Service ("LMDS").[23]

B. Telecommunications Act of 1996

The 1996 Act resulted in several proceedings that affect many CMRS operators: Interconnection, Universal Service, Number Portability, Forbearance, Biennial Review, and Customer Proprietary Network Information.

Interconnection. In 1994, pursuant to Section 332 of the Communications Act, in tandem with Sections 201 and 202, and in 1996, pursuant to the 1996 Act, the Commission adopted rules governing the rights of CMRS carriers to enter into agreements with Local Exchange Carriers ("LECs") for the interconnection of networks and for the transport and termination of calls.[24] While the Commission has not adopted any new interconnection actions that affect all CMRS carriers, there have been several developments that specifically affect paging carriers. These issues are discussed below in the Paging/Messaging section.[25]

Universal Service. On January 1, 1998, a new universal service support system went into effect[26] pursuant to Section 254 of the Communications Act, that modified the system for

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until 2007 and expand the definition of auctionable licenses to include all services except for public safety radio services, digital television licenses, and noncommercial educational broadcast or public broadcast stations. *See Balanced Budget Act of 1997* ("*BBA of 1997*") § 3002(a)(1)(E), 111 Stat. at 259; *BBA of 1997* § 3002(a)(1)(A), 111 Stat. at 259. The Commission must still have mutually exclusive applications for a license to be auctionable.

[23] *See* Appendix A, Tables 1A and 1B, p. A-2 and A-3, for a summary of all the auctions completed to date and Tables 2, 3, 4, 5, and 6 for licensee by licensee results of these five auctions.

[24] *See* Implementation of Sections 3(n) and 332 of the Communications Act, Regulatory Treatment of Mobile Services, *Second Report and Order*, 9 FCC Rcd 1411 (1994), *recon. pending*; Implementation of the Local Competition Provisions in the Telecommunications Act of 1996, CC Docket No. 96-98, *First Report and Order*, 11 FCC Rcd 15499 (1996).

[25] *See* Section III.B.6.b.

[26] *See* Federal-State Joint Board on Universal Service, *Report and Order*, CC Docket No. 96-45, FCC 97-157, 12 FCC Rcd 8776 (rel. May 8, 1997) ("*Universal Service Order*"). The Commission released an erratum correcting the Universal Service Order on June 4, 1997. *See also* Federal-State Joint Board on Universal Service, *Order on Reconsideration*, CC Docket No. 96-45, FCC 97-246 (rel. July 10, 1997); Federal-State Joint Board on Universal Service, *Second Order on Reconsideration*, CC Docket No. 96-45, FCC 97-400 (rel. Nov.

ensuring the provision of service: to rural, insular, and high cost areas; to low income individuals; and, to eligible schools, libraries and rural health care providers. Under Section 254, equitable and non-discriminatory contributions are required from all providers of interstate telecommunications service, including, for the first time, CMRS carriers.[27] However, the new system also permits CMRS carriers to receive universal service support.[28] The eligibility of CMRS for full participation in Universal service may promote more direct competition of wireless as a substitute for wireline service. Subsequently, the Commission instructed entities that are unable, without substantial difficulty, to distinguish their intrastate, interstate, or international revenues, or are unable to provide specific, line-by-line revenue totals for certain categories of revenues, to provide good faith estimates of such revenues.[29]

Number Portability. To address the concern that the inability of customers to retain their telephone numbers when changing local service providers would limit local competition, Congress added Section 251(b)(2) to the Communications Act,[30] requiring all LECs "to provide, to the extent technically feasible, number portability in accordance with requirements prescribed by the Commission."[31] The Commission began implementing this Congressional mandate in July 1996.[32] In this action, the Commission concluded that it has the authority to extend number portability requirements to some CMRS carriers.[33] In March 1997, the

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26, 1997); Federal-State Joint Board on Universal Service, *Third Order on Reconsideration*, CC Docket No. 96-45, FCC 97-411 (rel. Dec. 18, 1997); Federal-State Joint Board on Universal Service, *Fourth Order on Reconsideration*, CC Docket No. 96-45, FCC 97-420 (rel. Dec. 30, 1997).

[27] 47 U.S.C. § 254(d).

[28] *See Universal Service Order*, 12 FCC Rcd at 8932-34, 8944-46. We note that to receive universal service support a competitive carrier must be designated, by a state commission, as an eligible telecommunications carrier pursuant to Section 214(e). 47 U.S.C. § 214(e).

[29] *See* Changes to the Board of Directors of the National Exchange Carrier Association, Inc. (CC Docket No. 97-21), Federal-State Joint Board on Universal Service (CC Docket No. 96-45), *Order on Reconsideration, Second Report and Order, and Further Notice of Proposed Rulemaking*, FCC 97-292, (rel. Aug. 15, 1997).

[30] *See Telecommunications Act of 1996*, § 251(b)(2), Pub. L. No. 104-104, 110 Stat. 56 (1996).

[31] 47 U.S.C. § 251(b)(2) (1996).

[32] *See* Telephone Number Portability, *First Report and Order & Further Notice of Proposed Rulemaking*, 11 FCC Rcd 8352 (1996).

[33] *Id* at 8352.

Commission created a timeline for implementation of number portability by CMRS carriers.[34]

Forbearance. Under Section 10 of the Communications Act, as amended by the 1996 Act, the Commission must forbear from applying any regulation or provision to a telecommunications carrier if it determines that: (1) enforcement is not necessary to ensure that charges, practices, classifications, and services are just and reasonable, and not unjustly or unreasonably discriminatory; (2) enforcement is not necessary for the protection of consumers; and (3) forbearance is consistent with the public interest.[35] In making this public interest determination, the Commission must consider whether the forbearance will promote competition in the market for telecommunications services.[36] On February 4, 1998, the Commission completed its first CMRS action under Section 10 authority by forbearing from its pro forma transfer and assignment procedures.[37]

Biennial Review. The Commission is required by Section 11 of the Communications Act, as amended, to perform a biennial review of its regulations.[38] Section 11 requires the Commission to review all of its regulations applicable to providers of telecommunications services and determine whether any rule is no longer necessary in the public interest as the result of meaningful economic competition between providers of telecommunications services.[39] Further, Section 11 instructs the Commission to repeal or modify any regulation it

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[34] *See* In re Telephone Number Portability, CC Docket No. 95-116, *First Memorandum Opinion and Order on Reconsideration*, 12 FCC Rcd 7236 (1997), at para. 78 & App. E ("*Number Portability First Recon Order*"), modifying *Number Portability First R&O & FNPRM*, 11 FCC Rcd, at paras. 3, 77-82, App. F. *But see* "Wireless Telecommunications Bureau Seeks Comment on CTIA Petition for Waiver to Extend the Implementation Deadlines of Wireless Number Portability CC Docket No. 95-116," *Public Notice*, (rel. Dec. 9, 1997); Telephone Number Portability, *Petition for Forbearance of the Cellular Telecommunications Industry Association*, CC Docket No. 95-116, filed on Dec. 16, 1997.

[35] Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56, *codified at* 47 U.S.C. § 160(a).

[36] 47 U.S.C. § 160(b).

[37] *See* Federal Communications Bar Association's Petition for Forbearance from Section 310(d) of the Communications Act Regarding Non-Substantial Assignments of Wireless Licenses and Transfers of Control Involving Telecommunications Carriers and Personal Communications Industry Association's Broadband Personal Communications Services Alliance's Petition for Forbearance For Broadband Personal Communications Services, *Memorandum Opinion and Order*, 13 FCC Rcd 6293 (1998).

[38] 47 U.S.C. § 161. *See also 1998 Biennial Review of FCC Regulations Begun Early*, FCC News Release (rel. Nov. 18, 1997); *FCC Staff Proposes 31 Proceedings A Part of 1998 Biennial Regulatory Review*, Report No. GN 98-01 (rel. Feb. 5, 1998).

[39] 47 U.S.C. § 161(a).

determines to be no longer necessary in the public interest.[40] The Commission recently released the first of several biennial review items associated with CMRS. The item proposed to consolidate, revise, and streamline the rules governing application procedures for radio spectrum licenses in part to facilitate the implementation of the Universal Licensing System, a new licensing database for wireless services that will soon become fully operational.[41]

Customer Proprietary Network Information. In the 1996 Act, Congress recognized that new competitive market forces and technologies had the potential to threaten consumer privacy interests and enacted Section 222 to establish a framework governing carrier use and disclosure of customer proprietary network information ("CPNI") and other customer information obtained by carriers in their provision of telecommunications services.[42] In February 1998, the Commission adopted rules permitting carriers to use without approval information related to their existing service relationship with the customer but requiring that the carriers get customer approval for the use of information outside of the service relationship.[43] At the same time, the Commission sought further comment on several other issues, including customers' right to restrict all uses by carriers of CPNI, enforcement mechanisms, and foreign storage of and access to domestic CPNI.[44] The Commission's Common Carrier Bureau recently released a decision stating that independently-derived information regarding customer premises equipment ("CPE") and information services is not CPNI and may be used to market CPE and information services to customers in conjunction with bundled offerings.[45]

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[40] 47 U.S.C. § 161(b).

[41] *See* Biennial Regulatory Review -- Amendment of Parts 0, 1, 13, 22, 24, 26, 27, 80, 87, 90, 95, 97, and 101 of the Commission's Rules to Facilitate the Development and Use of the Universal Licensing System in the Wireless Telecommunications Services (WT Docket No. 98-20), *Notice of Proposed Rulemaking*, FCC 98-25 (rel. Mar. 18, 1998).

[42] 47 U.S.C. § 222.

[43] *See* Implementation of the Telecommunications Act of 1996: Telecommunications Carriers' Use of Customer Proprietary Network Information and Other Customer Information (CC Docket No. 96-115) and Implementation of the Non-Accounting Safeguards of Sections 271 and 272 of the Communications Act of 1934, As Amended (CC Docket No. 96-149), *Second Order and Order and Further Notice of Proposed Rulemaking*, FCC 98-27 (rel. Feb 26, 1998), at para. 4.

[44] *Id*. at para. 5.

[45] *See* Implementation of the Telecommunications Act of 1996: Telecommunications Carriers' Use of Customer Proprietary Network Information and Other Customer Information (CC Docket No. 96-115), DA *Order*, 98-971 (rel. May 21, 1998).

C. Other Commission Actions Affecting CMRS

Several other actions by the Commmission over the past year may affect CMRS, including Partitioning and Disaggregation, Enhanced 911, Calling Party Pays, Communications for Law Enforcement Act, and tower siting, as discussed below.

Partitioning and Disaggregation. In the past year, the Commission has extended partitioning and disaggregation[46] to services not already covered, such as WCS,[47] paging,[48] and 220 MHz Land Mobile.[49]

Enhanced 911. The Communications Act requires the Commission to promote "safety of life and property through the use of wire and radio communication."[50] Responding to this mandate the Commission adopted rules requiring certain wireless carriers to implement 911 and Enhanced 911 ("E911") services.[51] On December 1, 1997, the Commission adopted revisions to these rules intended to remedy technical problems identified in the record while otherwise reaffirming its commitment to the rapid implementation of the technologies needed to bring emergency assistance to wireless callers throughout the United States.[52]

Calling Party Pays. Calling party pays ("CPP") is a service option that some cellular, paging,

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[46] Partitioning is the reassignment of radio licenses along geopolitical or geographic areas other than those used by the Commission in the original assignment process. Disaggregation is the assignment of discrete portions or blocks of spectrum licensed to a geographic licensee or qualifying entity. *See* Geographic Partitioning and Spectrum Disaggregation by Commercial Mobile Radio Services Licensees, WT Docket No. 96-148, *Report and Order and Further Notice of Proposed Rulemaking*, 11 FCC Rcd 21831 (1996).

[47] *See* Amendment of the Commission's Rules to Establish Part 27, the Wireless Communications Service, GN Docket No. 96-228, *Report and Order*, 12 FCC Rcd at 10785 (1997).

[48] *See* Revision of Part 22 and Part 90 of the Commission's Rules to Facilitate Future Development of Paging Systems, WT Docket No. 96-18, *Second Report and Order and Further Notice of Proposed Rulemaking*, 12 FCC Rcd 2732 (1997).

[49] *See* Amendment of Part 90 of the Commission's Rules to Provide for the Use of the 220-222 MHz Band by the Private Land Mobile Radio Service, PR Docket No. 89-552, *Third Report and Order*, 12 FCC Rcd. 10943 (1997) (adopting partitioning and disaggregation for all 220 MHz licensees).

[50] Section 1 of the Communications Act, 47 U.S.C. § 151.

[51] *See* Revision of the Commission's Rules To Ensure Compatibility with Enhanced 911 Emergency Calling Systems, CC Docket No. 94-102, *Report and Order and Further Notice of Proposed Rulemaking*, 11 FCC Rcd 18676 (1996) ("*E911 First Report and Order"* and "*E911 Second Notice*").

[52] *See* Revision of the Commission's Rules To Ensure Compatibility with Enhanced 911 Emergency Calling Systems, CC Docket No. 94-102, *Memorandum Opinion and Order*, 12 FCC Rcd 22665 (1997) ("*E911 Reconsideration Order*").

and broadband PCS providers offer, whereby the party placing the call or page pays the airtime charge and any applicable charges for calls transported within the LECs' Local Access and Transport Areas. While common in many countries throughout Europe, Latin American, and in Israel, CPP is less widely available in America. An industry study argues that international experience shows CPP billing spurs wireless usage, promotes acceptance of wireless service, allows greater cost control by consumers, and increases the proportion of traffic on wireless networks relative to wireline networks.[53] The Commission adopted a Notice of Inquiry on CPP in September, 1997 to explore whether the wider availability of CPP would enable CMRS providers to more readily compete with wireline services, and actions that the Commission should or could take to promote the wider availability of CPP for CMRS providers.[54] In response to this Notice, the Cellular Telecommunications Industry Association ("CTIA") filed a petition asking the Commission to issue a Notice of Proposed Rulemaking to adopt uniform, nationwide rules for CPP.[55]

Communications Assistance for Law Enforcement Act. Enacted in 1994, the Communications Assistance for Law Enforcement Act ("CALEA") requires telecommunications carriers, including CMRS carriers, to ensure that their equipment, facilities, and services can comply with the surveillance capability requirements identified in the Act.[56] Since the enactment of CALEA, the law enforcement community, represented by the Federal Bureau of Investigation ("FBI"), has been engaged in a debate with the telecommunications industry concerning the technical standards necessary for compliance with CALEA's requirements. In October 1997 the Commission released a Notice of Proposed Rulemaking addressing its basic responsibilities under the Act, including determining which carriers are subject to CALEA's requirements and ensuring carriers' system security and integrity relating to surveillance activities.[57] In December 1997, the Telecommunications Industry Association ("TIA") adopted an interim standard for CALEA compliance, which the law enforcement community objects to on the basis that it does not address all the capabilities CALEA authorizes. Since the release of the *Second Report*, in response to petitions, the Commission released a Public Notice establishing a two track proceeding to examine: extending the compliance deadline

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[53] *See* CTIA Service Report, *The Who, What, and Why of "Calling Party Pays,"* Jul. 4, 1997.

[54] *See* In the Matter of Calling Party Pays Service Option in the Commercial Mobile Radio Services WT Docket No. 97-207, *Notice of Inquiry*, 12 FCC Rcd 17693 (1997).

[55] *See* Petition for Expedited Consideration for the Cellular Telecommunications Industry Association, WT Docket No. 97-207, filed Feb. 23, 1998.

[56] 47 U.S.C. § 1002(a) *and* 47 U.S.C. § 1001 note.

[57] *See* Communications Assistance for Law Enforcement Act, *Notice of Proposed Rulemaking*, 13 FCC Rcd 3149 (1997).

(currently October 25, 1998) and establishing technical compliance standards.[58]

Tower Siting. As discussed in the introduction, new mobile telephone operators have launched service in a large number of BTAs. However, operators often claim that they have experienced delays when they petition local authorities for permission to construct a new tower. According to a recent report on tower siting published by CTIA, 202 proposed tower sitings, impacting six million POPs, were delayed or under a moratorium as of September 25, 1997.[59] In July 1997, in response to a petition filed by CTIA,[60] the Commission determined that it has the authority to preclude moratoria of unlimited or unspecified duration under the 1996 Act.[61] At the same time, the Commission sought comment on this conclusion as well as other issues related to the potential anti-competitive effects of tower siting moratoria.[62]

III. THE CMRS INDUSTRY

As discussed in the introduction, this report employs a different framework than the *Second Report*, focusing on four consumer-oriented product categories instead of various, Commission-defined CMRS services: mobile telephony, paging/messaging, traditional dispatch, and mobile data. This report focuses on three areas: (1) the general structure of each sector, (2) the nationwide competitive trends of each sector, and (3) the existing barriers to entry and other factors limiting the further development of competition.

A. Mobile Telephony

For the purposes of this report, the mobile telephone market is defined as all operators who offer commercially available interconnected mobile phone services. These operators provide access to the public switched telephone network ("PSTN") via mobile communication devices that employ radiowave technology to transmit their calls. Currently, this market is dominated by providers using three different types of FCC licenses: cellular radiotelephone, broadband PCS, and SMR services. While all three of these FCC services were created at different times and with different intentions, they each now offer mobile telephone services that are

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[58] *See* "Communications Assistance for Law Enforcement Act," *Public Notice*, DA 98-762 (rel. Apr. 20, 1998).

[59] *See* Appendix B, Table 6, p. B-10.

[60] *See* Federal Preemption of Moratoria Regulation Imposed by State and Local Governments On Siting of Telecommunications Facilities, DA 96-2140, *Petition for Declaratory Ruling of the Cellular Telecommunications Industry Association* (filed Dec. 16, 1996).

[61] *See* "Supplemental Pleading Cycle Established for Comments on Petition for Declaratory Ruling of the Cellular Telecommunications Industry Association", *Public Notice*, FCC 97-264 (Jul. 28, 1997), at 3.

[62] *Id*. at 3-4.

fundamentally interchangeable. Furthermore, while providers use different marketing techniques and different technologies to differentiate themselves to the public, they are all offering essentially the same product, mobile telephone services.

The mobile telephone market is in the midst of an important transformation. Prior to 1995, the mobile telephone market consisted primarily of two cellular providers operating in each market. To spur market entry and provide consumers with the benefits of a more competitive mobile telephone market, the Commission facilitated the entry of new providers into the market by allocating additional spectrum and assigning up to six new broadband PCS licenses in each market. While this transformation is still underway, the mobile telephone market is well on its way to becoming dynamic and competitive.

The discussion below begins with overview of the mobile telephone market. This is followed by separate sections for cellular, broadband PCS, digital SMR, analog SMR, and resellers. Each section will discuss the market's performance and important trends since the *Second Report*. In addition, each section will discuss how competition is affecting each market.

1. Mobile Telephone Overview and Analysis

a. Mobile Telephone Market Structure and Performance

In 1997, the mobile telephone market continued to exhibit strong growth (*See* Figure 3). As of December 1997, the market had over 55 million subscribers, an increase of 25.6 percent over the figure of 44 million reported in the *Second Report* for December 1996.[63] This growth is also the largest 12 month increase in terms of absolute numbers in the history of the mobile telephone market. This level of subscribership translates into over 20 percent of the country's population subscribing to mobile telephone services.

The mobile telephone market's financial indicators performed similarly to its subscriber growth. The market's total service revenue for the twelve months ending in December 1997 was $27.5 billion,[64] an increase of 16.5 percent over the twelve months ending December 1996. The market's operating cash flow[65] for 1997 is estimated to be $10.9 billion,[66] a 24

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[63] *See* Appendix B, Table 1, p. B-2.

[64] *Id.* at p. B-2.

[65] Operating cash flow equals earning before interest, taxes, depreciation and amortization (often referred to as "EBITDA"). It is a commonly used measure to determine the financial performance of many wireless telecommunications operators.

Figure 3: Mobile Telephone Industry - 1993 to 1997

Source: Cellular Telecommunications Industry Association,*see* Appendix B, Table 1 p. B-2 for complete data.
National Penetration figures are calculated using US population estimates from Dennis Leibowitz, et. al.,*The Wireless Communications Industry,* Donaldson, Lufkin & Jenrette, Fall 1997, at 16.

percent increase over the 1996 amount of $8.8 billion.[67] This increase led the market's cash flow margin to decline to 32.6 percent.[68]

As was found in the *Second Report*, the average monthly bill in the wireless telephone market for the past year continues to decline, reflecting a trend of increasing penetration in market sectors with lower usage and, consequently, lower monthly bills.[69] The average monthly bill (often referred to as average revenue per unit, or "ARPU") declined from $47.70 in December 1996 to $42.78 as of December 1997.[70] By many reports, however, monthly bills associated with digital mobile telephone services are higher than the market average.[71] A reason often cited for this difference is higher usage levels of the digital products.[72]

Much of the mobile telephone market is still in its infancy and will require a great deal of investment by operators during the coming years for infrastructure and other start-up costs. Therefore, the ability of operators to access capital markets is an important indicator in determining the health of the market. As of April 9, 1998, mobile telephone operators had raised a total of $1.55 billion in public capital during the year.[73] This comes after mobile telephone operators had used public capital markets to raise $5.5 billion in 1997 and $5.7 billion in 1996.[74]

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[66] It is important to note that the incumbent cellular operators had positive cash flow while the broadband PCS and digital SMR operators had negative cash flow, bringing down the wireless telephone market's total. *See* Paul Kagan Associates, Inc., *10-Year Wireless Projections*, WIRELESS TELECOM INVESTOR, Feb. 18, 1998, at 6.

[67] Paul Kagan Associates, Inc., *10-Year Wireless Projections*, WIRELESS TELECOM INVESTOR, Jun. 24, 1996, at 5.

[68] Paul Kagan Associates, Inc., *10-Year Wireless Projections*, WIRELESS TELECOM INVESTOR, Feb. 18, 1998, at 6.

[69] *Second Report*, 12 FCC Rcd at 11280.

[70] *See* Appendix B, Table 1, p. B-2.

[71] *See* Dennis Leibowitz et al, THE WIRELESS COMMUNICATIONS INDUSTRY, Donaldson, Lufkin & Jenrette, Fall 1997, at 21 and 44. ("*DLJ Report*")

[72] *See DLJ Report* at 21 *and* Thomas J. Lee, *Mobile Outlook - Third Quarter of 1997*, Equity Research: Wireless Services, Smith Barney, Nov. 26, 1997, at 29.

[73] *See* Appendix B, Table 2A-2C, p. B-3.

[74] *Id*. at p. B-3.

b. Operational Trends

(1) License Consolidations and Exchanges

The process of license consolidation in the mobile telephone market discussed in the *Second Report*[75] continues to occur. In general, operators are acquiring new licenses to gain the efficiencies of larger and/or more cohesive footprints and the marketing possibilities of multiple product offerings. To date, consolidation has not significantly reduced the number of providers of a given service within a geographic market. Most of the activity in the CMRS license secondary market over the past year fits into three categories: footprint expansion, footprint refinement, and rural investment.[76]

Footprint Expansion. Since the first cellular licenses were granted, mobile telephone operators have been accumulating licenses to expand their footprints into new regions in hopes of capitalizing on the various efficiencies associated with economies of scale.[77] Since the *Second Report*, there have been several acquisitions in this category, including the three described below. SBC Communications, Inc. ("SBC") announced that it intended to acquire Southern New England Telecommunication Corp. ("SNET")[78] and its cellular licenses covering 5.7 million[79] POPs.[80] Century Telephone Enterprises, Inc. ("Century") acquired Pacific Telecom, Inc. giving Century an additional 1.9 million cellular POPs plus 4.1 million broadband PCS POPs.[81] Lastly, Nextel Communications, Inc. ("Nextel"), the nation's largest SMR operator, acquired Pittencrieff Communications, Inc. ("Pittencrieff"),[82] the second largest

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[75] *Second Report*, 12 FCC Rcd at 11281.

[76] Broadband PCS operators also have been selling licenses to facilitate the deployment of their networks, as discussed below in the section analyzing the broadband PCS sector.

[77] *Second Report*, 12 FCC Rcd at 11281.

[78] *Southern New England Telecommunications to Merge with SBC Communications*, News Release, SBC Communications Inc., Jan. 5, 1998. This merger is still awaiting regulatory approval and consummation.

[79] *Fact Sheet: Southern New England Telecommunication Corp.*, (visited Feb. 18, 1998), <http://www.sbc.com/Media/SNET-FS.html>.

[80] "POPs" is a short-hand reference to the total population within the geographic areas licensed to a wireless provider.

[81] *Century Completes Largest Acquisition in Its History, Finalizes Purchase of Pacific Telecom, Inc.*, News Release, Century Telephone Enterprises, Inc., Dec. 1, 1997.

[82] *See* In re Applications of Pittencrieff Communications, Inc. Transferor and Nextel Communications, Inc. Transferee For Consent to Transfer Control of Pittencrieff Communications, Inc. and its Subsidiaries, *Memorandum Opinion and Order*, CWD No. 97-22, DA 97-2260 (rel. Oct. 24, 1997), at 3. ("*Nextel-*

SMR operator, giving Nextel 6,000 new 800 MHz SMR channels covering over 25 million POPs.[83]

To date, consolidation activity has been more focused on cellular licenses, with less consolidation of broadband PCS licenses. This may begin to change following the Commission's implementation of the World Trade Agreement ("WTO") on February 9, 1998. In response to this agreement, the rules governing levels of foreign ownership of domestic telecommunications companies have been modified to allow domestic companies to access more substantial quantities of capital from investors in WTO countries than previously permitted.

Footprint Refinement. In addition to the outright acquisition of new wireless licenses, operators often exchange licenses with other operators to fill in gaps around their existing clusters. In one of the largest examples in the past year, United States Cellular Corporation ("US Cellular") and BellSouth Corporation ("BellSouth") swapped 34 cellular licenses. US Cellular received a controlling interest in 12 licenses around its existing service areas in Wisconsin and Illinois. In return, BellSouth obtained ownership interests in 22 licenses, most of which were situated around its existing clusters in Kentucky and Tennessee.[84]

Rural Investment. In the past year, interest in the investment potential of rural cellular operators has increased. Two mergers, with a combined value of over $2.1 billion, are of particular interest because the acquiring entity was not another cellular operator. Instead, the buyers represented investment funds. A unit of Blackstone Capital Partners Merchant Banking Fund purchased 87 percent of CommNet Cellular, Inc. ("CommNet"), which owns interests in 85 markets with 3.5 million POPs, for $718 million in cash and debt.[85] In the second acquisition, PriCellular Corporation ("PriCellular") was sold to American Cellular Corporation, which represents a number of investors, for $1.4 billion in cash and debt.[86]

Pittencrieff").

[83] *PCI Stockholders Approve Merger With Nextel,* News Release, Pittencrieff Communications, Inc., Sep. 16, 1997. Nextel also expanded its footprint through the Commission's Upper 800 MHz SMR auction. *See* Section III.A.4.a.

[84] *United States Cellular Announces Trade For BellSouth's Wisconsin Properties*, News Release, United States Cellular Corporation, Feb. 4, 1997.

[85] *Commnet Cellular Closes Merger with Affiliate of The Blackstone Group*, News Release, CommNet Cellular, Inc., Feb 10, 1997.

[86] *PriCellular to be Acquired in a $1.4 Billion Transaction*, News Release, PriCellular Corporation, Mar. 9, 1998.

c. Intra-Sector Competition

This report's analysis of competitive developments in the mobile telephone market focuses on three aspects: the entry of new competitors into the marketplace, the effect this entry has had on mobile telephone service prices, and the effect this entry has had on consumer behavior.

(1) Market Entry by New Competitors

To track the progress of new operators entering the mobile telephone market, the Commission has compiled a list of BTAs with some level of coverage by new mobile telephone providers.[87] These data are based on publicly available sources of information released by the operators such as news releases, filings made with the Securities and Exchange Commission, and coverage maps available on operators' Internet sites.[88] Data from these sources were used because the Commission's rules do not require the new entrant licensees to file information with the Commission detailing their buildout efforts.

When the *Second Report* was released, broadband PCS and Nextel were in early stages of entering different geographic markets.[89] Since that time, a number of these operators have significantly expanded their footprints. To date, approximately 273 BTAs, containing over 219 million POPs, have three or more mobile telephone operators offering service.[90] (*See* Figure 2 for a map.) This represents 87 percent of the nation's total POPs. While over one-half of these BTAs have only three mobile telephone operators, 71 BTAs have four providers, 51 BTAs have five providers, and 13 have six providers. These 135 BTAs contain over 68 percent of the nation's POPs.

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[87] For the purposes of this analysis, the new entrants are defined as being either operators using any of the six blocks of broadband PCS spectrum or Nextel Communications in the areas where it has launched its new digital mobile telephone product. Nextel's digital product is included as the sole SMR competitor because the Commission does not possess any information on where other SMR operators are using analog technology to compete with cellular and broadband PCS operators. In addition, the only other operator using digital SMR technology is not marketing itself as a competitor to cellular and broadband PCS operators. *See Nextel-Pittencrieff*, at 21.

[88] There are several important caveats to note when using these data. First, to be considered as having "coverage," only a portion of a BTA territory needs to be covered. This means that some of the BTAs included in this summary have only a small amount of coverage, possibly resulting from the buildout of a neighboring market. Second, because of the size of some of the BTAs in the Western U.S., the maps included in this report overstate the actual coverage. Third, multiple operators shown in the same market are not necessarily providing service to the same areas. Fourth, the POPs figures used in this analysis include all of the POPs in a BTA with coverage. This results in an overstatement of the total number of POPs actually covered.

[89] *Second Report*, 12 FCC Rcd at 11290-11293.

[90] In other words, customers in the area have access to the services of the two incumbent cellular operators plus at least one new entrant. *See* Appendix B, Table 3A, p. B-4.

Driven by the desire to maximize the market of potential customers as quickly as possible, the new entrants have been concentrating their deployment efforts on the more populous geographic markets. To show this behavior, the Commission has divided the BTAs into four quartiles (groups of equal size) by their total populations.[91] Of the BTAs in the top quartile (the 123 most populated BTAs), 115 have at least one new entrant providing coverage. The second quartile (the next 123 most populated BTAs) has 81 BTAs with some coverage and the bottom two quartiles have only 48 and 29 BTAs, respectively, with coverage.

(2) Price Competition

Perhaps the most sought after benefit of competition in the mobile telephone market is a reduction of service prices. While the Commission has been unable to identify any sources of information that track mobile telephone prices in a comprehensive and systematic manner, there are a number of reports available indicating that the entrance of new competitors into this market is beginning to have the desired effect on prices. Since these studies were all performed using different methodologies and market samples, their findings vary and are only comparable in the broadest terms. However, as detailed below, it appears that prices have been falling and that the reductions are at least in part the result of entry by new competitors.

One of the earliest studies examining the effect of competition on mobile telephone prices, released in April 1997, stated two important findings. First, markets with one or more broadband PCS operators have average combined rates for cellular and broadband PCS between 15 and 18 percent below the cellular rates in markets with no broadband PCS operators.[92] Second, the study found that broadband PCS operators were setting prices between 10 and 15 percent below the cellular operators in their markets.[93]

This second finding that broadband PCS operators are generally setting their prices below those of their cellular competitors is a point upon which other analysts have agreed. For example, according to one estimate, by the end of September 1997, broadband PCS prices were between 17 and 20 percent below cellular prices.[94]

There also have been reports that prices for mobile telephone service have been decreasing

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[91] *See* Appendix B, Table 3B, p. B-4.

[92] The Yankee Group, *Competition Begins to Have an Impact of Wireless Pricing*, YANKEEWATCH: MOBILEFLASH, Apr. 18, 1997, at 1.

[93] *Id*. at 1.

[94] *See* Perry D. Walter & Christopher E. Jefferson, PCS VERSUS CELLULAR: A QUARTERLY SURVEY OF WIRELESS PRICING IN MARKETS WHERE PCS OPERATORS HAVE BEGUN SERVICE, The Robinson-Humphrey Company, LLC, Jan. 9, 1997, at 2. *See also* Paul Kagan Associates, Inc., *Competitive Rates in Wireless Telecom*, Nov. 1997, at 25.

over time. For example, one study reported that between 1994 and early 1997 the average price in competitive markets had dropped by 25 percent.[95] Several other studies have shown that this decline continued into 1997. One study compared mobile telephone prices in December 1996 and September 1997 and found a decline of approximately 6 percent with some decreasing as much as 30 to 40 percent.[96] A series of quarterly surveys from 1997 found that prices have dropped between 15 percent and 34 percent, much of which was due to cellular operators lowering their prices in response to broadband PCS operators.[97] Finally, a study comparing year-end prices for 1996 and 1997 found that the median price per minute had dropped between 30 percent and 40 percent for residential users and between 30 percent and 50 percent for business users.[98]

It should be noted that since the beginning of 1998, at least one broadband PCS carrier, Sprint PCS, has raised its rates in certain markets.[99] For example, in New York City, Sprint PCS is still offering a $0.10 per minute plan, but it is only as part of a 1,000 minutes for $99 plan.[100] Analysts expect Sprint PCS to make similar changes nationwide.[101]

The actual price per minute of mobile telephone service varies significantly depending on an individual customer's service plan. According to one study, the average price for service in the most expensive plans is over $0.50 per minute while the least expensive plans average in the mid $0.20 per minute range.[102] The price per minute also varies by geographic area with the average price per minute ranging from as high as $0.73 to as low as $0.25.[103]

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[95] This is compared to a 10 percent decline in markets only served by cellular operators. *See* The Yankee Group, *Competition Begins to Have an Impact of Wireless Pricing*, YANKEEWATCH: MOBILEFLASH, Apr. 18, 1997, at 3.

[96] Paul Kagan Associates, Inc., *Competitive Rates in Wireless Telecom*, Nov. 1997, at 10.

[97] The Robinson-Humphrey Company, LLC, taken from RCR - Lynnette Luna, *Moderate Prices Indicate Bullish Market*, RCR RADIO COMMUNICATIONS, Jan. 19, 1998, at 18.

[98] David A. Freedman & Gregory H. Lundberg, *Untethered Stories & Stats*, Equity Research - Wireless Communications, Bear Stearns & Co., Inc., Jan. 1998, at 1.

[99] Linda Runyon et. al., *Sprint PCS Is Raising Prices*, Comment - Telecommunications - Wireless, Merrill Lynch, Jan. 21, 1998, at 1.

[100] *Id*. at 1

[101] *Id.* at 2.

[102] *PCS is Driving Down U.S. Wireless Pricing*, News Release, The Yankee Group, Sep. 29, 1997.

[103] *Id*.

(3) Consumer Response

Competition between incumbents and new entrants in the mobile telephone marketplace seems to have elicited a positive response from consumers. According to at least one analyst, growth in the overall mobile telephone market has been stimulated by competition.[104] This is shown by the fact that in each of the first three quarters of 1997 the mobile telephone market experienced a higher percentage growth than it did in the first three quarters of 1996.[105] Another analyst reports that 50 percent of the new broadband PCS subscribers are new mobile telephony customers, which is much higher than the 33 percent the analyst had expected.[106]

The new entrants are starting to take a larger share of this growth. In the third and fourth quarters of 1997, the broadband PCS operators and Nextel combined to claimed 39.5 and 32.6 percent respectively of the new subscribers, up from 24.6 percent in the second quarter and 15.3 percent in the first.[107]

There is also evidence that users of the new digital services are using their mobile phones more than users of analog systems. The typical analog cellular subscriber uses approximately 100 to 120 minutes each month, while broadband PCS subscribers are using 250 to 300 minutes each month.[108] One broadband PCS carrier, Aerial Communications, Inc., has reported average usage of nearly 350 minutes-of-use per month.[109] This trend is most likely a response to pricing plans that offer a large volume of bundled minutes each month, as discussed in the Marketing and Pricing Strategies section below.

There is also a survey by J.D. Power and Associates suggesting that those customers who are using broadband PCS services are more satisfied than customers with traditional cellular

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[104] Thomas J. Lee, *Mobile Outlook - Third Quarter of 1997*, Equity Research: Wireless Services, Smith Barney, Nov. 26, 1997, at 10.

[105] *Id.* at 40.

[106] *DLJ Report*, at 22.

[107] Thomas J. Lee and Andrew E. Grovers, *Mobile Outlook - Spring 1998*, Equity Research: Wireless Services, Salomon Smith Barney, Mar. 24, 1998, at 61.

[108] Thomas J. Lee, *Mobile Outlook - Third Quarter of 1997*, Equity Research: Wireless Services, Smith Barney, Nov. 26, 1997, at 29.

[109] *Aerial Communications Has Strong Customer Growth*, News Release, Aerial Communications, Inc., Jan. 28, 1998.

service.[110] In addition, the survey says that 80 percent of broadband PCS customers who had formerly used cellular services were more satisfied with their PCS service.[111]

d. Intra-Sector Competitive Strategies

The material below provides a general description of a few of the most important strategies that are apparent in the marketplace. The strategies are separated into three groups: geographic coverage; customer segments; and, marketing and pricing.

(1) Geographic Coverage

The mobile telephone market includes a highly diverse community of operators. One informative method of comparing this diverse group of entities is to analyze the population and the spectrum covered by their licenses. Table 4 in Appendix B, contains the POPs, MHz-POPs and unduplicated POPs[112] for the top 50 mobile telephone operators.[113]

The three operators executing nationwide strategies are identified at the top of Table 4 in Appendix A. AT&T Corp. ("AT&T"), Sprint PCS, and Nextel are all in the process of deploying systems that will allow them to offer seamless coverage throughout most of the country on their own networks. Sprint PCS' licenses will allow it to reach the largest number of potential customers with unduplicated coverage of approximately 243 million POPs. AT&T and Nextel are close behind with 234 million and 230 million unduplicated POPs. It is important to note that because Nextel's coverage is based on SMR licenses with smaller amounts of spectrum, it has a lower total of MHz-POPs than its two nationwide competitors.

The next category of mobile telephone operators consists of those who are executing large regional strategies, or super-regions. This group includes LECs relying on their cellular and broadband PCS licenses (*e.g.*, BellSouth, SBC, and GTE Corp. ("GTE")) and pure wireless operators who are relying almost entirely on their broadband PCS licenses (*e.g.*, Next*Wave* Telecom, Inc. ("Next*Wave*"), Omnipoint Corp. ("Omnipoint"), and PrimeCo Personal

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[110] *J.D. Power and Associates Report Shows PCS Leading Cellular Providers in Customer Satisfaction,* News Release, J.D. Power and Associates, Jan. 13, 1998.

[111] *Id.*

[112] MHz-POPs is a measure used by the Commission to allow the comparison of licenses which cover the same geographic area but with different amounts of spectrum. The MHz-POP gives greater weight to a license's spectrum by multiplying that license's POPs by its bandwidth. Unduplicated POPs is a measure used to compensate for an operator owning as many as three cellular and broadband PCS licenses in the same geographic area (for example, one cellular and two DEF block broadband PCS licenses), leading to a double counting of the license's POPs.

[113] All of the information in this "Geographic Coverage" section is taken from Appendix B, Table 4, p. B-5.

Communications L.P. ("PrimeCo")). In order to compete against those operators with nationwide footprints, some operators have formed alliances designed to simulate a national presence. For example, PrimeCo has signed a roaming agreement with its two partner companies (Bell Atlantic Corp. ("Bell Atlantic") and Airtouch Communications, Inc. ("Airtouch")) that will allow its broadband PCS customers to access their wireless service on cellular networks covering two-thirds of the nation's POPs, including 35 of the top 50 cities.[114] In addition, thirteen broadband PCS operators have formed the North American GSM Alliance to facilitate roaming throughout North America for customers using Global System for Mobile Communications ("GSM") mobile telephones.[115]

After the large regional operators listed in Table 2, there are numerous operators executing strategies focused on even smaller contiguous regions or even specific markets.

(2) Customer Segment Strategies

When the cellular telephone was first introduced in 1983 and for a number of years afterwards, its principal audience was business users who required mobile communications when away from the office and could afford to pay the relatively high cost associated with the service. Then, as was discussed in the *Second Report*, cellular operators slowly began to expand their market, attracting non-business customers who were often purchasing service for safety reasons.[116] However, the past year has seen several mobile telephone operators renew their focus on customers that generate higher ARPUs such as business users.

The most notable of these operators is Nextel, which is using its nationwide digital SMR network along with a set of service options and pricing plans to create a product that appeals to businesses with a mobile work force.[117] AT&T has also recently announced that it is refocusing its wireless marketing efforts on what it terms "high-value" customers, putting the quality of the new customers being added ahead of the total volume of new customers.[118]

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[114] *PrimeCo Announces Coast-To-Coast Roaming*, News Release, PrimeCo Personal Communications, L.P., Dec. 1, 1997.

[115] *See GSM Alliance Formed To Compete With National Wireless Carriers; Intel Endorses GSM Technology to Deliver Wireless Data Communications to Mobile PC Users*, News Release, Powertel, Inc., Aug. 4, 1997; *Cook Inlet PCS Joins GSM Alliance*, News Release, The North American GSM Alliance LLC, Apr. 28, 1998; *GSM Alliance Adds Five New U.S. PCS Companies; Service Footprint Spreads Across North America*, News Release, The North American GSM Alliance LLC, May 26, 1998.

[116] *Second Report*, 12 FCC Rcd at 11281.

[117] For more details about Nextel's mobile telephone operations, *see* Section III.A.4.a below.

[118] John M. Bensche & Briar Mewbourne, *AT&T Wireless Strategy Augurs Well For Emerging Carriers*, Wireless Services - Omnipoint, Lehman Brothers, Jan. 27, 1998, at 2.

(3) Marketing & Pricing Strategies

This report focuses on three of the most prominent pricing developments of the past year: the high volume bundling of minutes, the use of prepaid service, and multiple product bundling.

Plans With Large Bundles of Minutes. One of the investment community's concerns about the arrival of the broadband PCS operators was the potential for new entrants to use price competition to rapidly gain market share. The principal concern was that competition would dramatically reduce monthly access fees and, therefore, have a negative effect on all wireless operators' profitability. To date, this has generally not occurred.

Instead, many broadband PCS operators offer large bundles of inexpensive minutes to give the appearance of a lower price-per-minute than their cellular competitors. For example, some broadband PCS operators are using a large volume of minutes to offer plans with an average price-per-minute of $0.10.[119] To date, cellular operators have often matched these plans.[120] It is important to note that these plans usually combine specific amounts of peak and off-peak minutes to create their low rates. For example, several Sprint PCS plans provide 400 minutes for $40 and 600 minutes for $60, yet only half of the minutes are usable at peak hours.[121] There are even examples of some carriers offering unlimited free minutes. These plans were often early promotions to compensate for a lack of coverage at the time a system launched.[122] However, at least one operator, WirelessNorth, has begun such a plan on an ongoing basis.[123]

According to analysts, there are two principal motivations behind this strategy. First, it allows broadband PCS operators to leverage one of their primary assets, tremendous amounts of excess capacity on their networks. According to one analyst, even with the cellular market's deployment of digital technology, the maximum average minutes-of-use their networks will be able to support will rise from approximately 180 minutes-of-use per

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[119] Sprint PCS, PrimeCo, and Omnipoint Corp. are among the most notable. *See* Paul Kagan Associates, Inc., *Competitive Rates in Wireless Telecom*, Nov. 1997, at 3.

[120] *DLJ Report*, at 17.

[121] Perry D. Walter & Christopher E. Jefferson, PCS VERSUS CELLULAR: A QUARTERLY SURVEY OF WIRELESS PRICING IN MARKETS WHERE PCS OPERATORS HAVE BEGUN SERVICE, The Robinson-Humphrey Company, LLC, Oct. 8, 1997, at 3.

[122] *DLJ Report*, at 17.

[123] *WirelessNorth Releases Unlimited Minutes Plus PCS Plan*, News Release, WirelessNorth, Jan. 20, 1998.

subscriber per month today to only 280 by the year 2000.[124] In contrast, this analyst estimates that broadband PCS networks can currently support over 11,000 minutes-of-use per subscriber per month. While the average capacity per subscriber will decrease as the operators add subscribers, it is estimated that the average supportable minutes-of-use on broadband PCS networks will not fall below 1,000 minutes per subscriber per month until early in the next century.[125] The second motivation, which should benefit all mobile telephone operators, is simply to get users more comfortable with using their mobile telephones more often. It is believed that an increased comfort level will help shift traditional usage patterns away from wireline-based telephone services.

Prepaid Service. An important new marketing trend in the mobile telephone market has been the rise of prepaid service. Traditionally, many potential mobile telephone customers were denied service because of their poor credit rating, even though they could afford the cash investment required. This was done because of the great potential for customers to run up large bills in a very short period of time. Under the prepaid marketing plan, customers purchase a phone and a specific amount of service. Once those minutes are used, the customer cannot use the phone until more minutes are purchased.

While the use of prepaid service is fairly recent, it is already having an impact on some providers' operations. For example, Omnipoint reported that one-half of its new subscribers in the third quarter of 1997 were using prepaid service.[126] At least one analyst sees great potential for prepaid service, projecting that by 2001, 20 percent of customers will be using prepaid service.[127]

Prepaid service has benefits for both customers and operators. The customers without good credit ratings can gain access to mobile phone service. In addition, without the lengthy credit checks, purchasing prepaid service is a potentially much simpler transaction with customers buying generic shrink-wrapped packages. The operators gain access to a whole new group of potential customers who lacked the proper credit rating. Operators also can use prepaid service to market to other groups like the budget conscious and others who want to limit mobile telephone spending. Without the need for credit checks, operators can also greatly expand their distribution channels beyond their retail storefronts. Prepaid service also can reduce operator costs by limiting their exposure to fraud.

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[124] Paul Kagan Associates, Inc., *PCS Minute Inventory at 1.9 GHz a Powerful Weapon*, WIRELESS MARKET STATS, Jul. 17, 1996, at 2.

[125] *Id*. at 2.

[126] Thomas J. Lee, *Mobile Outlook - Third Quarter of 1997*, Equity Research: Wireless Services, Smith Barney, Nov. 26, 1997, at 59.

[127] *DLJ Report*, at 27.

Multiple Product Bundling. A number of telecommunications providers with mobile telephone operations have begun efforts to market wireless service bundled with traditional wireline-based services. Depending on how an operator implements this strategy, there can be many benefits to consumers. For example, US WEST Communications, Inc. is using its broadband PCS licenses to offer consumers a service which gives them a single telephone number for when they are at home, the office, or away from either.[128] Other operators are using this strategy to offer one-stop-shopping and an integrated bill for wireless and wireline telephony plus other services like Internet access and paging.[129] One of the motivations behind ALLTEL Corp.'s recently announced merger with 360° Communications, Inc. ("360°") was it enhanced both companies' ability to offer integrated product bundles.[130]

e. Wireless - Wireline Voice Competition

In addition to competing with each other for shares of the mobile telephone market, cellular, broadband PCS, and digital SMR operators can also potentially provide competition with wireline providers in the market for local exchange service.[131]

Historically, mobile telephony has been thought of as a complement to wireline voice services with each product competing for a different pool of customer minutes-of-use. Now, however, many believe that wireless and wireline technologies are increasingly competing for a single pool of minutes-of-use.[132] For example, wireline service currently costs between $0.05 and $0.20 per minute while one recent study estimated the price of mobile telephone service as ranging between $0.25 and $0.73 per minute.[133] This price differential means that wireline

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[128] *US WEST Delivers First-In-The-Nation Service Giving Customers the Convenience of Home of Office Phone "To-Go"*, News Release, US WEST Communications, Inc., Sep. 23, 1997.

[129] *See Packaged Offers Will Dominate BellSouth's Marketing Strategy in 1998*, BellSouth Corp., Feb. 25, 1998 *and ALLTEL to Launch Its First PCS Offering in Jacksonville, Florida*, News Release, ALLTEL Corp., Feb. 23, 1998.

[130] *See ALLTEL, 360° Will Merge in More Than $6 Billion Transaction*, News Release, ALLTEL Corp., Mar. 16, 1998.

[131] The mobile telephone providers are also competing with paging/messaging providers, which is discussed below, in Section III.B.6.b. There are also operators who are beginning to use fixed wireless technologies to provide local exchange service in competition with wireline providers. *See* Appendix F for a discussion of a variety of fixed wireless services.

[132] *See* Michael Elling, *The ABCs of PCS Pricing, Plus a Special Bonus - Virtual Wireless Local Loop*, Prudential Securities Equity Research, Mar. 7, 1997, at 6-7.

[133] *PCS is Driving Down U.S. Wireless Pricing*, News Release, The Yankee Group, Sep. 29, 1997.

networks capture the large majority of customers' total minutes-of-use.[134] However, as mobile telephone competition decreases this price difference, analysts believe that increasing numbers of customers will transfer telephone usage from wireline to wireless networks.[135] According to one operator, the ratio between wireless and wireline pricing has already decreased from 13-to-1 to 4.8-to-1.[136]

While many analysts concur that a transfer of usage between wireline and wireless systems will occur, it is hard to say exactly how long it will take or how much substitution will occur. One key variable is the sensitivities of consumer demand to the relative prices of wireless and wireline telephone service as the difference in prices narrows. However, it is difficult to make accurate predictions because there is no relevant behavioral history from which we can draw guidance.

Rather than waiting for mobile prices to decrease, wireless providers can compete for local access by creating pricing plans that encourage their customers to use mobile phones as substitutes for wireline phones. To date, these pricing plans have taken two forms. First, some operators have announced pricing plans with large bundles of minutes or even unlimited usage specifically designed to encourage the substitution of wireless for wireline usage. The pricing used by WirelessNorth described above was designed for this purpose.[137] In addition, AT&T recently announced several new nationwide, single-rate plans[138] which, according to AT&T, were partly targeted at individuals who travel a lot and see wireless as a replacement for wireline.[139] Second, some carriers offer their customers technologies and pricing plans that encourage use of their mobile phones while they are home or near home. For example, Bell Atlantic offers a service to its limited mobility and price conscious customers called Talk*Along*. This service offers lower monthly and per minute pricing for phone usage inside

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[134] A Yankee Group study reported that wireline networks commanded approximately 98 percent of all MOUs in 1996. *See DLJ Report*, at 5.

[135] Michael Elling, *The ABCs of PCS Pricing, Plus a Special Bonus - Virtual Wireless Local Loop*, Prudential Securities Equity Research, Mar. 7, 1997, at 6.

[136] These ratios were reported by the broadband PCS operator PrimeCo. *See* John M. Bensche, *Cooking with Gas at CTIA '98*, BENSCHE MARKS, Vol. 98-03, Wireless Services, Lehman Brothers, Mar. 3, 1998, at 1.

[137] *WirelessNorth Releases Unlimited Minutes Plus PCS Plan*, News Release, WirelessNorth, Jan. 20, 1998.

[138] *AT&T Launches First National One-Rate Wireless Service Plan*, News Release, AT&T Corp., May 7, 1998.

[139] *AT&T Wireless Joins Sprint PCS in Single-Rate Offer, but Adds Contracts*, COMMUNICATIONS DAILY, Vol. 18, No. 89, May 8, 1998.

of a small, geographically defined local calling area.[140]

f. Industry Projections

To gain an understanding of the future direction of the mobile telephone market, it is useful to consider projections made by a number of telecommunications market analysts. These projections, however, represent a wide range of opinions that were generated using different methodologies and assumptions.[141] The estimates made in these projections of the national penetration rate of mobile telephone service in the year 2002 range between 38 and 47 percent. According to these predictions, cellular carriers will have between 25 and 31 percent of the penetration. Broadband PCS carriers will have between 8 and 15 percent of the penetration and digital SMR carriers will have the remainder.

To unify these projections for the purposes of calculating an average growth rate, we have calculated an average of these projections. According to this average figure, the mobile telephone market's total penetration rate would grow at a compound annual average growth rate of approximately 14.7 percent over the next five years and the market would have over 114 million subscribers by the end of 2002. Cellular operators would have 68.3 percent of these subscribers, broadband PCS operators 25.8 percent, and digital SMR operators 5.9 percent. This level of subscribership would translate into a national penetration rate of over 41 percent by the end of 2002.

An important trend to note is that all of the projections assume that the new entrants would gain an increasing percentage of each year's incremental growth at the expense of cellular operators. In each of the last two years of these projections, broadband PCS operators would gain, on average, 57 percent of new subscribers while cellular operators would gain slightly more than 33 percent, with digital SMR operators gaining the rest.

2. Cellular Sector Analysis

The Commission has licensed 50 MHz of spectrum in the 800 MHz frequency band for two competing cellular systems in each market (25 MHz for each system). These licenses are divided into 305 Metropolitan Statistical Areas ("MSAs") and 428 Rural Service Areas ("RSAs"), plus a market for service in the Gulf of Mexico, for a total of 734 geographic license areas.

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[140] Bell Atlantic Corp., *TalkAlong from Bell Atlantic* (visited Apr. 6, 1998) <http://www.bam.com/talkalng.html>.

[141] *See* Appendix B, Tables 5A-5E, pp. B-7 to B-9 for the figures described in this section.

a. Cellular Sector Structure and Performance

As illustrated in Appendix B, Table 7A,[142] the nine largest cellular operators by subscribership are affiliated with either bell operating companies ("BOCs"), inter-exchange carriers, or entities that have been spun off from one of those two (Airtouch and 360°).[143] Most of the remaining operators fall into two groups: (1) independent cellular carriers generally specializing in providing service in rural areas (e.g., Western Wireless, Rural Cellular Corp., and CommNet) and (2) smaller LECs, who own licenses in their wireline service areas (e.g., SNET and Aliant Communications, Inc.).[144]

This divide between the nine largest operators and the rest of the sector can be seen in the carriers' penetration rates.[145] At the end of 1997, the large carriers, with their mostly urban systems which were launched in the 1980s and early 1990s, all had penetration rates between 9.1 and 12.2 percent. In contrast, many of the remaining carriers, with their mostly less populated systems which were launched in the 1990s, have penetration rates between five and eight percent.

Over the past several years, the operation of cellular systems has blossomed into a sizable business. The total revenues of the cellular companies reported in Appendix B have increased from over $10 billion in 1994 to more than $24 billion in 1997.[146] In 1997, each of the nine largest operators had in excess of $1 billion in revenue, with the five largest having over $2.5 billion. As cellular operators have increased their total volume of business, they have also improved their efficiency and profitability, exhibited by increasing their EBITDA margin[147] from 34.6 percent in 1994 to 39.0 percent in 1997.[148] In addition, the annual growth rate of the EBITDA margin increased from 3.8 percent in 1994 to 4.7 percent in 1997.

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[142] The data in this table, as well as Tables 7B through 7E, are for companies required to report information with the Securities and Exchange Commission because they are traded on either the public equity or public debt markets.

[143] *See* Appendix I for a list of cellular license ownership by operators for whom information was available.

[144] Some of these LECs have seen the potential of mobile telephones and have greatly expanded their cellular businesses beyond their wireline service areas.

[145] *See* Appendix B, Table 7B, p. B-12.

[146] *See* Appendix B, Table 7C, p. B-13.

[147] A company's EBITDA margin, or cash flow margin, equals EBITDA divided by total revenue. It is used as a measure of a company's efficiency and profitability. EBITDA is defined as earnings before interest, taxes, depreciation and amortization.

[148] *See* Appendix B, Table 7E, p. B-15.

b. Response to Competition

The most important change in the cellular sector brought about by the rise of competition has been the deployment of digital services. This change has been driven by the limitations of the analog technology originally used by the cellular operators. While cellular operators have achieved nearly complete coverage of the United States,[149] they were beginning to encounter over-capacity problems on their systems, threatening to degrade their quality of service and limit subscriber growth. By integrating digital technology into their networks, the cellular operators are able to use compression algorithms to increase the capacity of their networks. Digital technology also allows many more services to be delivered to customers through their handsets, such as e-mail and other data applications. The cellular operators knew that gaining similar capabilities would be essential to remaining competitive with the digital networks used by the impending new entrants.

In an effort to track the digital rollout by cellular operators, we have compiled a list of MSAs and RSAs with some level of digital coverage by the incumbent cellular operators. This data is based on information from operators, as well as publicly available information released by the operators such as news releases, filings made with the Securities and Exchange Commission, and coverage maps available on operators' Internet sites. This analysis found that digital cellular services are available in over 249 MSAs and RSAs, which have a combined coverage of more than 178 million POPs, or approximately 71 percent of the nation's total population.[150] It is important to note that while there is significant cellular coverage using digital technology, most of the cellular providers' existing subscriber base is still using analog technology.

3. Broadband PCS Sector Analysis

Broadband PCS is similar to cellular service, except that broadband PCS systems were designed to use a digital format. The Commission set aside 120 MHz between 1850 MHz and 1990 MHz for broadband PCS.[151] This spectrum is divided into three blocks of 30 MHz each and three blocks of 10 MHz each. Two of the 30 MHz blocks are divided into 51 Major Trading Areas ("MTAs"). One of the 30 MHz blocks and all of the 10 MHz blocks are divided into 493 BTAs.

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[149] *See* Appendix H, Map 1, p. H-2 for a map of analog cellular coverage.

[150] For a map *see* Appendix H, Map 2, p. H-3.

[151] The remaining 20 MHz of spectrum for unlicensed broadband PCS is allocated for short-range communications such as a local area network in offices. These systems operate with very low power and have a limit on the duration of transmissions.

a. Broadband PCS Sector Structure and Performance

The companies deploying broadband PCS networks are still in the early stages of developing their businesses. As expected of telecommunications businesses in their start-up phases, all of the operators are investing large sums of capital on infrastructure construction as well as marketing efforts designed to gain as many new, revenue-generating customers as possible. Consequently, many traditional measures of financial performance are of limited use. For example, analysts expect typical broadband PCS operators to incur negative EBITDA until at least the year 2000, with no positive net income achieved for several additional years.[152]

One method of evaluating the performance of broadband PCS operations is to monitor their ability to add new subscribers. Throughout 1996 and 1997, broadband PCS operators report increasing levels of subscriber growth.[153] For example, in the fourth quarter of 1997, the broadband PCS operators added over 848,000 new subscribers, an increase of 53.4 percent over the 553,000 subscribers added in the third quarter of 1997 and more than double the 406,000 added during the second quarter.

b. Broadband PCS Trends - Franchising and Joint Ventures

So far this year, broadband PCS licensees have entered into several joint ventures making use of the Commission's partitioning and disaggregation rules. The three largest of these ventures were initiated by AT&T. First, on October 9, 1997, AT&T created a partnership in which Triton PCS received 20 MHz of AT&T's MTA licenses in a number of BTAs throughout the Southeast.[154] In return for the 11 million POPs in these BTAs, AT&T received a 20 percent stake in Triton PCS. Since then, AT&T announced similar ventures with TeleCorp, Inc. and Cincinnati Bell, Inc. covering a total of 14.4 million POPs.[155]

These partnerships are of particular significance because AT&T is allowing its partners to use

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[152] *See DLJ Report*, at 24; John M. Bensche & Briar Mewbourne, *The PCS Report: Coverage Initiated on the Personal Communications Services Industry*, Wireless Services, Lehman Brothers, Nov. 11, 1997, at 46.

[153] *See* Appendix B, Table 8, p. B-16.

[154] *Joint Venture Agreement Expands AT&T's Digital Wireless Phone Coverage*, News Release, AT&T Wireless, Oct. 9, 1997.

[155] *See AT&T Wireless, TeleCorp Venture to Build, Operate Digital Wireless Network*, News Release, AT&T Wireless Services, Jan. 26, 1998; *AT&T, Cincinnati Bell Agree to Form Digital Wireless Venture*, News Release, AT&T Wireless Services, Feb. 3, 1998.

the AT&T name in their marketing efforts.[156] This deal may be the start of a larger trend as other carriers are said to be investigating the possibility of franchising their brand names in a similar manner.[157]

According to analysts, one motivation behind these partnerships is the desire to speed the rollout of broadband PCS networks in smaller urban and rural areas which might have a lower priority in AT&T's deployment plans.[158] While the larger PCS licensees have generally concentrated their rollout efforts in major urban markets, they realize the strategic importance of creating truly nationwide networks as quickly as possible. These partnerships allow the large broadband PCS operators to continue concentrating their financial resources on larger markets, while their new partners can begin construction in less populated areas.[159]

c. Competitive Development

Given that the broadband PCS sector is in its early stages of development, the most important variable affecting its ability to compete in the mobile telephone market is coverage. As discussed above, the primary short-term advantage held by the incumbent cellular sector is its near ubiquitous coverage. Many potential customers, especially business users, will be hesitant to sign up for service until broadband PCS has adequate coverage. Thus broadband PCS operators have made expansion of their footprint a primary focus.

To date, broadband PCS service has been launched in approximately 249 BTAs containing over 213 million POPs.[160] (*See* Figure 4 for a map). This represents 84 percent of the nation's total POPs. While close to 70 percent of these BTAs have only one broadband PCS operator, 67 BTAs have two PCS operators and 15 BTAs have three operators. These 82 BTAs include 57 percent of the nation's POPs.

Viewing the rollout of broadband PCS by license blocks shows that most of the activity has

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[156] AT&T has also entered into a deal with Dobson Communications, Inc. ("Dobson"), whereby AT&T will assist Dobson in the construction of a network using the same digital technology as AT&T. *See Dobson Communications Signs Operating Agreement with AT&T Wireless Services*, News Release, AT&T Wireless Services, Dec. 10, 1997.

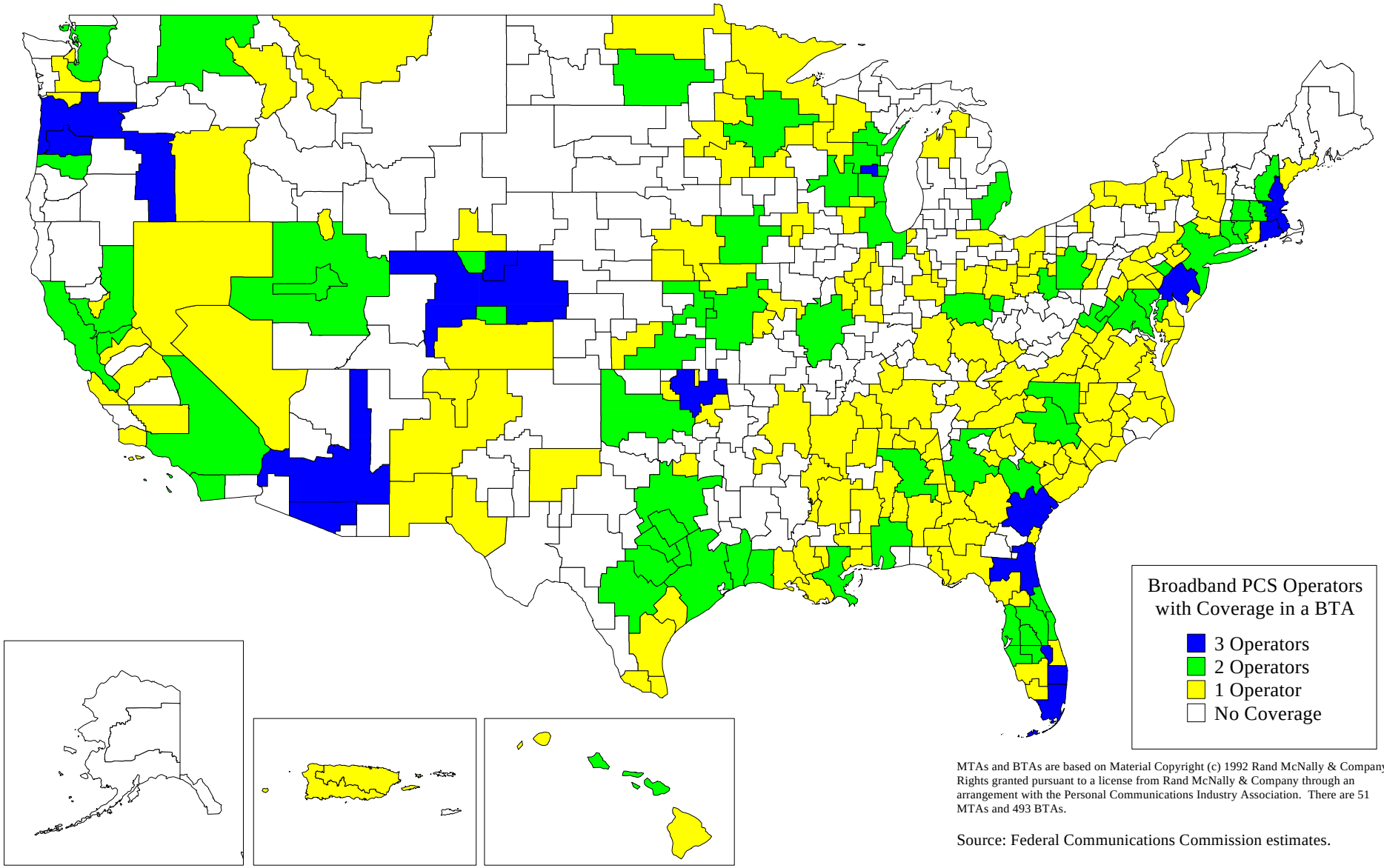
[157] Stephanie N. Mehta, *Sprint, Too, Moves to Franchise Wireless Service*, THE WALL STREET JOURNAL, Sep. 26, 1997, at B5.

[158] Telecommunications Reports International, Inc., *AT&T Wireless Joint Ventures Would 'Franchise' Brand Name*, WIRELESS MESSAGING REPORT, Sep. 30, 1997.

[159] *Id.*

[160] *See* Appendix B, Table 9A, p. B-17.

Estimated Broadband PCS Service Rollouts: Number of PCS Operators in Each BTA with Some Level of Coverage



Source: Federal Communications Commission estimates.

Figure 4

been in the A and B blocks, with 118 and 174 BTAs launched respectively.[161] C block operators have coverage in 33 BTAs with over 17 million POPs.

To show the size of the markets where the broadband PCS operators have been concentrating their deployment efforts, the Commission has divided the BTAs into quartiles by their total populations.[162] Of the BTAs in the top quartile (the 123 most populated BTAs), 110 have at least one broadband PCS new entrant providing coverage. The second quartile (the next 123 most populated BTAs) has 70 BTAs with some coverage and the bottom two quartiles have only 42 and 27 BTAs, respectively, with coverage.

d. Factors Affecting Sector Growth and Competitive Development

While the broadband PCS sector has performed well in its attempt to enter the mobile telephone market, there are a number of issues that have the potential to limit operators' ability to develop their businesses and compete with incumbent cellular operators.

(1) Coverage by Technology Type

One factor often cited as impacting the ability of broadband PCS operators to gain and retain customers is their relative lack of coverage compared to cellular operators.[163] This means that until broadband PCS operators have deployed systems with coverage more comparable to that of incumbent cellular operators, the broadband PCS operators may be at a competitive disadvantage. While broadband PCS operators have launched service in BTAs covering a large percentage of the nation's population, this coverage is not as complete as it seems due to the different technologies in use by different operators. When the Commission created broadband PCS, it chose not to mandate the use of a specific technology. This led to the use of three different technologies: Code Division Multiple Access ("CDMA"), Time Division Multiple Access ("TDMA"), and GSM.[164] At present, a phone using one of these three technologies will not function in an area that only has coverage by one of the other two. The result of these competing technologies is that for all broadband PCS operators to achieve a

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[161] *See* Appendix B, Table 9C, p. B-17.

[162] *See* Appendix B, Table 9D, p. B-18.

[163] *See* Linda Runyon et al., *The Next Generation II: Wireless in the US*, United States - Telecommunications/Wireless, Merrill Lynch, Mar. 10, 1998; *J.D. Power and Associates Report Shows PCS Leading Cellular Providers in Customer Satisfaction*, News Release, J.D. Power and Associates,Jan. 13, 1998.

[164] 21st Century Telesis, Inc. is planning to use a fourth technology called Personal Access Communications System ("PACS") with its C, D, and F block broadband PCS licenses. PACS is a low-power microcell technology which its proponents believe can be installed at a lower cost that the other, high-power, broadband PCS technologies. *See* Lynnette Luna, *21st Century Grooming First PACS Deployment*, RCR RADIO COMMUNICATIONS REPORT, Dec. 29, 1997, at 1 and 38.

footprint competitive with that of cellular operators, three complete national networks will have to be deployed or dual mode phones must be widely used (*see* below).

Viewing broadband PCS deployment in terms of the technology,[165] CDMA has covered the most POPs by launching in BTAs with over 67 percent of the nation's POPs.[166] Although GSM has coverage in more BTAs than CDMA, it has fewer total POPs, with over 56 percent of the nation's POPs. This is due to GSM being deployed by many C block licensees and most of the C block launches have been in smaller, rural BTAs with lower population densities. While TDMA is far behind in terms of broadband PCS rollouts (with coverage in 18 BTAs), several cellular carriers, including most notably AT&T, have extensive footprints for TDMA in their cellular network.

(2) Dual Mode Phones

To compensate for their lack of coverage, broadband PCS operators planned to use phones that are capable of using multiple technologies and multiple bandwidths. In general, dual mode phones will first search for its digital network and if none is found, it will connect to the analog cellular network. While many operators assumed that phones possessing this type of capability were going to be available soon after they launched, the devices are only just becoming available. To date, dual mode phones are only available for TDMA and CDMA. Integrated dual mode GSM phones are not yet generally available.[167]

(3) State and Local Tax Issues

A trend affecting mobile telephone operators since the original broadband PCS auctions has been the rise of state and local governments imposing taxes and fees specifically on telecommunications carriers. These assessments take numerous forms. For example, governments have levied taxes based on the amount broadband PCS operators paid for their licenses in the Commission's auctions.[168] Taxes have been assessed based on the gross receipts from the usage of wireless telecommunications devices based on the logic that

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[165] *See* Appendix H, Maps 3, 4, and 5, pp. H-4, H-5, and H-6 for maps.

[166] *See* Appendix B, Table 9B, p. B-17.

[167] Nokia does manufacture a Nokia Plus module that makes the Nokia 6190 the first phone supporting dual mode AMPS/GSM 1900 roaming. *See Nokia Introduces Next Generation Product Family for GSM,* News Release, Nokia Corp, Nov. 10, 1997. Most operators using GSM have chosen to wait for fully integrated dual mode units to become available.

[168] *See* Western PCS I Corp. Petition of Preemption of the Oregon Department of Revenue Notice of Proposed Assessment; and Request for Declaratory Ruling, File No. WTB/POL 96-3 (filed Jul. 8, 1996).

wireless operators were avoiding public rights of way by using city air space.[169] Fees and taxes have also been required before permission can be granted to construct tower sites.[170]

4. Other Competitors: Nextel Communications, Other Specialized Mobile Radio Operators, and Resellers

This section discusses several other types of operators who are providing competition in the mobile telephone market: Nextel Communications, Inc., other SMR operators, and resale operators.[171]

a. Nextel Communications, Inc.

For a number of years, another source of competition in the mobile telephone market has been SMR service. SMR was first established by the Commission in 1979 to provide land mobile communications on a commercial basis. While the primary use for SMR traditionally has been dispatch services,[172] SMR systems have always had the ability to offer "interconnected" service allowing access to the PSTN, but have suffered from limited capacity.[173] The new digital technologies have allowed SMR to become a competitor in the mobile telephone market.

The operator most responsible for using digital technology to make SMR a competitor in the mobile telephone market has been Nextel, with its deployment of Motorola's integrated Digital Enhanced Network ("iDEN").[174] Nextel began offering digital mobile telephone service in August 1993. However, first generation iDEN technology experienced a number of technical difficulties that had a negative effect on the system's reliability, capacity, and voice

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[169] Christopher Davis, *Proposed Cellular Ordinance Adds Fee*, INDEPENDENT MAIL (Anderson City, South Carolina), Jun. 16, 1997.

[170] *Council To Consider Cellular-Tower Fee*, THE COURIER-JOURNAL (Louisville, Kentucky), Nov. 30, 1997, at 2B.

[171] Another source of potential competition in the mobile telephone market is from satellite-based providers who are currently in the progress of deploying their systems. *See* Appendix G, p. G-1 for a further discussion.

[172] *See* Section III.C for a discussion of the dispatch market.

[173] SMR carriers who provide interconnected service are also required to follow Commission regulations related to common carrier services. *See* Champion Communications Services, Inc., Form 10-KSB40, Dec. 31, 1997, at 10-11.

[174] There are examples of other SMR licensees (Southern Communications, Inc., also using iDEN, and Geotek Communications, Inc., using their own FHMA system) who are more focused on the traditional dispatch market using digital technology. *See* Section III.C.

transmission quality.[175] Nextel relaunched its iDEN digital network in Chicago during the third quarter of 1996 and has continued to expand its network throughout 1997. Nextel's network currently covers approximately 65 percent of the nation's population,[176] with coverage in more than 400 cities,[177] including 79 of the top 100 markets.[178] At the end of the third quarter of 1996, after three years of offering iDEN service in a limited number of markets, Nextel had acquired 228,000 digital customers. Due in part to a wider level of deployment, this number had increased to over 1.6 million during the six quarters since the relaunch, with net subscriber growth increasing each quarter.[179]

Nextel has combined the iDEN technology with a marketing plan to make its digital service a unique offering in the mobile telephone market designed to appeal most to business users.[180] In addition to interconnected mobile telephone service, iDEN allows Nextel to offer customers paging/messaging as well as traditional two-way dispatch services through its "Direct Connect" feature. All of these services can be accessed from a single, multi-function unit.[181] Nextel has also leveraged its nationwide footprint by not charging roaming fees to customers, so that users get the same prices wherever they use their Nextel phone. In addition, Nextel bills per second after the first minute of use and allows a business to pool its minutes among all employees.[182]

Nextel holds less spectrum than most of its cellular and broadband PCS competitors. Nextel holds between 10 and 15 MHz of the 21.5 MHz 800 MHz SMR band in most of the larger markets, ranging from an average of 14 MHz in the top 10 cities to slightly more than 10

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[175] Nextel Communications, Inc., Form 10-K, Dec. 31, 1996, at 5.

[176] Nextel Communications, Inc., Form 10-K, Dec. 31, 1997, at 27.

[177] *Nextel Adds More Markets to Its National Network*, News Release, Nextel Communications, Inc., Dec. 4, 1997. *See* Appendix H, Map 6, p. H-7 for a map of Nextel's deployment.

[178] *Nextel Reports First Quarter 1998 Results*, News Release, Nextel Communications, Inc., Apr. 15, 1998.

[179] *See* Appendix B, Table 10, p. B-18.

[180] Nextel has begun to explore selling its phones through retail outlets such as Ritz Camera Centers, Inc. and CompUSA, Inc. and has indicated that it may start to market its products beyond the business community sometime in the future. *See* Stephanie N. Mehta, *Nextel Takes First Steps Into Consumer Market*, THE WALL STREET JOURNAL, Nov. 13, 1997, at B6.

[181] Nextel Communications, Inc., Form 10-K, Dec. 31, 1996, at 4.

[182] Cynthia M. Motz & Robert J. Hordon, *Nextel Communications*, Equity Research - Americas - Wireless Telecommunications Services, Credit Suisse First Boston, Dec. 18, 1997, at 4.

MHz across the top 300 cities.[183] In the Upper 800 MHz SMR auction, Nextel was the high bidder on 475 licenses for a total of $88.8 million.[184] On average, Nextel won rights to almost 10 MHz of spectrum in areas covering approximately 98 percent of the U.S. population. To gain full use of these licenses, Nextel will need to relocate incumbent licensees to other portions of the 800 MHz band pursuant to established FCC rules. These licenses may allow Nextel to re-tune all other licensees currently operating in the license blocks won by Nextel in order to achieve a contiguous spectrum position and gain an estimated 30,000 additional usable frequencies throughout the United States.[185] Nextel's technology is incompatible with those of cellular and broadband PCS networks, which means that Nextel's digital customers will only be able to use their phones in areas where Nextel itself has deployed iDEN technology.[186] To counter this, Nextel plans to expand it footprint to cover 85 percent of the nation's POPs within the next few years.[187]

b. Other SMR Operators

Traditionally, urban SMR operators have had only a limited ability to offer mobile telephone services. This has been due to a number of factors including limited spectrum availability and the preclusion of spectrum reuse by the high-power, single site transmitter systems employed by SMR operators.[188] In contrast, in less spectrum-scarce, rural areas, SMR operators have faced fewer capacity difficulties. Consequently, they have had a greater ability to offer mobile telephone services.[189] For example, until its merger with Nextel, Pittencrieff Communications, Inc. focused on rural areas and presented its service as an alternative to cellular operators.[190] In total, the portion of the SMR market other than Nextel that offers

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[183] John M. Bensche & Briar Mewbourne, *Nextel Communications: Initiating Coverage*, Wireless Services, Lehman Brothers, Sep. 3, 1997, at 8.

[184] *See* Appendix A, Table 5, p. A-5.

[185] *Nextel Strengthens Spectrum Position in FCC Auction*, News Release, Nextel Communications, Inc., Dec. 9, 1997.

[186] *See* Nextel Communications, Inc., Form 10-K, Dec. 31, 1997, at 29-30. Nextel does have roaming agreements with operators in other countries such as Clearnet Communications, Inc. in Canada. *See* Nextel Communications, Inc., Form 10-K405, Dec. 31, 1997, at 4.

[187] Nextel Communications, Inc., Form 10-K, Dec. 31, 1996, at 10.

[188] Nextel Communications, Inc., Form 10-K, Dec. 31, 1996, at 5.

[189] Pittencrieff Communications, Inc., Form 10-K, Dec. 31, 1996, at 4.

[190] *Id*. at 4.

interconnected service today has several hundred thousand customers.[191]

c. Resellers

Resellers offer service to consumers by purchasing airtime at wholesale rates from facilities-based providers and reselling it at retail prices.[192] According to a survey performed by the National Wireless Resellers Association ("NWRA"), the resale sector has between 100 and 120 providers with a total of approximately 2 million mobile telephone subscribers.[193] In 1996, the top 20 resale providers had almost 1 million subscribers, an increase of 28 percent from 1995.[194] In addition, while MCI Communications Corp. remains by far the largest reseller with almost 42 percent of the top 20s' subscribers, over 88 percent of this growth was generated by the remainder of the top 20s' providers.

In June 1996, the Commission adopted an order extending the cellular resale rule to broadband PCS and certain SMR carriers.[195] Under the rule, carriers are prohibited from unreasonably restricting the resale of their services, and no carrier may offer like communications services to a reseller at less favorable prices, terms, or conditions than are available to similarly situated customers, absent reasonable justification.[196]

To date, resellers have stated that they have had only minimal success with entering into agreements with A and B block broadband PCS carriers. In the NWRA survey mentioned above, only 11 percent of the respondents said they had an agreement with a broadband PCS carrier, and only 7 percent had agreements with someone other than Next*Wave*.[197]

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[191] *See* Appendix D, Table 1, p. D-2.

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

[193] Anthony Bruno, *Resale Industry Rises to Meet Challenges of New Environment*, RCR RADIO COMMUNICATIONS REPORT, Aug. 4, 1997, at 11.

[194] *See* Appendix B, Table 11, p. B-19.

[195] 47 C.F.R. § 20.12. Interconnection and Resale Obligations Pertaining to Commercial Mobile Radio Services, CC Docket No. 94-54, *First Report and Order*, 11 FCC Rcd 18455 (1996) *(Resale Report and Order) recon. pending*. The Commission also determined that the development of a competitive market will obviate the need for a resale rule. Therefore, the Commission's rules terminate five years after the last group of initial licenses for broadband PCS is awarded. *Resale Report and Order*, 11 FCC Rcd 18468-69.

[196] *Resale Report and Order*, 11 FCC Rcd at 18462 (para. 12).

[197] Anthony Bruno, *Resale Industry Rises to Meet Challenges of New Environment*, RCR RADIO COMMUNICATIONS REPORT, Aug. 4, 1997, at 12.

B. Paging and Messaging

Like the mobile telephone industry, the paging industry is seeing a convergence of technological offerings. Paging, offered since the 1940s, has historically been a one-way wireless radio-transmission using coded radio signals to activate a device that provides a sound, visual or tactile indicator. However, paging carriers are in the process of expanding their product offerings to include two-way messaging, voice messaging, and data transmission such as e-mail and stock quotes. What has traditionally been called the paging industry is using these new products to redefine itself for the information age as the messaging industry.

This report's discussion of the paging industry begins with an analysis of the industry as a whole followed by information about specific service providers including information about consolidations and restructurings in the marketplace. The report also identifies two major regulatory issues (interconnection and pay phone compensation) which affect the entire paging and messaging industry. Finally, it discusses emerging technologies, many of which employ narrowband PCS spectrum.

1. Paging Industry Structure and Performance

The paging industry continues to experience substantial growth in terms of total subscribership and annual revenues as shown in Figure 5.[198] According to analysts, over seven million new paging units (including both one- and two-way units) were estimated to be added in 1997 for a total of 49.8 million paging units.[199] This estimate projects that at year-end there were more than two and one-half times the number of pagers on the market compared to just five years ago. The total 1997 paging revenues are estimated to be $5.1

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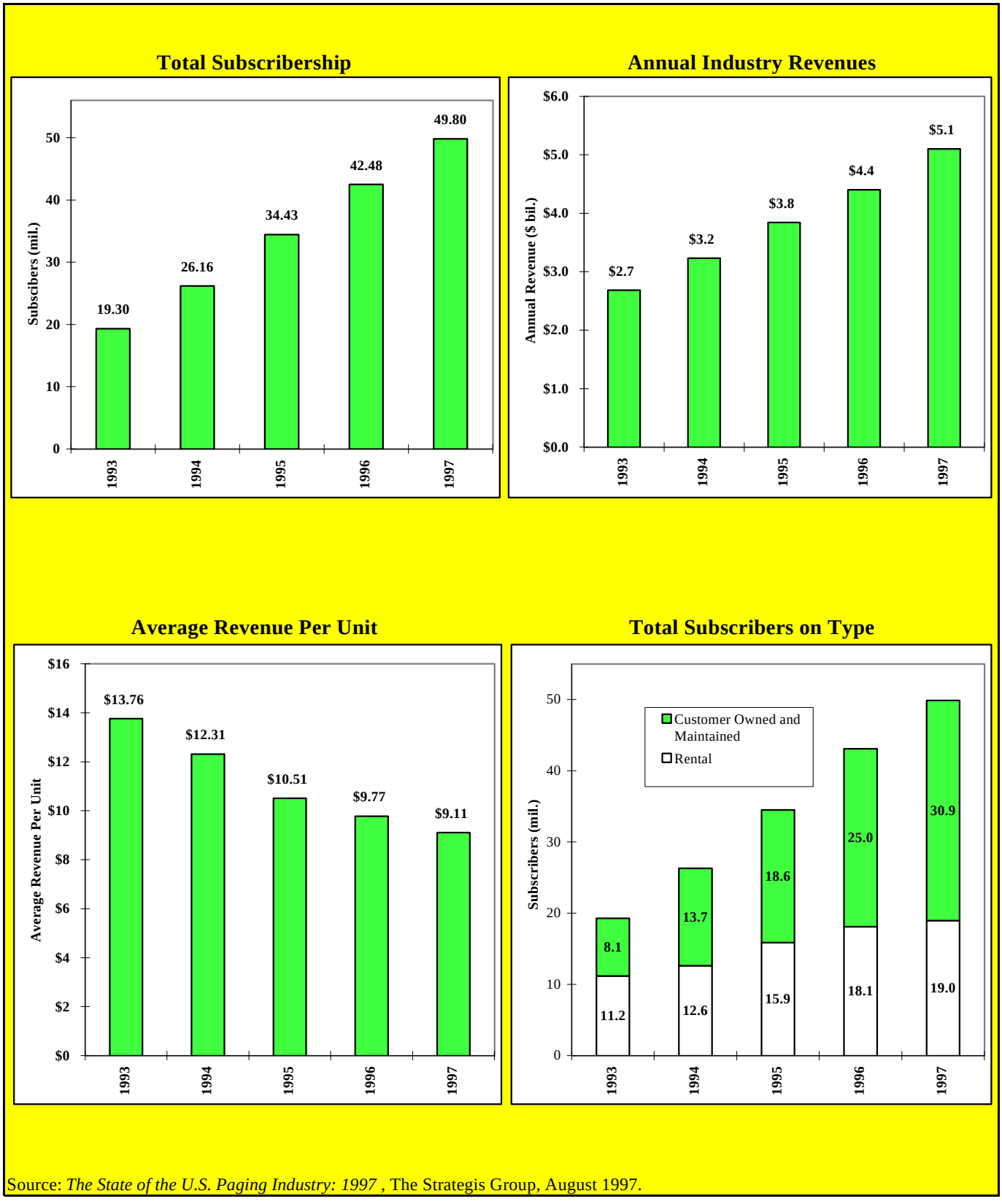
[198] Appendix C, Table 1, p. C-2, displays the information in tabular form. Appendix C also includes lists of public paging companies' paging units in service, paging company revenues, EBITDA/operating cash flow, and EBITDA/operating cash flow Margin. *See* Tables 2, 3, 4, and 5, pp. C-3 through C-7, respectively.

[199] THE STATE OF THE U.S. PAGING INDUSTRY: 1997, The Strategis Group (1997) at 32. ("*Strategis Paging Report*") Because the Commission had access to only one source of comprehensive historic industry-wide numbers, we have chosen to use the same source for forecasted year-end 1997 numbers for comparison purposes. Other forecasts that were available are summarized below. Forecasts of Donaldson, Lufkin & Jenrette Securities Corporation (48 million), PCIA, 1997 WIRELESS MARKET PORTFOLIO, A COLLECTION OF FORECASTS ON THE WIRELESS INDUSTRY, at 11. ("*PCIA Forecast*") The Insight Research Corporation (44.48 million), *id*. at 14. Paul Kagan Associates, Inc. (48.6 million), *id*. at 15-16. Forecast of WinterGreen Research Inc. (52.7 million). *Status Report: Snapshot of Paging, Consumer Appeal Drives Paging*, WIRELESS WEEK, Dec. 1, 1997, at 24. Credit Suisse estimates 46.01 million subscribers for 1997. Cynthia M. Motz & Robert J. Hordon, *Where's the Beep?*, Equity Research--Americas, Credit Suisse First Boston, Feb. 18, 1998, at 14. ("*Credit Suisse*")

Figure 5: Paging/Messaging Industry - 1993 to 1997



Source: *The State of the U.S. Paging Industry: 1997* , The Strategis Group, August 1997.

billion.[200]

While subscribership and annual revenues have increased, the ARPU[201] has decreased by one-third over the past five years from $13.76 in 1993 to $9.11 in 1997.[202] One reason for the decrease in ARPU is the increased number of Customer-Owned and Maintained ("COAM") pagers compared to the number of rental pagers in service since 1993. Driven in part by decreasing prices for pagers over the period 1993 to 1997,[203] COAM pagers, which constituted 42 percent of the market in 1993, were forecasted to increase to 62 percent of the market in 1997. Despite the decrease in ARPU since 1993, analysts anticipate that the increased penetration of alphanumeric paging, the development of narrowband PCS services, and a stabilization of paging reseller rates will increase average monthly revenue per pager over time.[204]

2. Operational Trends

There are more than 600 paging companies in the United States.[205] However, there has been a great deal of consolidation in the marketplace as evidenced by the increase in the market share held by the ten largest publicly-traded paging companies. In 1993, the ten largest publicly-traded paging carriers accounted for 47 percent of the market and by the end of 1997 they accounted for 64 percent.[206] Furthermore, in 1997 the top five companies accounted for

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[200] *Strategis Paging Report*, at 41. Other forecasts include The Insight Research Corporation ($5.1 billion), *PCIA Forecast*, at 13-14. Paul Kagan Associates, Inc., ($4.2 billion), *id*. at 15-16. The Strategis Group ($5.1 billion), *id*. at 17-18. The forecast of WinterGreen Research Inc. ($6.6 million). *Status Report: Snapshot of Paging, Consumer Appeal Drives Paging*, WIRELESS WEEK, Dec. 1, 1997, at 24.

[201] For a further discussion of ARPU *see* Section III.A.1.a.

[202] *Strategis Paging Report*, at 7 and 64.

[203] The price of a numeric pager has fallen from $126 in 1992 to $58 in 1997, while the price of an alphanumeric pager has fallen from $191 to $132 during the same period. WIRELESS PRICING 1998, The Strategis Group (1998).

[204] *Paging Industry Posts Surprising Growth*, Press Release, The Strategis Group, Aug. 22, 1997, Washington, D.C.

[205] *Paging Facts & Industry Links*, PageMart Industry Information (visited Jan. 14, 1998) <http://www.pagemart.com/f_1.html>.

[206] *See* Appendix C, Table 2, p. C-3. *See also Strategis Paging Report*, at 32, 181 (updated by Strategis and information contained in company filings with the Securities and Exchange Commission). In order to calculate the 1993 percent, MobileComm with 1,232,000 units was included in the top ten. BellSouth Corporation, Form 10-K, Dec. 31, 1995, at 28. In the *Second Report*, the Commission noted that the top 10 carriers constituted 83 percent of the market but noted that other percentages reported include 70 percent and 62 percent, noting that, "[T]he 83 percent share may be overstated as it does not reflect the expanded universe of paging subscribers due to PCS systems that include paging as part of the total service package." *Second Report*,

more than 50 percent of the $5.1 billion paging market. However, despite the increase in market concentration, there are still a large number of competitors in each market. The 25 largest cities in the nation have an average of 29 paging licensees, not including resellers, while the 25 smallest MSAs have an average of 12 paging licensees per area.[207]

3. Industry Consolidations

During the past year there have been two major consolidations in the paging marketplace as Metrocall acquired Page America and ProNet.[208] A third major consolidation in the paging market between Telephone and Data Systems, Inc. ("TDS") and TSR Paging ("TSR") reached agreement in 1997 and was completed in April of this year. Industry analysts anticipate that there will be additional mergers and consolidations in the paging marketplace.[209]

Metrocall. On July 1, 1997, Metrocall, the country's fifth largest paging company at that time, completed its purchase of Page America and acquired over 200,000 customers.[210] Following that acquisition, on December 30, 1997, Metrocall acquired ProNet, the seventh largest carrier, giving Metrocall over 4 million customers and making it the second largest paging carrier in the United States.[211]

TDS/TSR. On December 23, 1997, Telephone and Data Systems, Inc. ("TDS"), owner of approximately 82 percent of American Paging, Inc., announced it had entered into an agreement with TSR Paging, Inc. ("TSR") to combine their paging businesses into a limited

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12 FCC Rcd at 11302. TSR Paging, Inc., a privately-held paging company would be ranked eighth in terms of number of domestic paging units. We have not included TSR in the list because we do not have publicly available financial data on the company. Substituting TSR in eighth place would increase the top 10 market share (publicly- and privately-held companies) to 65 percent. *Strategis Paging Report*, at 181. *TDS Announces Agreement to Combine American Paging With TSR Paging*, News Release, TSR Paging, Inc., Dec. 23, 1997.

[207] RCR, RCR'S 1997 PAGING HANDBOOK. The numbers reported in the *Second Report* (*see* 12 FCC Rcd at 11301, n. 145) for the 25 largest cities included only those licensees operating as Radio Common Carriers ("RCC") and due to an oversight did not include Private Carrier Paging ("PCP") providers. Including PCPs would increase the number of licensees in the 25 largest cities from 18 to 33.

[208] In addition, there were also a few smaller mergers. ProNet acquired Modern & Personal Communications (18,000 paging units) and Teletouch purchased laPAGEco (6,800 units). *Strategis Paging Report*, at 189. On December 15, 1997, Vanguard Cellular acquired NationPage (70,000 paging units). *Credit Suisse*, at 46.

[209] *DLJ Report*, at 33; Jeanine M. Oburchay & Colin McArdle, WIRELESS MESSAGING, Bear, Stearns & Co. Inc., Aug. 29, 1997 at 3-4.

[210] *Metrocall Completes Page America Transaction*, Press Release, Metrocall, Inc., Jul. 1, 1997.

[211] *Metrocall Completes ProNet Merger*, Press Release, Metrocall, Inc., Dec. 30, 1997.

liability company called TSR Wireless, LLC, resulting in the fourth largest paging company in the United States.[212] On April 7, 1998, TDS announced that American Paging, Inc. and TSR Paging, Inc., had completed the final step in the combination.[213]

4. Industry Restructurings

In addition to the industry consolidations discussed above, there have also been major industry restructurings over the past year. The largest restructuring occurred when MobileMedia Corporation ("MobileMedia"), the country's third largest paging company, filed for Chapter 11 protection. In addition, EconoPage, Inc. closed its business in the fall of 1997.

Mobilemedia. On January 31, 1997, MobileMedia, a provider of one-way paging over its two nationwide networks, filed for protection under Chapter 11.[214] Financial problems stemming from the acquisition of BellSouth's MobileComm paging unit were said to have contributed to the Company's insolvency.[215] On January 27, 1998, MobileMedia filed its reorganization plan with the United States Bankruptcy Court for the District of Delaware.[216] MobileMedia continues to operate and serve its 3.4 million customers and recently announced plans to build out its narrowband PCS networks and begin providing two-way services in selected markets

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[212] *TDS Announces Agreement to Combine American Paging With TSR Paging*, News Release, TSR Paging, Inc., Dec. 23, 1997.

[213] *TDS Announces Combination Of American Paging With TSR Paging*, News Release, Telephone and Data Systems, Inc., Apr. 7, 1998.

[214] *MobileMedia Seeks U.S. Bankruptcy Protection While Reorganizing Business*, COMMUNICATIONS DAILY, *available in* 1997 WL 3941705 (Jan. 31, 1997). As additional background, in April 1997, the Commission directed MobileMedia to show cause why its licenses should not be revoked based on several issues related to false statements, misrepresentations, lack of candor, or willfully or repeatedly violating certain sections of the Commission's rules with respect to the filing of certain FCC forms and reports as well as in the construction and operation of paging facilities. In the Matter of MobileMedia Corp., et. al., WT Docket No. 97-115, *Order to Show Cause, Hearing Designation Order, and Notice of Opportunity For Hearing For Foreclosure*, 12 FCC Rcd 14896 (1997). On June 6, 1997, the FCC issued an order granting MobileMedia a 10-month stay of the revocation proceedings. During the stay, MobileMedia is to provide the Commission with monthly status reports regarding the progress of bankruptcy proceedings and further, there are to be no transfers or sales of MobileMedia's stock owned by MobileMedia's directors or officers during the pendency of the stay. MobileMedia Corporation, et. al. Applicant for Authorizations and Licensee of Certain Stations in Various Services, WT Docket No. 97-115, *Order*, 12 FCC Rcd 7927 (1997). On March 27, 1998, MobileMedia requested a six-month extension of the stay granted in the above-mentioned proceeding. MobileMedia Corporation Request for Extension of Stay, WT Docket No. 97-115, filed Mar. 27, 1998.

[215] *MobileMedia Seeks U.S. Bankruptcy Protection While Reorganizing Business*, COMMUNICATIONS DAILY, *available in* 1997 WL 3941705 (Jan. 31, 1997).

[216] MobileMedia Communications, Inc., Form 8-K, Jan. 27, 1998, at 10.

sometime in 1998.[217]

EconoPage. EconoPage, Inc., a California-based reseller with 250,000 paging customers, closed this fall; this forced subscribers to turn to Paging Network, Inc. ("PageNet"), Metrocall, Inc., and PageMart Wireless, Inc. ("PageMart"), the companies that were reselling their paging services to EconoPage. At the time EconoPage closed, it was estimated that customers may lose as much as $7 million in prepaid services and creditors were owed approximately $4 million.[218]

5. Regulatory Issues

Interconnection Issues. Several paging-related interconnection issues contained in the Commission's *Local Competition First Report and Order* and the *Local Competition Second Report and Order* are currently under reconsideration by the Commission. Parties filed petitions regarding the Commission's conclusions that: paging companies should receive mutual compensation, LEC's cost-based termination rates should not be used for paging,[219] and paging carriers do not provide telephone exchange service.[220]

In addition, on December 30, 1997, the Common Carrier Bureau clarified that its rules, "do not allow a LEC to charge a provider of paging services for the cost of LEC transmission facilities that are used on a dedicated basis to deliver to paging service providers local

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[217] MobileMedia Communications, Inc., Form 8-K, Oct. 30, 1997 at 8; Antony Bruno, *MobileMedia to Build Out NPCS System*, RCR RADIO COMMUNICATIONS REPORT, Jan. 5, 1998, at 1.

[218] Jeanine M. Oburchay & Colin McArdle, WIRELESS MESSAGING, Bear, Stearns & Co. Inc., Nov. 17, 1997, at 10-11; *Low-Cost Paging Company Folds*, TELECOMWORLDWIRE, *available in* 1997 WL 13595579, (Oct. 29, 1997).

[219] Implementation of the Local Competition Provisions in the Telecommunications Act of 1996, CC Docket No. 96-98, Interconnection between Local Exchange Carriers and Commercial Mobile Radio Service Providers, CC Docket No. 95-185, *First Report and Order*, 11 FCC Rcd 15499, 15997 (1996), *aff'd in part and vacated in part sub nom. Competitive Telecommunications Ass'n v. FCC*, 117 F.3d 1068 (8th Cir. 1997), *aff'd in part and vacated in part sub nom. Iowa Utils. Bd. v. FCC*, 120 F.3d 753 (8th Cir. 1997), *petitions for cert. granted*, 66 U.S.L.W. 3484 (U.S. Jan. 28, 1998) (No. 97-826); *Order on Reconsideration*, 11 FCC Rcd 13042 (1996); *Second Order on Reconsideration*, 11 FCC Rcd 19738 (1996); *Third Order on Reconsideration and Further Notice of Proposed Rulemaking*, 12 FCC Rcd. 1246 (1997); *further recon. pending*.

[220] Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, CC Docket No. 96-98, *Second Report and Order and Memorandum Opinion and Order*, 11 FCC Rcd at 19538 (1996), n.700, vacated in part by *People of the State of California v. FCC*, 124 F3d 934 (8th Cir. Aug. 22, 1997), cert. granted, *AT&T Corp. v. Iowa Util. Bd.*, 118 S.Ct. 879 (Jan. 26, 1998).

telecommunications traffic that originates on the LEC's network."[221]

Pay Phone Compensation. In May 1998, the D.C. Circuit remanded the Commission's decision requiring that interexchange carriers compensate pay phone providers $.284 per toll-free call for access code and subscriber 800 calls made from a pay phone.[222] The court gave the Commission six months to further explain the derivation of the rate level. Pay phone compensation may affect paging customers who have been assigned an 800 number (via the IXC) to access their pager. Paging companies are permitted to pass on the costs of pay phone compensation to their customers. For example, SkyTel Communications Inc. ("SkyTel")[223] is blocking its general 800 access numbers and charges customers $.30 per call for personal 800/888 numbers that are accessed from pay phones.[224] PageNet announced that rather than blocking pages from a pay phone, it will charge customers $5 per month for a

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[221] Letter From A. Richard Metzger, Jr., Chief, Common Carrier Bureau, to Keith Davis, Cathleen A. Massey, Kathleen Q. Abernathy, Judith St. Ledger-Roty, and Mark Stachiw of 12/30/97, (DA 97-2726); "Pleading Cycle Established For Comments on Applications For Review By the Full Commission and Petition For Stay Pending Review of the December 30, 1997 Common Carrier Bureau Letter Regarding Interconnection Between LECs and Paging Carriers," *Public Notice*, DA 98-206 (rel. Feb. 3, 1998).

[222] Implementation of the Pay Telephone Reclassification and Compensation Provisions of the Telecommunications Act of 1996, CC Docket No. 96-128, *Report and Order*, 11 FCC Rcd 20541 (1996); *Order on Reconsideration*, 11 FCC Rcd 21233 (1996). (together known as the *Payphone Orders*, affirmed in part and vacated in part). *See Illinois Public Telecomm. Ass'n v. FCC*, 117 F.3d 555 (D.C. Cir. 1997). *See also Second Report and Order*, CC Docket No. 96-128, 13 FCC Rcd 1778 (1997), *pets. for recon. pending, remanded, MCI Telecomm. Corp. v. FCC*, No. 97-1675 (D.C. Cir. May 15, 1998).

The Personal Communications Industry Association ("PCIA") petitioned the FCC to stay the *Second Report and Order*. In the Matter of the Pay Telephone Reclassification and Compensation Provisions of the Telecommunications Act of 1996, CC Docket No. 96-128, *Request for Stay of the Personal Communications Industry Association*, (1997). PCIA's request was denied. In the Matter of Implementation of the Pay Telephone Reclassification and Compensation Provisions of the Telecommunications Act of 1996, CC Docket No. 96-128, *Memorandum Opinion and Order*, 12 FCC Rcd 21872 (1997). PCIA also sought a stay in court which was denied. Motion for Stay of the Personal Communications Industry Association, *Personal Communications Industry Association v. Federal Communications Commission and United States of America*, Case No. 97-1709, (1997) , *motion denied, MCI Telecommunications Corporation v. FCC and the United States of America*, No. 97-1675 (1998).

[223] On May 21, 1998, Mobile Telecommunication Technologies Corporation announced that shareholders had approved a proposal to change the company's name to SkyTel Communications Inc. The change took affect at the close of business on May 22 and the company's stock began trading as SKYT when NASDAQ opened on May 26, 1998. *Mtel changes name to SkyTel Communications Inc.*, Press Release, SkyTel Communications Inc., May 21, 1998.

[224] *FCC Ruling Affects Pay Phone Users* (visited June 8, 1998) <http://www.mtel.com/SKYTEL.NSF/eca04ab4f99b0dfd8625658b00656321/27346c953ccb3e648525654e007b4374>. SkyTel states that the pay phone service providers are charging $.284 each and the long distance carriers are charging $.016 each for a combined total of $.30 per call. *Id*.

toll-free pager number or permit the customer to switch to a non-toll free number.[225] Other paging companies are providing pay phone blocking service for personal 800/888 pager numbers.[226]

6. Intra-Sector Competition

As previously discussed, with over 600 paging companies in the U.S., the paging market is competitive. While 64 percent of the market is concentrated in the top ten largest companies, the 25 smallest MSAs still have an average of 12 licensees per area. This section will discuss market entry by narrowband PCS providers. This section will also discuss current trends in marketing strategies by paging and messaging companies.

a. Narrowband PCS

In 1993, the Commission allocated 3 MHz of spectrum for narrowband PCS.[227] The Commission did not specify limitations regarding the use of the auctioned spectrum.[228] The spectrum was divided into 11 national narrowband PCS licenses and 30 regional narrowband PCS licenses. These narrowband licenses were auctioned in 1994. Nine of the national licensees are concentrating on guaranteed[229] and two-way text messaging. Two licensees, PageNet and CONXUS Communications, Inc. ("CONXUS"), are focusing on voice service, *i.e.*, pagers that are portable answering machines.[230]

Compared to traditional one-way paging service, narrowband PCS offers the availability of a return channel and a high speed protocol. The return channel permits the pager to check in with the network when the pager is active and confirm message delivery. In addition, instead of broadcasting the message over all transmitters, as is done with traditional paging,

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[225] *PageNet Will Not Block Calls From Pay Phones to Paging Customers*, Press Release, Paging Network, Inc., Dec. 12, 1997.

[226] *See, e.g., PageMart - FCC Notice* (visited May 21, 1998) <http://www.pagemart.com/FCCnotice.html>.

[227] Amendment of the Commission's Rules to Establish New Narrowband Personal Communications Services, GEN Docket No. 90-314, ET Docket No. 92-100, *Narrowband First Report and Order*, 8 FCC Rcd 7162, 7185 (1993).

[228] *Narrowband First Report and Order*, at 7164.

[229] Guaranteed, sometimes referred to as 1.5 way messaging or advanced text messaging, guarantees message delivery through system confirmation from the network. If the customer is temporarily out of range or has turned off the pager, messages are stored and then delivered to the customer when he returns to range or turns on the pager. *See* Mobile Telecommunication Technologies, Inc., Form 10-K, Dec. 31, 1997, at 4.

[230] *DLJ Report*, at 37.

narrowband PCS transmits the message only to the area where the pager is located using the nearest transmitter, enabling the spectrum to support a larger base of customers than traditional one-way paging. Because narrowband PCS transmits at a much faster speed due to the wider available bandwidth as compared to traditional one-way paging (8,000 to 112,000 bits per second ("bps") versus 1,200 to 2,400) carriers can provide more bandwidth-intensive services such as text and voice messaging.[231]

Although some narrowband PCS operators launched as early as 1995, messaging services provided over narrowband PCS are still in the early stages of deployment. Nevertheless, analysts indicate that there is evidence that providers are lowering prices[232] and analysts anticipate that by 2001 there will be between 5.0 and 15.5 million narrowband PCS customers.[233] Today, 40 percent of the narrowband PCS market consists of two-way text messaging, another 40 percent is guaranteed messaging, and the remaining 20 percent is voice messaging. Analysts estimate that by 2001, 50 percent will be voice messaging, 31 percent will be guaranteed messaging and 19 percent will be two-way text messaging.[234]

Three companies, SkyTel Communications Inc. ("SkyTel"),[235] PageNet, and CONXUS, have launched narrowband PCS services to date. Appendix C, Table 6, page C-8, provides the number of subscribers for each of the three companies along with a comparison of the monthly prices for select narrowband PCS service offerings of SkyTel, PageNet, and CONXUS. Appendix C, Table 7, page C-10, shows the current deployment status of narrowband PCS licensees. Figure 6 shows the current narrowband PCS coverage of SkyTel, PageNet, and CONXUS and Appendix C, Table 8, page C-11, shows the estimated narrowband PCS rollouts by number of launches.

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[231] *Strategis Paging Report*, at 280-81. The Bishop Company reports true data speeds (defined as accounting for overhead, interference, static, and time waiting for space on the network) of 512 to 6,400 bps for one-way paging and 6,400 to 25,600 bps for narrowband PCS. WIRELESS DATA NETWORKS, A GUIDE TO MOBILE COMPUTING, The Bishop Company, (1997) at 19, 32, 37. ("*Bishop Report*")

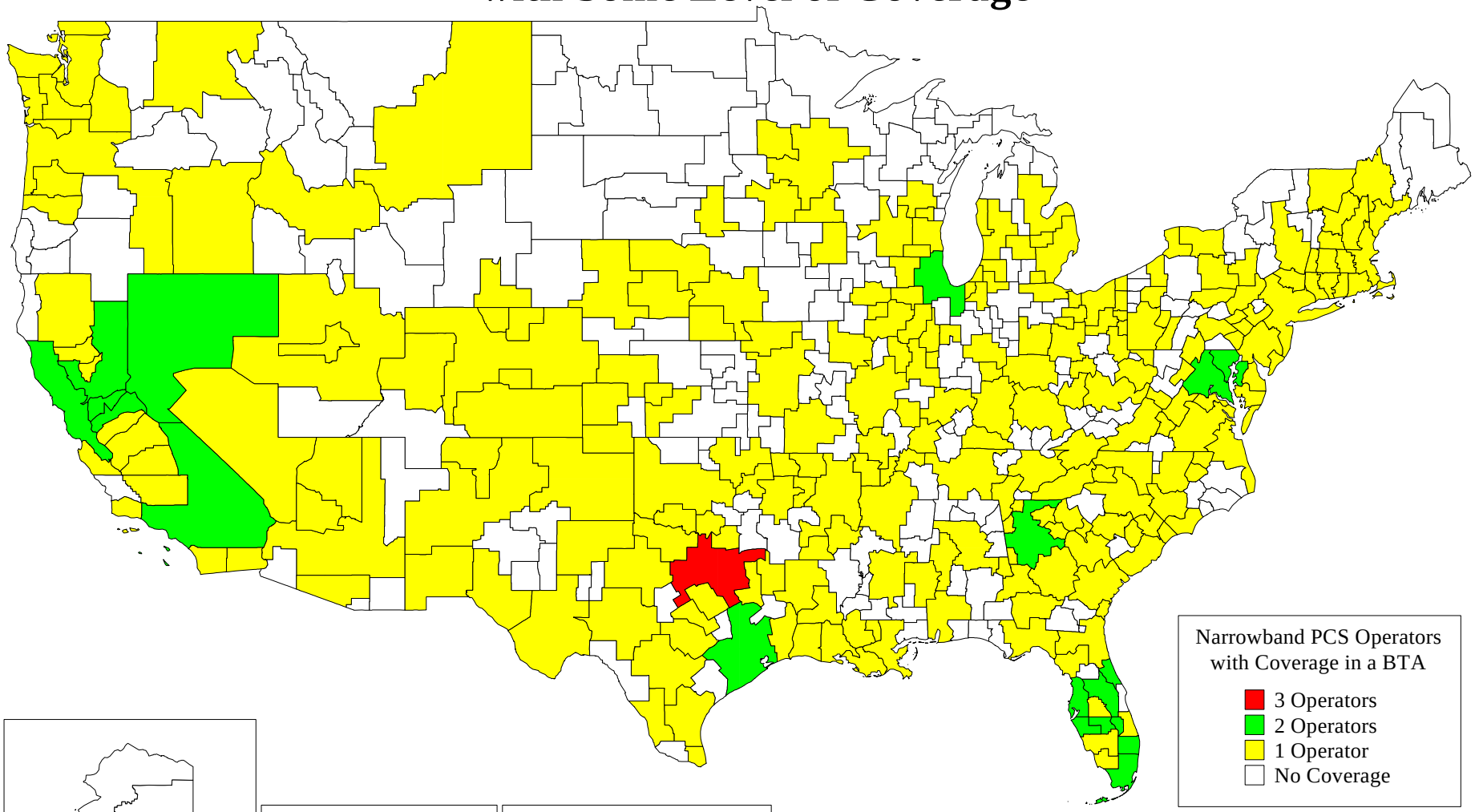
[232] THE U.S. MOBILE DATA MARKETPLACE: 1997, The Strategis Group (1997) at 107. ("*Strategis Mobile Data Report*")

[233] *PCIA Forecast*, at 11-17. Forecasts for Donaldson, Lufkin & Jenrette Securities Corporation (15.5 million), *id*. at 11. The Insight Research Corporation (5.68 million), *id*. at 13. Paul Kagan Associates, Inc., (5.0 million), *id*. at 15. The Strategis Group (8.4 million), *id*. at 17.

[234] *Strategis Paging Report*, at 304.

[235] On May 21, 1998, Mobile Telecommunication Technologies Corporation announced that shareholders had approved a proposal to change the company's name to SkyTel Communications Inc. The change took affect at the close of business on May 22 and the company's stock began trading as SKYT when NASDAQ opened on May 26, 1998. *Mtel changes name to SkyTel Communications Inc.*, Press Release, SkyTel Communications Inc., May 21, 1998.

Estimated Narrowband PCS Service Rollouts: Number of Narrowband PCS Operators in Each BTA with Some Level of Coverage



Source: Federal Communications Commission estimates.

Figure 6

b. Marketing Strategies

Paging companies are marketing their paging and messaging services in a number of ways. This discussion focuses on three recent trends in the marketplace: resale, enhanced services and prepaid/calling party pays services.

Resale. Resale has contributed to an increase in the number of pagers in service. Resale accounted for 37 percent of the paging units in service in 1996, up from 10 percent in 1991.[236] In addition, 42 percent of paging service sales in 1996 were reached through a company's own sales force and the remaining sales were through either walk-ins or mass retail agents.[237] Resale has several benefits for the paging industry and its customers. Resale offers lower acquisition costs per customer, lower ongoing customer maintenance costs, expanded market presence and broader distribution channels, and lower management costs as compared to direct retail distribution. However, carriers find there are also drawbacks to resale. Paging carriers offer their product to resellers at large discounts and therefore such sales produce lower revenues compared to the other available distribution channels.[238] Paging companies are not required by FCC rules to offer resale.

Enhanced Services. One way in which paging companies are attempting to differentiate their paging products is by providing enhanced and complementary services such as voice mail, e-mail forwarding, and information services such as news updates, sports scores, and stock quotes. Adoption of such services by subscribers, however, has been relatively slow. For example, only 10 percent of paging customers subscribe to voice mail and 7 percent receive information services. While over 20 percent of paging companies provide forwarding of e-mail messages, only 4 percent of customers subscribe to such services.[239]

Prepaid/Calling Party Pays Services. In an effort to expand their subscriber bases, paging companies offer prepaid paging services and calling party pays services. Prepaid paging services come with a pager, a specific number of months of service, and a set number of pages. As with mobile telephones, prepaid paging works well for customers with poor credit histories or if paging services are only necessary for a brief period.[240] A paging customer that

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[236] *Strategis Paging Report*, at 9-11.

[237] *Strategis Paging Report*, at 89. PageMart for example sells its pagers in more than 12,000 retail outlets; Jeanine M. Oburchay & Colin McArdle, WIRELESS MESSAGING, Bear, Stearns & Co. Inc., Nov. 17, 1997, at 9.

[238] *Strategis Paging Report*, at 90.

[239] *Id*. at 91-92.

[240] *CUE, PageNet To Offer Enhanced Paging Services*, LAND MOBILE RADIO NEWS, *available in* 1996 WL 7867231, (Nov. 15, 1996).

subscribes to calling party pays only pays for the cost of the pager and the paging party would pay for the cost of each page.[241]

7. Inter-Sector Competition

In addition to facing strong intra-sector competition, paging carriers also face competition from other wireless sectors. The digital, two-way nature of mobile telephony, such as digital cellular and broadband PCS, allows handsets to act as pagers. Cellular and broadband PCS providers have found it extremely easy to provide paging services in concert with their traditional lines of business. For example, digital cellular and broadband PCS providers have begun offering paging bundled with their other services.[242] Several carriers offer free numeric paging to subscribers.[243] However, one analyst notes that it is doubtful that cellular and broadband PCS carriers will be able to meet the flat rate pricing, lower service costs, and low device costs encountered by paging customers.[244] In addition, because both cellular and broadband PCS handsets have a much lower battery life than pagers, some analysts argue that paging and cellular/broadband PCS may in fact be complements. Analysts found that both cellular and broadband PCS customers view their wireless phones and pagers differently. Due to their much longer battery life than both cellular and broadband PCS, pagers are left on for an average of 18 hours per day.[245] SkyTel notes that a pager can be used to notify the customer that someone needs to talk with them, allowing the recipient to return the call at his convenience thus saving a cellular phone battery and possibly avoiding the roaming charges associated with receiving calls on a cellular or broadband PCS phone.[246] In addition, in 1993, 21 percent of paging customers used a cellular phone and by 1996 that percentage had

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[241] Ameritech for example has been offering Calling Party Pays - Paging (CPPP) since August 1995. *Ameritech Paging Successful in Chicago*, RBOC UPDATE, *available in* 1997 WL 5804234, (Jan. 1, 1996). In April 1997, Preferred Networks, Inc., a wholesale paging provider, began offering "Priceless Page" a calling party pays service to other operators. *Preferred Networks Offers Calling-Party-Pays in Chicago*, LAND MOBILE RADIO NEWS, *available in* 1997 WL 8474331, (Apr. 11, 1997). In September 1997, SourceOne Wireless began offering the service on a nationwide basis. *Calling party pays with new pager*, HFN THE WEEKLY NEWSPAPER FOR THE HOME FURNISHING NETWORK, *available in* 1997 WL 9570745, (Sep. 29, 1997).

[242] Omnipoint for example offers both numeric and alphanumeric paging to its customers. *Omnipoint Wireless Data Solutions* (visited Apr. 8, 1998) <http://www.omnipoint.com/data/data.html>.

[243] *See, e.g., Aerial Store/Coming Soon to Your Area* (visited Jan. 20, 1998) <http://www.aerial1.com/storex.htm>.

[244] *Strategis Mobile Data Report*, at 98.

[245] *Strategis Paging Report*, at 306.

[246] Mobile Telecommunication Technologies Corp., Form 10-K, Dec. 31, 1996, at 11-12.

increased to 32 percent.[247]

Narrowband PCS providers also face competition from other sectors of the wireless industry. For example, digital cellular and PCS providers provide two-way messaging services.[248] In addition, circuit-switched systems may pose a competitive threat to voice messaging. ReadyCom is testing a two-way voice messaging service in Raleigh, North Carolina that will overlay cellular networks and plans to rollout service in mid-1998.[249] Two mobile packet data providers, Ardis Company ("Ardis") and BellSouth Wireless Data, also provide two-way text messaging.[250]

Finally, satellite providers and SMR systems also offer paging and messaging services. For a discussion of satellite services, *see* Appendix G. SMR services are discussed in Sections III.A.4.a and III.C

8. Paging and Messaging Projections

In order to project the future growth of the paging/messaging industry, we have utilized several analysts' projections for total paging units in service and total revenues. Each of the projections has differing methodologies and assumptions. According to available forecasts, paging units in service as of year-end 2001 are estimated to be in the range of 56.7 to 101.3 million units (an average of 71.1 million), compared to an average of 54.6 million units forecasted for the end of 1998. The average of the forecasts results in a compound average growth rate of 9.2 percent[251] compared to a compound average growth rate of 26.7 percent

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[247] *Strategis Paging Report*, at 171.

[248] Omnipoint for example provides both incoming and outgoing e-mail at 15 cents per message. *Welcome to Omnipoint Communications* (visited Feb. 27, 1998) <http://www.omnipoint-pcs.com/phila.htm>.

[249] ReadyCom's Responder service allows users to receive, store, and reply to voice messages from a pager sized handset. *ReadyCom Inc.* (visited Jan. 20, 1998) <http://www.readycom.com>.

[250] *Ardis Two Way Messaging Service: air.mail@ardis Strike Anywhere, Anytime,* (visited Jan. 20, 1998) <http://www.network.ardis.com>; *RAM Mobile Data - RAMfirst* (visited Jan. 20, 1998) <http://www.ram.com/sol/ramfirst/index.html>. In March 1998, RAM Mobile Data USA Limited Partnership changed its name to BellSouth Wireless Data following its acquisition by BellSouth Corporation. *BellSouth Changes Name of RAM Mobile Data to 'BellSouth Wireless Data'*, Press Release, RAM Mobile Data, Mar. 18, 1998.

[251] *PCIA Forecast*, at 11-17. Forecasts for Donaldson, Lufkin & Jenrette Securities Corporation (1998 - 55.5 million and 2001 - 75 million), *id.* at 11. The Insight Research Corporation (1998 - 50.34 million and 2001 - 66.22 million), *id*. at 13. Paul Kagan Associates, Inc. (1998 - 53.6 million and 2001 - 61.1 million), *id*. at 15. The Strategis Group (1998 - 55.5 million and 2001 - 66.4 million), *id*. at 17. Strategis' forecast may be slightly overstated since the historic numbers used herein were revised after discussions with Strategis and paging company representatives. WinterGreen Research Inc. (1998 - 63.2 million and 2001 - 101.3 million).

from 1993 to 1997.[252] This reduction may be partially due to analysts' contention that companies are beginning to shift their focus from subscriber to revenue growth.[253] The fastest growing segment of the one-way paging market is alphanumeric service. By 2001, analysts expect that 21 percent of one-way units in service will be alphanumeric.[254] Many analysts also expect narrowband PCS growth to accelerate. Several of the forecasts separately project narrowband PCS units for the period 1998 to 2001. These forecasts include an estimated 5.0 to 15.5 million narrowband PCS units (an average of 8.6 million) at year-end 2001 resulting in a compound average growth rate of almost 92 percent from 1998 to 2001.[255]

As mentioned above, statements have been made that in the future, paging carriers' business will emphasize revenue rather than subscriber growth.[256] By 2001, total paging industry revenues are expected to grow to between $5.5 and $14.6 billion.[257] Narrowband PCS services are expected to account for 21 percent of revenues, according to one projection.[258] Finally, average revenue per unit is expected to increase due to the growth in penetration of narrowband PCS services and alphanumeric one-way paging which are both expected to have a higher revenue per subscriber than other services offered by carriers.[259]

Status Report: Snapshot of Paging, Consumer Appeal Drives Paging, WIRELESS WEEK, Dec. 1, 1997, at 24. Credit Suisse (1998 - 49.46 million and 2001 - 56.71 million). *Credit Suisse* at 34.

[252] *See* Appendix C, Table 1, p. C-2.

[253] Jeanine M. Oburchay & Colin McArdle, WIRELESS MESSAGING, Bear, Stearns & Co. Inc., Nov. 17, 1997, at 3-5; Roger O. Crockett and Dee Gill, *News: Analysis & Commentary, Telecommunications, Scary Signals on Pagers*, BUSINESS WEEK, *available in* 1997 WL 14814990, Dec. 29, 1997.

[254] *Strategis Paging Report*, at 38.

[255] *PCIA Forecast*, at 11-17. Forecasts for Donaldson, Lufkin & Jenrette Securities Corporation (1998 - 2.0 million and 2001 - 15.5 million), *id*. at 11. The Insight Research Corporation (1998 - 580,000 and 2001 - 5.68 million), *id*. at 13. Paul Kagan Associates, Inc., (1998 - 800,000 and 2001 - 5.0 million), *id*. at 15. The Strategis Group (1998 - 1.5 million and 2001 - 8.4 million), *id*. at 17.

[256] Jeanine M. Oburchay & Colin McArdle, WIRELESS MESSAGING, Bear, Stearns & Co. Inc., Nov. 17, 1997, at 3-5; Roger O. Crockett and Dee Gill, *News: Analysis & Commentary, Telecommunications, Scary Signals on Pagers*, Business Week, *available in* 1997 WL 14814990, (Dec. 29, 1997).

[257] *PCIA Forecast, at 13-17.* Forecasts for The Insight Research Corporation ($10.72 billion), *id*. at 13. Paul Kagan Associates, Inc. ($5.47 billion), *id*. at 15. The Strategis Group ($7.2 billion), *id*. at 17. Forecast of WinterGreen Research Inc. ($14.56 billion). *Status Report: Snapshot of Paging, Consumer Appeal Drives Paging*, at 24.

[258] *Strategis Paging Report*, at 3-5.

[259] *Id*. at 5.

9. Competitive Assessment

In both the *First* and *Second Reports*, the Commission concluded that the paging segment of the CMRS market is considered to be highly competitive.[260] The Commission drew this conclusion based on two findings. First, there were many companies actively competing with each other in every geographic market.[261] Second, paging prices were quite low compared to other CMRS services and further, prices were most likely declining.[262]

We continue to believe that the paging/messaging industry is highly competitive. First, although concentration has increased in the past few years, there are a large number of providers in all areas. As mentioned above, there are an average of 29 paging licensees in the 25 largest cities in the U.S., not including resellers, and an average of 12 paging licensees in the 25 smallest MSAs. In addition, the increased concentration can be partially attributed to the economies of scale that mergers offer through the ability of the carrier to provide services to a broader geographic and demographic base more efficiently. Further, there are many local and regional providers, resellers have proliferated, and paging services are available from such diverse retail outlets as shopping mall kiosks, 7-Eleven, and Eckerd Drugs.[263] Second, as described above, mobile telephone providers are entering the paging market easily and at low costs to both the carrier and customer through their existing broadband PCS, cellular, and SMR licenses. Third, customers can switch providers at low cost.[264] Analysts note that the monthly churn[265] in paging is higher than other segments of the wireless industry partially due to a lower up front investment. Churn in the paging industry was 2.8 percent at year-end 1996 compared to 1.5 percent for SMR and 2.1 percent for cellular.[266] Fourth, as noted above, in response to competition, paging carriers have begun to transform themselves from "paging" carriers to "messaging" carriers. Finally, as noted in the *Second Report*, paging prices are quite low compared to other CMRS services.[267] While there

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[260] *First Report*, at 8867-68; *Second Report*, at 11305.

[261] *Second Report*, at 11305.

[262] *Id*.

[263] PageMart signed an agreement in October 1997 with Eckerd Drugs and 7-Eleven to allow them to sell its paging services. P*ageMart Enters 1997 4Q with Guns Blazing*, INSIDE PAGING, Oct. 20, 1997, at 3.

[264] *Strategis Paging Report*, at 88.

[265] Churn is the rate at which wireless operators lose customers. BATTLING CHURN TO INCREASE SHAREHOLDER VALUE, WIRELESS CHALLENGE FOR THE FUTURE, Andersen Consulting, (1997).

[266] *Strategis Paging Report*, at 103.

[267] *Second Report*, at 11305.

have been reports of selected price increases among some carriers,[268] one analyst notes that the monthly price of numeric paging with a customer-owned pager was $11.98 in 1992, and in 1997 the price had fallen to $9.23, a reduction of almost 23 percent. Similarly, monthly numeric paging with a rental pager has fallen over the same period from $18.97 to $12.33, a decrease of 35 percent.[269]

C. Traditional Dispatch Services

Dispatch services allow two-way, over the air, voice communications between two or more mobile units (e.g., between a car and a truck) or between mobile units and fixed units (e.g., between the end user's office and a truck). Typical users of dispatch services include service and delivery companies whose operations require their employees to communicate with each other on a private (one-to-one) or fleet (one-to-many) basis.

The Commission has defined the market for commercial dispatch services as primarily comprising of two services: SMR (which operates in the 800 MHz and 900 MHz bands) and 220 MHz.[270] This definition includes service offered via trunked analog or digital systems. Trunking allows a number of users to share a multi-channel system by electronically searching for and assigning an open frequency to a particular user only when use of the system is desired. However, non-trunked (conventional) analog dispatch services are excluded because of less reliable system access and the loss of privacy due to sharing of fixed

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[268] PageNet reported that it plans to increase prices as part of its planned restructuring. Paging Network, Inc., Form 10-K405, Dec. 31, 1997, at 3. While noting a proposal from PageNet to offer $2 per month paging, including air time and lease for a small number of pagers, Bear Stearns' analysts argue that the intensity of price competition is decreasing. Jeanine M. Oburchay & Colin McArdle, WIRELESS MESSAGING, Bear, Stearns & Co. Inc., Nov. 17, 1997, at 3-4.

[269] WIRELESS PRICING 1998, The Strategis Group (1998). In order to determine the 1997 average prices, Strategis surveyed paging providers in the top 20 markets and computed a simple nationwide average. In order to obtain a single price for each observation, Strategis analysts assumed that the customer was an initial buyer who wanted the shortest contract available. Since carriers typically provide at least 500 pages a month with numeric paging service, Strategis made no usage-based adjustment to the prices. While there is a relationship between these prices and ARPU, ARPU considers vertical features that could be added to the basic numeric paging package and also considers that subscribers will have contracts with varying term lengths. Telephone conversation with Strategis representatives (Jan. 1998).

[270] *Nextel-Pittencrieff*, at 15. Commercial dispatch services are also offered by qualified private land mobile operators ("PMRS") who can provide dispatch service to others on a for-profit basis and still be classified as PMRS as long as they are not connected to the PSTN. The PMRS category includes Industrial Radio Services and Land Transportation Radio Services. *See First Report*, 10 FCC Rcd at 8861-8863. It is also true that SMR and 220 MHz licensees who do not offer interconnected service are not considered to be CMRS carriers.

channel assignments.[271]

It is important to note that in addition to the dispatch services being provided with SMR and 220 MHz licenses, there is also a large volume of private radio licensees using their licenses for their own dispatch services. According to one dispatch provider, there were approximately 17 million private radio users in the United States as of December 31, 1997.[272] Due to the lack of available data, this report is limiting its discussion of dispatch services to SMR and 220 MHz licensees.

1. Commercial Dispatch Market Performance and Structure

In 1997, the commercial dispatch market's total subscribership increased by 43 percent from 2.3 to 3.3 million units.[273] Of the 1997 total, approximately 1.74 million were dispatch-only subscribers.[274] As with the SMR-based mobile telephone services, the past three years have seen the prices for commercial dispatch services become bifurcated along analog and digital lines. Between 1995 and 1997, the ARPU for analog dispatch services remained almost stable, rising from $16.50 to $16.80.[275] In contrast, over the same time period, the average monthly revenue for digital dispatch services increased 72 percent from $20.30 to $34.90.

The structure of the market for SMR-based dispatch services has a level of consolidation similar to that of SMR-based mobile telephone services.[276] The largest operator was Nextel with 800,000 analog-based dispatch subscribers.[277] This total was 46 percent of all dispatch subscribers. The next largest operator was Pittencrieff with 92,000 subscribers, until Nextel's acquisition of Pittencrieff was approved by the Commission on October 24, 1997.[278] By the end of 1997, there were only six other operators with more than 10,000 subscribers and the top 20 largest operators included nine with fewer than 5,000 subscribers.

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[271] United States Department of Justice also reached this assessment in *United States v. Motorola and Nextel*, 60 Fed. Reg. 19,284 at p.2 and n.24.

[272] Nextel Communications, Inc., Form 10-K, Dec. 31, 1997, at 10. This represents an increase of 500,000 from the year-end 1996 figure. *See* Nextel Communications, Inc., Form 10-K, Dec. 31, 1996, at 5.

[273] *See* Appendix D, Table 1, p. D-2.

[274] The interconnected subscribers are discussed above in the Mobile Telephony section.

[275] *See* Appendix D, Table 2, p. D-2.

[276] *See* Appendix D, Table 3, p. D-3 for the Top 20 SMR Operators.

[277] This figure had decreased to 583,000 by the end of 1997. *See* Appendix D, Table 1, p. D-2.

[278] *Nextel-Pittencrieff*, at para. 2.

2. Major Trends and Developments

a. Upper 800 MHz Band Auction

As described above, on December 8, 1997, the Commission completed an auction for 10 MHz of the 800 MHz portion of the SMR bands. Because the largest winner of licenses in this auction, Nextel, plans to use these frequencies mostly for its digital mobile telephone service, this auction will have an impact on the dispatch industry. In order to make optimal use of its new licenses for digital services, Nextel will most likely have to relocate incumbent operators to its remaining analog 800 MHz channels or its 900 MHz channels.

b. Deployment of Digital Technology

Just as digital technology has begun to be deployed in the mobile telephone market, it is also beginning to be deployed in the dispatch market, most notably by Nextel using iDEN technology in the 800 MHz SMR band to compete in the mobile telephone market. However, there are other examples of more dispatch oriented SMR operators who are also deploying digital technology. For example, there are other providers who are using iDEN technology in the 800 MHz SMR band, including Southern Company which offers its Southern LINC service across 120,000 square miles in the Southeastern United States.[279] Motorola has also recently introduced the first iDEN-based system allowing 900 MHz SMR operators to use digital technology.[280]

Another example of an SMR provider using digital technology is Geotek Communications, Inc. ("Geotek") which uses its own patented FHMA technology in the 900 MHz SMR band to provide a range of telecommunications services to small- and medium-size businesses with mobile fleets of vehicles.[281] In addition to offering traditional mobile telephone and one-to-many dispatch services, Geotek also offers a range of mobile messaging, mobile data and vehicle location services.[282] As of January 15, Geotek had launched a number of regional networks and had 15,151 subscribers.[283]

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[279] Southern Company, *Service Territory*, (visited May 13, 1998) <http://www.solinc.com/serviceterr.asp>.

[280] *Motorola Introduces First 900 MHz iDEN-Based System*, News Release, Motorola, Inc., Apr. 22, 1998.

[281] Geotek Communications, Inc., Form 10-K, Dec. 31, 1996, at 2.

[282] *Id*. at 3.

[283] *Geotek Reports Year End Subscriber Growth*, News Release, Geotek Communications, Inc., Feb. 5, 1998.

c. 220 MHz

While dispatch services are mostly offered using the 800 and 900 MHz SMR bands, there are also dispatch providers using the 220 MHz service.[284] For the past few years, the Commission has frozen new applications for 220 MHz licenses while it prepared to auction off the remaining spectrum in this band.[285] Consequently, the band is significantly less encumbered than the 800 and 900 MHz SMR bands.[286] Furthermore, the rise of digital services on the 800 and 900 MHz SMR bands with their higher monthly prices has led to an increased demand for the less expensive dispatch services.[287] For this reason, the market is anticipating the 220 MHz auction which the Commission plans to commence in 1998.

D. Mobile Wireless Data Services

1. Overview

Broadly speaking, the CMRS industry can be divided into two major categories: mobile telephony and mobile "non-telephony." Non-telephony is a catchall phrase for non-voice services such as paging, two-way text messaging, e-mail, faxes, and Internet access. Data can be transmitted over a wide range of networks including: wireless phone systems, pagers, wireless local area networks (LANs), satellite systems, or laptop computers connecting through wireless systems.[288]

Currently, mobile wireless data services are provided by CMRS providers such as paging, narrowband PCS, cellular, broadband PCS, and SMR companies using a wide range of technologies and spectrum holdings.[289] In addition, unlike one-way paging which is fairly homogenous, mobile wireless data service providers offer very different products as shown below. Some products, such as those used in the transportation industry, have been around for some time while mobile wireless connections to the Internet are fairly new.

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[284] For example, Intek Global Corporation (formerly Intek Diversified Corp.) had 7,400 customers on 220 MHz systems as of March 31, 1998. *Intek Global's RoameR One Subscriber Base Reaches Over 7,400 in Second Quarter*, News Release, Intek Global Corporation, Apr. 8, 1998.

[285] Acceptance of 220-222 MHz Private Land Mobile Applications, *Order*, 6 FCC Rcd 3333 (1991).

[286] Caron Carlson, *FCC Prepares 220 MHz Auction*, WIRELESS WEEK, Jan. 12, 1998, at 26; Intek Diversified Corp., Form 10-K, Sep. 30, 1997, at 3.

[287] Intek Diversified Corp., Form 10-K, Sep. 30, 1997, at 8.

[288] Satellites and wireless computers are not technically categorized as CMRS technologies.

[289] *See, e.g., RCR's Top 20 Mobile Data Operators*, RCR RADIO COMMUNICATIONS REPORT, Sep. 22, 1997, at 10.

2. Market Participants

This report divides carriers providing mobile wireless data services into three general categories for discussion purposes: 1) carriers that provide services via paging and two-way messaging such as paging carriers, via pagers, and mobile telephone companies, via handsets; 2) carriers that provide services via wireless modems;[290] and 3) satellite providers. The main difference between the three categories is capacity. Paging applications permit small transmissions of text. Narrowband PCS applications permit two-way transmission of data, but it is more limited in the amount of data it can transmit due to its bandwidth when compared to cellular and broadband PCS. On the other hand, wireless modem applications provided over cellular and broadband PCS, can generally transmit larger amounts of data. The capacity of satellite applications varies depending on the type of satellite system.[291] Therefore, the products offered via paging/messaging providers, wireless modem applications, and satellites are significantly different, as discussed below.

As noted at the beginning of the report, the use of categories does not imply that the Commission's view of operators and services is limited by the category in which this discussion places them. Many carriers provide services that overlap the three categories (*e.g.*, paging over a mobile phone or satellite handset and a wireless modem attached to a cellular or satellite handset) and it is unlikely that consumers would be concerned about which technology is used to provide mobile wireless data services. These categories have been established merely to facilitate the presentation contained in this report. Furthermore, because mobile wireless data services are evolving in many different ways, it is not clear at this time into which market sector these services will be placed in the future.

a. Paging and Messaging Services

Paging companies, currently predominantly limited to one-way communications, provide one-way data services such as news, stock reports and forwarding of e-mail to alphanumeric pagers. Paging as a data service is ubiquitous and inexpensive.

As discussed in Section III.B.6, paging companies with narrowband PCS licenses can provide

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[290] Paging and messaging providers can also provide services via a connection with a computer. For example, Wireless Access' AccessLink, a two-way pager, is equipped with a RS-232 port which allows a connection with a PC, personal digital assistant ("PDA"), or other handheld computer with AccessLink acting as a wireless modem. By using third party software, a message up to 1,000 characters long can be sent and retrieved via the interface. *What is 2-Way Messaging?* (visited Jan. 28, 1998) <http://www.waccess.com/whatis.htm#What types>. Further, in December, SkyTel launched PageWriter 2000 which permits communication with a fax machine and also permits connection with a personal computer. Sally Ruth Bourrie, *SkyTel Launches PageWriter 2000*, WIRELESS WEEK, Dec. 8, 1997, at 46.

[291] *Bishop Report*, at 85-86.

two-way mobile data services in the 900 MHz band, including one-way messaging with acknowledgement and response paging, wherein the paged customer responds to the sender. SkyTel currently provides one-way messaging with acknowledgement and two-way text messaging services over narrowband PCS. While the Commission realizes that consumers of mobile wireless data services are most likely indifferent about the technology used to send mobile wireless data, it is quite often the technologies that differentiate mobile data services and therefore the Commission believes it is useful to briefly describe them below.

b. Wireless Modem Services

Over a voice network, wireless modems generally connect to a data terminal (*e.g.*, a laptop computer) and a mobile telephone and then connect to a network via the number dialed.[292] Dedicated data networks, described below, typically utilize a data terminal and wireless modem.

(1) Circuit-Switched Data Transmission

The largest portion of the mobile wireless data services market is controlled by circuit-switched cellular data ("CSCD") providers[293] which accounted for almost 60 percent of the mobile wireless data market as of mid-year 1997.[294] This system uses the cellular network much as wired modems use the existing public switched telephone network and requires a dedicated transmission path.[295] Some of the benefits of CSCD networks are ease of use, efficient use of existing equipment, and very good coverage.[296] However, analysts note that because CSCD requires a continuous connection and long distance charges apply, it may not be as economical as packet data transmission for certain services.[297] Major providers of

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[292] Some carriers also use modem pools that are housed in the carrier's switch at the cell site to facilitate transmission between cellular modems, using one type of protocol at one end of the modem, and land line modems, using another type of protocol at the other end. Modem pools are accessed by dialing *DATA and the phone number of the destination modem. *Strategis Mobile Data Report*, at 47. In addition, some handset manufacturers are producing an all-in-one handset. *See, e.g.*, *Nokia 9000i Communicator* (visited Apr. 16, 1998) <http://www.nokia.com/com9000/n9000i.html>.

[293] Broadband PCS carriers also offer circuit-switched data transmission. *See, e.g., Omnipoint Wireless Data Solutions* (visited Jan. 21, 1998) <http://www.omnipoint.com/data1.htm>; *InfoStream Technical Details* (Western Wireless Homepage) (visited May 26, 1998) <http://www.wwireless.com/products/infotech.htm>.

[294] *Strategis Mobile Data Report*, at 49.

[295] *CDPD Forum: Wireless Mobile Data Networking - The CDPD Approach* (visited May 26, 1998) <http://www2.wirelessdata.org/public/whatis/whatis.html>, at 12.

[296] *Bishop Report*, at 23.

[297] *Id.* at 22-23.

CSCD include Southwestern Bell and ALLTEL Mobile.[298]

(2) Packet Data Transmission

Packet data transmission separates messages into data packets and permits the same channel to be used for many transmissions (space permitting), as opposed to circuit-switched methods, which require a dedicated transmission path. Packet data transmission is best for short bursty-type messages.

Cellular digital packet data service ("CDPD") is a packet-switched network that uses channel hopping to take advantage of unused channel space between voice calls on a cellular network. A hybrid protocol, circuit-switched CDPD, dials into the circuit-switched network and then transfers to a CDPD application which permits users to access CDPD applications where CDPD is not available.[299] Providers of CDPD include GTE Wireless, Bell Atlantic Mobile, and AT&T Wireless.[300] In October 1997, AT&T launched its voice and Internet-ready service, PocketNet. Mobile subscribers can integrate their schedules, contacts and other office information as well as access the Internet with an analog handset.[301] PocketNet is available in over 3,000 cities across the country.[302]

Analysts note that CDPD is anticipated to have wide coverage in the future and may be cost effective for certain sized files.[303] While CDPD applications currently serve 15,000 to 25,000 subscribers,[304] analysts estimate that by 1999 CDPD will account for 27 percent of the mobile wireless data users and 68 percent of revenues.[305] As of the end of the third quarter of 1997, CDPD was available to 53 percent of the population in 195 markets including 118 MSAs, 41

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[298] *RCR's Top 20 Mobile Data Operators*, at 10.

[299] *Bishop Report*, at 42.

[300] *RCR's Top 20 Mobile Data Operators*, at 10.

[301] The handset also includes a circuit-cellular modem. *Samsung Telecommunications - Wireless: Model SH-P10* (visited Feb. 11, 1998) <http://www.samsungtelecom.com/html/wireless/sh-p10.htm>; *AT&T PocketNet™ Service Features* (visited May 26, 1998) <http://www.attws.com/nohost/data/pocketnet/features.html>.

[302] *AT&T Wireless Data - PocketNet Coverage Areas* (visited May 4, 1998) <http://wddsales.entp.airdata.com/wireless/coverage/zip_coverage.html>.

[303] *Bishop Report*, at 42.

[304] Rikki Lee, *Status Report, Snapshot of Cellular Data, Coverage Climbing*, WIRELESS WEEK, Sep. 29, 1997, at 12.

[305] *NBI says CDPD is fastest growing mobile data market*, *CDPD NEWSROOM* (visited Apr. 16, 1998) <http://www2.wirelessdata.org/public/newsroom/reports_studies/nbi/nbi.html>.

RSAs and 36 international markets.[306]

There are also a number of dedicated data networks. BellSouth Mobile Data and Ardis Company ("Ardis") use radio frequency packet data networks to provide nationwide service, mostly to corporate users. BellSouth Mobile Data provides mobile data services through its Mobitex network. Third parties package Mobitex with their own software and hardware with the Mobitex network to provide e-mail and Internet services (*e.g.*, Wireless Internet, LLC).[307] BellSouth Mobile Data also provides two-way messaging and services such as support for field sales and service. Ardis provides services such as dispatch/job status, access to inventory data bases, and customer service information as well as packaged off-the-shelf applications such as RadioMail. In 1997, Ardis added two-way messaging applications. Both networks have extensive geographic coverage but do not provide voice service. BellSouth Mobile Data estimates it will have approximately 80,000 customers as of year-end 1997, not including two-way messaging customers, and Ardis had 65,000 subscribers at year end.[308] On March 31, 1998, AMSC Acquisition Company, a subsidiary of American Mobile Satellite Corporation ("AMSC"), completed its acquisition of Ardis.[309]

Metricom, Inc. ("Metricom") also provides dedicated mobile data services via a packet data radio network. It uses frequency set aside by the FCC for public use and, therefore, operates using an unlicensed network.[310] Metricom provides access to the Internet, e-mail, LANs, on-line services, and private intranets through its Ricochet service.[311] Currently, Ricochet is provided in the San Francisco Bay Area, Seattle and Washington, D.C., parts of Los Angeles

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[306] *Wireless Data Forum: CDPD Report Card* (visited Apr. 16, 1998) <http://www2.wirelessdata.org/public/newsroom/report_card/index.html>. Appendix H, Map 7 shows the estimated U.S. coverage of CDPD.

[307] *BellSouth Wireless Data - Wireless Access to LANs - Solutions* (visited May 4, 1998) <http://www.ram.com/sol/messaging/solutions.html#wti>.

[308] *Strategis Mobile Data Report*, at 120-126. Ardis representative Ms. Naomi Yeransian provided the year-end 1997 number on April 14, 1998. Appendix H, Map 8 shows BellSouth Mobile Data's current coverage.

[309] *American Mobile Completes Acquisition of ARDIS, Creating Integrated Terrestrial/Satellite Data Network*, Press Release, American Mobile Satellite Corporation, March 31, 1998.

[310] *Bishop Report*, at 78. The 902 to 928 MHz Industrial Scientific and Medical ("ISM") frequency was set aside by the FCC for public use. This frequency must be certified but not licensed. Other applications that use this spectrum include garage door openers and new cordless phones. *Id*. Metricom also plans to use unlicensed spectrum in the 2.4 GHz frequency band, and holds licenses in the 2.3 GHz frequency band that it has indicated it intends to use to provide service with end user speeds to 128 kbps. Metricom, Inc., Form 10-K405, Dec. 31, 1997, at 6-8.

[311] Metricom, Inc., Form 10-K405, Dec. 31, 1997, at 2. Appendix H, Map 9 shows Ricochet's current coverage.

and in corporate and university campuses as well as 10 airports.[312] AirTouch paging is also reselling Ricochet modems and Internet services in the San Francisco area.[313] As of the end of February 1998, Metricom had 20,000 Ricochet customers.[314]

c. Satellite Services

Satellites have been providing mobile data services since the 1960s to the military and large companies. For a discussion of satellite providers and data services provided, *see* Appendix G.

3. Industry Statistics

The mobile wireless data services market is still fairly new. According to one analyst, three percent of all wireless traffic is data.[315] The number of business mobile data subscribers was estimated to be 2 million at year-end 1997 and revenues from business mobile wireless data services were estimated to be $378 million at the end of 1997.[316]

4. Competitive Assessment

While the mobile wireless data services market is still in its infancy, it is useful to provide available information regarding prices, market share by mobile wireless network, and potential entry by competitors in order to better track the emerging competitive marketplace.

a. Prices

Because the mobile wireless data services provided today are highly differentiated based on among other things, the geographic coverage of their networks and the specific mobile wireless services offered due to bandwidth or transmission capacity, a direct comparison of prices is not particularly useful. However, one analyst has calculated a comparison of price ranges of sample data and e-mail transmissions among some of the companies outlined above. These prices are summarized in Appendix E, Table 1, page E-2. As demonstrated in the

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[312] Metricom, Inc., Form 10-K405, Dec. 31, 1997, at 2; *List of Cities with Current Ricochet Coverage* (visited Apr. 13, 1998) <http://www.ricochet.net/ricochet/coverage/citylist.html>.

[313] *Metricom, Inc. And AirTouch Paging Announce Reseller Agreement*, News Release, AirTouch Communications, Oct. 29, 1997.

[314] Metricom, Inc., Form 10-K405, Dec. 31, 1997, at 2.

[315] *Is Microsoft The Savior Of The Wireless Data Industry?*, COMMUNICATIONS TODAY, *available in* 1997 WL 13696955, (Oct. 29, 1997), *citing* Zsigo Wireless, a consulting firm.

[316] *Strategis Mobile Data Report*, at 23, 329.

table, certain technologies and services appear to be better suited to economically provide applications than are others. For example, CSCD is overall the least expensive for e-mail and data combined ($0.90 and $1.35 at the high end, respectively for the entire transmission). However, CDPD is less expensive for a 600 character e-mail at up to $0.08, but costs up to $12 for a four page data transmission.[317] In addition, customers will need to consider whether they require voice capability since dedicated data providers do not offer voice service while cellular providers supporting CSCD and CDPD do offer such services.

b. Market Share

Data regarding market share by carrier is not available. As of year-end 1997, one analyst estimates that cellular and broadband PCS had approximately 60 percent of the mobile data business subscribers, dedicated data networks had 15 percent, mobile satellite services and two-way messaging had 10 percent each, and SMR had 5 percent. The respective share of revenues is quite different than the share of subscribers. By revenues, mobile satellite services had 39 percent, dedicated data networks had 31 percent, cellular/broadband PCS had 19 percent, two-way messaging had 9 percent, and SMR had 2 percent.[318]

c. Entry

Analysts report that several carriers have plans to enter or expand their presence in the mobile wireless data market. For example, Nextel intends to introduce an application in 1998 through its iDEN network, providing packet data transmission to facilitate services such as access to intranets, sales force automation, and e-mail.[319] Analysts anticipate that cellular and broadband PCS carriers will offer data services over their digital networks once they are built out.[320] It is also anticipated that additional satellite providers will enter the mobile data

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[317] *See* Appendix E, Table 1, page E-2. The price comparison is for GTE services in January 1997. Recent GTE CDPD pricing information quotes up to $0.072 for an e-mail and up to $12.00 for four page data transmission. No updated information for CSCD pricing was available. It should be noted that Metricom as well as a Bell Atlantic CDPD service charge a flat monthly fee for unlimited usage, therefore, the costs for transmission will depend on the volume of usage by individual customer and may be lower than those quoted above if usage is high enough. The notes contained in Appendix E, Table 1, page E-3, provide updated pricing information for various companies where available.

[318] *Strategis Mobile Data Report*, at 329, 353.

[319] *Strategis Mobile Data Report*, at 150.; *Bishop Report*, at 63.

[320] *Strategis Mobile Data Report*, at 91, 333. Airtouch, for example, announced the start of a trial of CDMA digital data technologies beginning in March 1998. *QUALCOMM and AirTouch Announce Industry's First Trial of CDMA Digital Data Technology*, News Release, Airtouch Communications, Feb. 19, 1998.

services market and existing providers will expand their offerings.[321]

5. Industry Projection

Some analysts believe that the market for mobile wireless data is beginning to grow in part due to the widespread appeal of the Internet, the increased use of e-mail, and the standardization of equipment and software.[322] Analysts note that mobile wireless data services will allow carriers to differentiate their products to meet increased competition.[323] Analysts estimate that the potential market for wireless e-mail and Internet applications is 44.3 million and 39.6 million subscribers respectively. Further, analysts estimate that by 2001 there will be almost 11 million wireless e-mail users and 1.6 million wireless Internet subscribers using dedicated data, cellular and broadband PCS, and paging services.[324]

In addition to the services discussed above, other wireless services are being developed. For example, wireless location services provide applications such as fleet management, location-based billing, roadside assistance, navigation information, electronic yellow pages, and personal, vehicle, and pet tracking. One analyst estimates that there is a market potential of 63.6 million units.[325]

As expected, the range of predicted growth varies based on the assumptions used. For example, one analyst expects mobile wireless data business subscribers to grow from 2 million today to 10.4 million by 2001.[326] Another analyst projects that total mobile wireless data subscribers will grow from 2.2 million in 1997 to 9 million by 2001 and to over 12 million by 2002.[327] Analysts do agree that over one-half of the users will obtain service from cellular and broadband PCS mobile wireless data providers and that over one-half of the growth is expected to occur during the last two years as more user-friendly data services become available.[328] Based on three available forecasts, service revenues are expected to

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[321] *Strategis Mobile Data Report*, at 80, 81, and 159.

[322] *Id*. at 1.

[323] *Id*.

[324] *Id*. at 210-13.

[325] *Id*. at 215-17, 235.

[326] *Id*. at 329.

[327] Craig J. Mathias, *Wireless Data - What's Real? What's Wrong?*, BUSINESS COMMUNICATIONS REVIEW, Jun. 1997, at 53, *citing* The Yankee Group.

[328] Mathias at 53; *Strategis Mobile Data Report*, at 17.

grow to between $1.7 billion and $6 billion by 2001.[329]

IV. CONCLUSION

The CMRS marketplace is an evolving and complex industry where new services using emerging technologies, which were not even envisioned only a few years ago, compete with existing products. In addition, cross-over services, such as mobile telephone operators offering paging services and paging operators offering wireless data transmission, are growing at a rapid rate. These developments are having beneficial effects for consumers, to whom competition is bringing more choices at lower prices, and operators, to whom competition is bringing expanding business opportunities, increased technological innovation, and less regulatory intervention.

A. Mobile Services Competition

In the year since the release of the *Second Report*, competition in the mobile telephone market grew more than it had ever before. This new competition has been made possible by a flurry of service launches by broadband PCS and digital SMR operators and minimal regulatory oversight. The result of these operators' activities is that there is now at least three mobile telephone providers offering service in over 200 BTAs, containing over 200 million people. Furthermore, many of these markets have four, five, or six operators providing service. These new entrants (and incumbents) are not subject to rate and entry regulation and are being provided more and more regulatory flexibility to allow them to compete effectively.

The entrance by these new providers has resulted in substantial progress towards a truly competitive mobile telephone marketplace. While this development is still in its early stages, the signs of competition are clear. The per-minute charges for service have declined, by some estimates as much as 30 to 40 percent. At the same time, usage of these new services is increasing, with some operators reporting customers using as many as 350 minutes each month, three times the average on older cellular systems. Finally, some analysts believe that competition has helped to increase the growth rate of the mobile telephone market as a whole.

While these are welcome developments, there is ample room for improvement. Much of the deployment of new mobile telephone networks has been concentrated on more densely populated urban and suburban markets. Consequently, many less populated areas are still awaiting the arrival of mobile telephone competition.

Simultaneous to the developments in the mobile telephone market, the paging/messaging industry has begun its own transformation. While it has long been a highly competitive business with numerous providers in each market, it is now facing potential additional

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[329] *PCIA Forecast*, at 59-61; *Strategis Mobile Data Report*, at 353.

competition from providers of other services, such as mobile telephone, mobile data and even satellite providers. Consequently, the past year has seen paging operators enhancing and expanding their product offerings to include two-way messaging, voice messaging, and data transmissions such as e-mail and stock quotes.

Given that the dispatch market is in the process of structuring caused by Nextel's move into the mobile telephone market and that mobile data market is still in a developmental stage, a definitive statement as to their competitive status is not possible in this report.

B. Wireless/Wireline Competition

In addition, this past year has seen the beginnings of a shift in the relationship between wireless and wireline services. A number of wireless technologies have begun to take aim at services long thought of as the sole province of wireline operators. For example, a number of operators are deploying networks using fixed wireless technologies to compete with wireline local exchange service. In addition, mobile telephone operators are beginning to go one step further by using aggressive pricing to position their services as true replacements for the wire-based services of LECs. Other companies are using wireless technology to capitalize on the exploding demand for Internet access and provide individual consumers with services which are comparable, if not superior, to what they can obtain using wireline equivalents.

C. Regulatory Outlook

The increase in services offered in the marketplace, the reduction in prices for many of these new services, and the emergence of new technologies all clearly demonstrate that the Commission's policy formulation and regulation have promoted competition in the CMRS marketplace as required by Congress. The most important of these pro-competitive policies have been making large amounts of new spectrum available and permitting service flexibility. The Commission will continue to promote competition in its policy formulation for CMRS providers, in particular, by working to facilitate market entry by new entities, increase spectrum flexibility and position CMRS licensees to compete directly with wireline services thereby providing more options for consumers at a lower cost.

V. ADMINISTRATIVE MATTERS

This Third 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. § 322 (c)(1)(C).

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

Magalie Roman Salas
Secretary

May 14, 1998

Separate Statement of Chairman William E. Kennard
Third Annual Commercial Mobile Radio Services Competition Report

This marks the third time the Commission has issued a report on competition within the Commercial Mobile Radio Services. I am extremely proud that much has changed since the first report was issued. Since that time, we have seen significant growth in the number of wireless competitors and an increase in the services available to consumers. Thanks to our wireless auctions, duopoly in wireless telephony is now a thing of the past in many markets, and some markets have five or more operating providers. Now every other person on K Street has a wireless phone. But, more importantly, the benefits of wireless telephony are now finding their way to Main Street, USA in smaller towns across America. There are currently 55 million subscribers of wireless telephone service in the United States, people who now use a technology that was rarely seen only a few years ago. More will follow as buildout continues. As the level of competition increases, we should expect to see lower prices and better service for consumers.

The CMRS Competition Report also shows that the paging industry is extremely competitive. For example, it states that the 25 largest cities in the US have an average of 29 paging licensees, not including resellers, while the 25 smallest SMAs have an average of 12 licensees per area. I believe the industry and this Commission have done a lot to foster this competition.

Finally, the report suggests that some wireless providers are gearing up to compete against wireline providers. We should explore every available opportunity to promote that competition. Our exploration should include using the regulatory authority we now have to hasten the day when consumers begin to view wireless as a real substitute for wireline, and not just a complement. We should also recognize Congress's important role in promoting competition. I believe we should work with Congress to eliminate regulatory obstacles to the development of fixed, as well as mobile, wireless communications services. It would also be helpful for Congress to eliminate obstacles to the rapid deployment of wireless services. One important step would be to clarify that our licenses cannot be tied up in bankruptcy.

This report confirms that the market for wireless services is a dynamic, expanding market that is providing new services to consumers at lower prices. We should be heartened by its findings, and commit to do all that we can to ensure that the positive trends identified in the report continue. If we are successful, we will make a tremendous difference in the lives of the American people.

APPENDIX A:
SPECTRUM AUCTIONS

Table of Contents

Table 1A: FCC Auctions Summary - Service Design

Auction Number and Name	Number of Licenses (1)	Geographic License Scheme (2)	Spectrum per license	Total Spectrum (in megahertz)	Service Description
1 **Nationwide Narrowband PCS**	11 (3)	Nationwide	11 blocks, 5 = 50/50KHz, 3 = 50/12.5KHz, 2 = 50 KHz	0.7875 MHz	Advanced paging/data
2 **Interactive Video and Data Service**	594	MSA	2 blocks of 500 kHz	1 MHz	Interactive data
3 **Regional Narrowband PCS**	30	Regional	6 blocks, 2 = 50/50KHz, 4 = 50/12.5 KHz	0.45 MHz	Advanced paging/data
4 **A & B block Broadband PCS**	102 (4)	MTA	2 blocks of 30 MHz	60 MHz	Mobile voice and data
5/10 **C block Broadband PCS (5)**	493	BTA	1 block of 30MHz	30 MHz	Mobile voice and data
6 **Multichannel Distribution Service**	493	BTA	Max of 13 channels of 6 MHz	78 MHz (6)	Wireless cable
7 **900 MHz Specialized Mobile Radio**	1020	MTA	20 blocks of 25 kHz	5 MHz	Mobile voice and data
8 **Digital Broadcast Service (7)**	1	Full US Coverage	500 MHz	437.5 MHz	Multichannel video
9 **Digital Broadcast Service (7)**	1	Partial US Coverage	Uses same spectrum as full coverage license	375 MHz	Multichannel video
11 **D, E, & F block Broadband PCS**	1479	BTA	3 blocks of 10 MHz	30 MHz	Mobile voice and data
12 **Cellular Unserved**	14	MSA/RSA	2 blocks of 25 MHz	50 MHz	Mobile voice and data
13 **Interactive Video and Data Service**	981	MSA/RSA	2 blocks of 500 kHz	1 MHz	Interactive data
14 **Wireless Communications Service**	128	MEA/REAG	4 blocks, 2 = 10 MHz, 2 = 5 MHz	30 MHz	(8)
15 **Digital Audio Radio Service**	2	Full US Coverage	2 blocks of 12.5 MHz	25 MHz	Multichannel audio
16 **Upper 800 MHz Specialized Mobile Radio**	525	EA	3 blocks, 1 MHz, 3 MHz , and 6 MHz	10 MHz	Mobile voice and data
17 **Local Multipoint Distribution Service**	986 (9)	BTA	2 blocks, 1150 MHz and 150 MHz	1300 MHz	Fixed voice, data and video

Source: Federal Communications Commission

(1) This is the total number of licenses initially granted in each service. It does not take into account any partitioning and disaggregation activity. Some of these licenses have not yet been granted.
(2) MTAs = Major Trading Areas, BTAs = Basic Trading Areas, MSAs = Metropolitan Statistical Areas, RSAs = Rural Service Areas, MEAs = Major Economic Areas, REAGs = Regional Economic Area Groups.
(3) Includes one pioneer preference license.
(4) Includes three pioneer preference licenses.
(5) To date, two auctions have been completed for C block PCS, the original and one reauction.
(6)To be precise, Multipoint Distribution Service (MDS) total spectrum should be 76 MHz because Channel 2 was originally 6 MHz only in the top 50 markets. In the rest of the markets, it was Channel 2A with 4 MHz. As noted in the MDS Auction Procedures, Terms, and Conditions: "In 1992, the 2160-2162 MHz frequency was reallocated to emerging technologies, and thus, any subsequent MDS use of these 2 MHz will be secondary."
(7) There is a total of 500 MHz of DBS downlink spectrum available. The same spectrum can be reused at each of the eight U.S. DBS orbital slots. The figures in the table are (28/32) x500 and (24/32) x500, respectively, but they each refer to portions of the same 500 MHz of spectrum.
(8) WCS is permitted to implement a wide range of services, subject to FCC engineering requirements, including fixed, mobile, radio location, and broadcasting-satellite (sound) service.
(9) Cellularvision, Inc. has been granted a pioneer preference for a portion of the 1150 MHz New York BTA.

Table 1B: FCC Auctions Summary - Auction Results

Auction Number and Name		Total Winning Bids (1)	Bid Price (dollars per person per MHz)	Auction Duration			Number of Winning Bidders
				Began	Ended	# Rounds	
1	Nationwide Narrowband PCS	$650,306,674	$3.10	7/25/94	7/29/94	47	6
2	Interactive Video and Data Service	$213,892,375	$0.85	7/28/94	7/29/94	Oral Outcry	178
3	Regional Narrowband PCS	$392,706,797	$3.46	10/26/94	11/8/94	105	9
4	A & B block Broadband PCS	$7,721,184,171	$0.52	12/5/94	3/13/95	112	18
5/10	C block Broadband PCS(2)	$10,102,121,394.75	$1.33	12/18/95 7/3/96	5/6/96 7/16/96	184 25	90
6	Multichannel Distribution Service	$216,239,603	$0.067 (3)	11/13/95	3/28/96	181	67
7	900 MHz Specialized Mobile Radio	$204,267,144	$0.24 (3)	12/5/95	4/15/96	168	80
8	Digital Broadcast Service	$682,500,000	$0.0062	1/24/96	1/25/96	19	1
9	Digital Broadcast Service	$52,295,000	$0.0006	1/25/96	1/26/96	25	1
11	D, E, & F block Broadband PCS	$2,517,439,565	$0.33	8/26/96	1/14/97	276	125
12	Cellular Unserved	$1,842,533	n/a	1/13/97	1/21/97	36	10
13	Interactive Video and Data Service	(4)	(4)	(4)	(4)	(4)	(4)
14	Wireless Communications Service	$13,638,940	$0.0018	4/15/97	4/25/97	29	17
15	Digital Audio Radio Service	$173,234,888	$0.0274	4/1/97	4/2/97	25	2
16	Upper 800 MHz Specialized Mobile Radio	$96,232,060	$0.04	10/28/97	12/8/98	235	14
17	Local Multipoint Distribution Service	$578,663,029	$0.0018	2/18/98	3/25/98	127	104

Source: Federal Communications Commission

(1) Total Winning Bids includes high bids from the auction (net of any bidding credits) plus the price paid for any pioneer preference licenses.
(2) C block broadband PCS was auctioned in two auctions. The Total Winning Bids, Bid Price, and Number of Winning Bidders have been combined to avoid duplication.
(3) Estimated to adjust for encumbered spectrum.
(4) The second IVDS auction was postponed on January 29, 1997.

Table 2: Cellular Unserved Auction Results

Bidder Name	Licenses Won	Total POPs	Net High Bids
Christel Anderson/CHI Trust Partnership	1	233,568	$5,301
Coconino Arizona RSA Limited Partnership	1	204,305	$1,000
Constance L. Pollard/ETA Trust Partnership	1	28,237	$7,100
Cumberland Cellular Partnership	1	101,643	$11,000
Metacomm Cellular Partners	2	126,338	$1,013,022
N.E. Colorado Cellular, Inc.	1	23,712	$536,000
Oregon RSA #3 Limited Partnership	1	138,966	$37,000
Ted M. Peters/Epsilon Trust Partnership	1	100,504	$10
Triad Cellular Limited Partnership	1	22,300	$30,000
Western Wireless Corporation	4	251,938	$496,100

Source: Federal Communications Commission

Table 3: Wireless Communications Service Auction Results

Bidder Name	Licenses Won	Total POPs	Net High Bids
Bal\Rivgam, L.L.C.	5	42,117	$652,602
BellSouth Wireless Cable, Inc.	22	226,359	$6,194,608
Cellutec	2	223	$7,345
CFW Communications Company	3	8,099	$233,000
Coloma Wireless, Inc.	31	74,774	$853,691
Comcast WCS Communications, Inc.	17	225,163	$1,479,485
CS Wireless Systems, Inc.	2	19,152	$100,000
McLeod, Inc.	4	15,024	$4
Metricom, Inc.	8	209,998	$1,447,034
Omnipoint Data Company, Inc.	9	42,361	$85,991
Pacific Triangle Communications	3	1,331	$31,735
PCSCO Partnership	8	67,289	$1,600,000
Pioneer Telephone Association, Inc.	1	1,094	$18,018
Shell Offshore Services Company	4	100	$826,000
Telecorp Management Corp., Inc.	3	12,118	$59,866
Triad Cellular Corporation	3	61,955	$17,061
Valley Telephone Cooperative, Inc.	1	2,945	$32,500

Source: Federal Communications Commission

Table 4: Digital Audio Radio Service Auction Results

Bidder Name	Licenses Won	Total POPs	Net High Bids
Satellite CD Radio, Inc.	1	Full US Coverage	$83,346,000
American Mobile Radio Corp.	1	Full US Coverage	$89,888,888

Source: Federal Communications Commission

Table 5: Upper 800 MHz Specialized Mobile Radio Auction Results

Bidder Name	Licenses Won	Total POPs	Net High Bids
Cellutech	8	1,504	$43,485
Communications Pacfic Inc.	1	176	$478,400
Hawaiian SMR Company	1	1,108	$279,000
High Tech Comm. Services, Inc.	1	3,624	$1,182,750
Jamestown Communications, Inc.	2	432	$102,000
Mid-States Wireless, Inc.	3	529	$56,250
Mountain SMR Group	1	1,108	$308,100
Nevada Wireless	16	5,315	$1,067,300
Nextel License Acquisition Corp.	475	732,263	$88,805,075
North Sight Communications, Inc.	1	3,624	$1,571,700
Porta-Phone Paging Licensee	3	1,475	$1,037,000
Silver Palm Communications, Inc.	4	996	$74,100
Southern Company	7	4,817	$1,184,000
Supreme Radio Communications	1	524	$42,900

Source: Federal Communications Commission

Table 6: Local Multipoint Distribution Service Auction Results

Bidder Name	Licenses Won (both A and B blocks)	Total POPs	Net High Bids
ABS LMDS Venture	9	1,898,540	$772,750
Actel Corporation	32	10,618,245	$9,728,690
Advantage Cellular Systems, Inc.	4	554,304	$208,237
AirCom Consultants, Inc. dba AirCom, Inc.	5	465,728	$213,620
AKS LMDS Venture	3	220,052	$312,950
Alenco Communications, Inc.	2	305,762	$255,200
Alpine Communications, L.C.	3	698,237	$340,281
ALTA WIRELESS, INC.	4	6,846,284	$15,152,500
American Telecasting Development, Inc.	1	189,731	$314,250
American Wireless, Inc.	1	83,263	$64,900
Antilles Wireless Cable TV Co.	1	102,000	$64,350
ARNet, Inc.	16	9,094,681	$11,566,684
Baker Creek Communications, L.P.	232	90,815,802	$25,631,379
Bascom Mutual Tele. Company-Sycamore Tele.	1	147,523	$127,600
BCK\RIVGAM, L.L.C.	3	2,154,991	$6,090,150
Blackwater Holdings, LLC	27	4,579,724	$3,114,249
BTA Associates	7	3,663,936	$16,996,500
Cable & Communications Corporation	1	65,077	$292,500
Catfish Communications, L.L.C.	4	578,783	$110,012
Cellular Holding, Inc.	10	2,016,495	$3,540,429
Cellular Mobile Systems of St. Cloud G. P., LLP	2	367,637	$85,150
Central Oklahoma Telephone Company	1	72,552	$119,350
Central Texas Telephone Investments, Inc.	4	427,058	$442,650
Charles J. Brinkman	1	98,609	$51,700
Chickasaw-People's PCS	6	603,089	$363,996
Comcell, Inc.	1	209,339	$247,500
Command Connect, LLC	7	2,159,405	$1,958,667
Consolidated Telephone Cooperative	1	38,001	$38,500
Cortelyou Communications Corp.	15	10,573,982	$25,241,133
CoServ, L.L.C.	6	7,519,988	$10,293,750
Craw-Kan Telephone Cooperative, Inc.	2	306,029	$347,600
CRH Consortium	7	1,179,888	$651,811
Digital and Wireless Television, L.L.C.	2	481,054	$239,248
Duckhorn Broadcasting, Inc.	1	73,214	$23,100
Eclipse Communications Corporation	51	11,465,575	$14,330,559
ENMR Telephone Cooperative, Inc.	7	764,196	$2,880,000
Farmers Mutual Telephone Company	1	440,062	$423,500
Farmers Telephone Cooperative, Inc.	1	149,524	$126,750
Fleming-Mason Service Corporation	4	442,903	$225,777
Gateway Telecom, LLC	4	524,255	$281,095
GCI Communication Corp.	1	388,943	$271,000
Glenwood Telephone Membership Corporation	2	214,374	$186,450
Golden West Wireless, Inc.	2	255,833	$257,400
Gulf Coast Services, Inc.	1	594,397	$579,000
Hamilton Contracting, Inc.	1	532,880	$293,084
HighSpeed.Com, L.L.C.	20	5,989,276	$3,982,422
Home Telephone Company, Inc.	1	624,369	$624,369
Horry Telephone Cooperative, Inc.	2	288,106	$313,300
IRON MOUNTAIN WIRELESS, INC.	3	647,042	$52,745
IT&E Overseas, Inc.	4	352,000	$180,150
Judicious Communications L.L.C.	1	71,130	$24,200
Kaplan Telephone Company, Inc.	1	496,579	$476,850
Kingdon R. Hughes	10	1,910,777	$1,299,000

Table 6: Local Multipoint Distribution Service Auction Results Continued

Bidder Name	Licenses Won	Total POPs	Net High Bids
Lakedale Link, Inc.	4	1,262,625	$233,350
LeoMax Communications	3	214,070	$270,600
Liberty Cellular, Inc.	21	2,071,185	$1,219,116
LMDS Ltd.	6	2,284,569	$1,651,650
Mark Twain Communications Company, Inc.	2	111,126	$42,900
Mary J Kuiken	12	1,940,982	$254,511
MEDIA PCS VENTURES, INC.	2	387,368	$387,368
Midwest Wireless Communications, L.L.C.	4	698,662	$357,696
Mr. Watson	3	626,605	$330,829
Network Wireless	3	826,156	$128,150
New Wave Networks, LLC	6	1,026,310	$866,250
NEXTBAND Communications, LLC	42	96,297,809	$134,707,175
North Alabama Cellular, LLC	1	131,556	$72,355
Northeast Communications of Wisconsin, Inc.	17	2,139,253	$1,023,528
Northern Communications, Inc.	2	115,264	$23,650
Northwest Communications Cooperative	2	150,199	$47,300
NUCOM	5	533,921	$29,590
One Call Communications, Inc.	2	722,773	$646,000
Orwell Communications, Inc.	3	482,574	$406,450
Panhandle Telecommunication Systems, Inc.	1	53,960	$20,150
PCTV Gold, Inc.	2	2,512,474	$3,221,400
Pine Belt Communications, Inc.	2	312,375	$151,329
PinPoint Communications Inc.	3	146,069	$158,950
Ponderosa Telephone Co., The	3	1,469,493	$317,200
Progressive Communications	1	178,808	$96,250
PVT NetWorks, Inc.	1	48,605	$546,000
RF Development, LLC	2	414,300	$227,864
Ruvin Isaak Lerman	4	336,864	$156,750
Scientific Software Solutions, Inc.	2	174,710	$51,700
SKSW LMDS Venture	4	1,445,176	$3,737,250
Star Search Rural TV & Cellular, Inc.	2	140,336	$185,900
Sulphur Springs Valley Electric Cooperative, Inc.	1	97,624	$46,500
Sunshine LMDS Network, Inc.	5	1,546,845	$1,173,835
Swayzee Telephone Company	1	109,238	$60,080
Telecorp LMDS, Inc.	8	8,155,256	$3,824,700
Totelcom of Oklahoma, Inc.	6	580,102	$422,400
Touch America, Inc.	24	4,357,894	$7,021,055
Tri-Corners Telecommunications, Inc.	2	325,552	$698,250
TVCON/Rio Vision	8	1,282,400	$310,200
TWG LMDS, LLC	3	942,430	$251,350
U S WEST Communications, Inc.	8	6,846,072	$9,923,000
Valley Telephone Cooperative, Inc.	2	701,888	$386,037
Vanguard LMDS Corp.	22	7,121,234	$8,884,527
Venture Wireless, Inc.	4	586,730	$443,702
Vernal Communications	1	47,000	$12,925
Virginia Tech Foundation, Inc	4	1,517,865	$1,104,431
Webster-Calhoun Cooperative Telephone Assoc.	1	131,731	$72,452
West Liberty Telephone Company	1	115,731	$42,900
WinStar LMDS, L.L.C.	15	16,838,923	$43,372,050
WIRELESS DISTRIBUTION SERVICES, INC.	2	665,920	$366,255
WNP Communications, Inc.	40	105,074,661	$186,868,132

Source: Federal Communications Commission

APPENDIX B:
MOBILE TELEPHONY

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Table 1: CTIA's Semi-Annual Mobile Survey of the Mobile Telephone Industry

Date	Estimated Subscribers	Total Six-Month Service Revenues (000s)	Cell Sites	Employees	Cumulative Capital Investment (000s)	Average Local Monthly Bill
Jan 85	91,600	$178,085	346	1,404	$354,760	
June 85	203,600	$176,231	599	1,697	$588,751	
Dec 85	340,213	$306,197	913	2,727	$911,167	
June 86	500,000	$360,585	1,194	3,556	$1,140,163	
Dec 86	681,825	$462,467	1,531	4,334	$1,436,753	
June 87	883,778	$479,514	1,732	5,656	$1,724,348	
Dec 87	1,230,855	$672,005	2,305	7,147	$2,234,635	$96.83
June 88	1,608,697	$886,075	2,789	9,154	$2,589,589	$95.00
Dec 88	2,069,441	$1,073,473	3,209	11,400	$3,274,105	$98.02
June 89	2,691,793	$1,406,463	3,577	13,719	$3,675,473	$85.52
Dec 89	3,508,944	$1,934,132	4,169	15,927	$4,480,141	$83.94
June 90	4,368,686	$2,126,362	4,768	18,973	$5,211,765	$83.94
Dec 90	5,283,055	$2,422,458	5,616	21,382	$6,281,596	$80.90
June 91	6,380,053	$2,653,505	6,685	25,545	$7,429,739	$74.56
Dec 91	7,557,148	$3,055,017	7,847	26,327	$8,671,544	$72.74
June 92	8,892,535	$3,633,285	8,901	30,595	$9,276,139	$68.51
Dec 92	11,032,753	$4,189,441	10,307	34,348	$11,262,070	$68.68
June 93	13,067,318	$4,819,259	11,551	36,501	$12,775,967	$67.31
Dec 93	16,009,461	$6,072,906	12,805	39,775	$13,946,406	$61.48
June 94	19,283,306	$6,519,030	14,740	45,606	$16,107,920	$58.65
Dec 94	24,134,421	$7,710,890	17,920	53,902	$18,938,677	$56.21
June 95	28,154,415	$8,740,352	19,833	60,624	$21,709,286	$52.45
Dec 95	33,785,661	$10,331,614	22,663	68,165	$24,080,466	$51.00
June 96	38,195,466	$11,194,247	24,802	73,365	$26,707,046	$48.84
Dec 96	44,042,992	$12,440,724	30,045	84,161	$32,573,522	$47.70
June 97	48,705,553	$13,134,551	38,650	97,039	$37,454,294	$43.86
Dec 97	55,312,293	$14,351,082	51,600	109,387	$46,057,911	$42.78

Source: *Semi-Annual Check Up Shows Wireless Industry in Vigorous Health*, News Release, Cellular Telecommunications Industry Association, 1997 *and Wireless Industry Sets New Growth Record: 11,270,301 Net Subscriber Growth in 1997*, News Release, Cellular Telecommunications Industry Association, April 1, 1998.

Tables 2A-2C: Mobile Telephone Industry Capital Markets - 1996 - 1998

Table 2A: 1998 Public Capital Markets
Through 4/9/98
(in billions)

	New Debt	New Equity	Total
PCS	$0.00	$0.00	$0.00
Cellular	$0.18	$0.00	$0.00
Digital SMR	$1.37	$0.00	$0.00
Total	$1.55	$0.00	$1.55

Table 2B: 1997 Public Capital Markets
(in billions)

	New Debt	New Equity	Total
PCS	$0.93	$0.16	$1.09
Cellular	$2.70	$0.00	$2.70
Digital SMR	$1.70	$0.00	$1.70
Total	$5.33	$0.16	$5.49

Table 2C: 1996 Public Capital Markets
(in billions)

	New Debt	New Equity	Total
PCS	$1.37	$1.27	$2.64
Cellular	$2.76	$0.16	$2.92
Digital SMR	$0.00	$0.15	$0.15
Total	$4.13	$1.58	$5.71

Sources:
Wireless Groups Take Turns at the Public Trough, material presented by Paul Kagan Associates, Inc. at the "Wireless Telecom Values & Finance: Across the Digital Divide" conference, Apr. 29-30, 1998, The Park Lane Hotel, New York, New York, held by Paul Kagan Associates, Inc.; except for PCS 1997 New Debt - Paul Kagan Associates, Inc., *Kagan Conference on Wireless Telecom Values & Finance*, WIRELESS TELECOM INVESTOR, Nov. 12, 1997, at 10.

Tables 3A - 3B: Mobile Telephone Industry New Entrant Rollout Summary

Table 3A: Estimated Mobile Telephone New Entrant Rollouts by Number of Launches

Number of New Entrants(1) with Coverage in a BTA	Number of BTAs	POPs in Those BTAs (2)	% of Total US POPs
1	138	45,188,844	17.9%
2	71	37,708,438	14.9%
3	51	110,853,174	44.3%
4	13	25,066,591	9.9%
5	0	0	0.0%
Total	273	219,817,047	87.0%

Table 3B: Estimated Mobile Telephone New Entrant Rollouts by Market Size

Quartiles by BTAs' POPs	# of BTAs with Coverage by a New Entrant (1)	Percent of BTAs in Quartile	POPs in Those BTAs (2)	Percent of POPs in Quartile
1st Quartile (123 largest BTAs)	115	93.5%	188,167,402	97.9%
2nd Quartile (2nd largest 123 BTAs)	81	65.9%	22,154,676	66.4%
3rd Quartile (3rd largest 123 BTAs)	48	39.0%	7,085,560	39.9%
4th Quartile (124 smallest BTAs)	29	23.4%	2,409,409	26.0%

Source: Federal Communications Commission estimates.

Notes:
1) The mobile telephone new entrants used in the analysis are broadband PCS operators plus Nextel Communications, Inc.
2) POPs from the 1990 Census.

Table 4: Mobile Telephone Industry Top 50 Operators

(In Millions)

Company	Cellular POPs (1)	ABC Block PCS POPs (1)	DEF Block PCS POPs (1)	Broadband POPs (2) Total	Rank	Broadband MHz-POPs (3) Total	Rank	Unduplicated Brdbd. POPs (4) Total	Rank
AT&T	77.09	118.60	149.46	345.15	1	6,979.85	1	234.39	2
Sprint PCS (5)		192.70	89.33	282.03	2	6,674.39	2	242.90	1
Nextel Communications				230.00	3	2,300.00	4	230.00	3
Nextwave Telecom		110.04	52.77	162.82	4	3,829.07	3	162.82	4
Omnipoint		38.85	92.26	131.11	5	2,088.15	5	93.82	5
SBC Communications (6)	38.95	35.23	2.22	76.40	6	2,052.74	6	76.40	6
Western Wireless	7.62	19.44	45.69	72.76	7	1,230.80	11	72.19	7
GTE Mobilnet	52.48	9.77		62.25	8	1,605.09	8	62.25	8
BellSouth Corporation	40.52	7.72	13.59	61.84	9	1,380.59	10	60.01	9
Primeco (7)		57.84		57.84	10	1,735.20	7	57.84	10
Bell Atlantic	55.45			55.45	11	1,386.20	9	55.45	11
Northcoast Operating Co.			47.68	47.68	12	476.85	22	47.68	12
Airtouch Communic. (8)	43.02			43.02	13	1,075.57	12	43.02	13
ALLTEL Corporation (9)	8.83		31.39	40.22	14	534.58	20	33.48	17
Rivgam Communicators			37.97	37.97	15	379.74	23	37.97	14
Pocket Communications		35.48		35.48	16	1,064.33	13	35.48	15
US West Media Group (8)	35.06			35.06	17	876.55	14	35.06	16
Powertel	0.32	17.30	12.48	30.10	18	651.63	17	23.10	22
Ameritech Corporation (6)	21.79	8.22		30.00	19	791.21	16	29.86	18
Aerial Communications		27.49		27.49	20	824.74	15	27.49	19
360 Communications (9)	25.93			25.93	21	648.30	18	25.93	20
United States Cellular	25.20			25.20	22	629.92	19	25.20	21
US West Communications			22.20	22.20	23	221.95	28	22.20	23
Aerforce			21.55	21.55	24	215.52	29	21.55	24
General Wireless	19.87			19.87	25	496.67	21	19.87	25
Comcast Corporation	8.22		9.87	18.08	26	304.09	25	11.51	29
Century Telephone Ent.	9.90		8.00	17.90	27	327.50	24	17.90	26
Telecorp Holding (PK)			13.39	13.39	28	133.89	37	13.39	27
Mercury PCS (PK)		2.50	9.16	11.65	29	166.50	32	11.65	28
Cook Inlet Western		1.55	9.26	10.81	30	139.04	35	10.81	30
Centennial Cellular	7.01	3.77		10.78	31	288.34	27	10.78	31
Devon Mobile Comm.		1.36	8.54	9.90	32	126.26	40	9.90	32
Clearcomm		9.67		9.67	33	290.12	26	9.67	33
Magnacom (PK)		2.64	5.47	8.10	34	133.80	38	8.10	34
Vanguard Cellular Systems	7.90			7.90	35	197.55	30	7.90	35
Urban Comm. PCS (PK)		3.47	4.42	7.89	36	148.28	34	7.89	36
21st Century Telesis (PK)		4.32	3.51	7.83	37	164.57	33	7.83	37
Radiofone	2.19		5.15	7.34	38	106.34	43	7.34	38
McLeod, Inc.			7.09	7.09	39	70.92	47	7.09	39
Puerto Rico Telephone	3.52		3.52	7.04	40	123.27	41	3.52	50
Chase Telecom (PK)		6.54		6.54	41	196.17	31	6.54	40
Atlantic Cellular Company	1.00		5.03	6.03	42	75.29	45	6.03	41
Dobson Comm. (SEC)	1.41		4.20	5.61	43	77.22	44	5.61	42
Southern New Eng.	5.53			5.53	44	138.13	36	5.53	43
Pricellular Corporation	5.10			5.10	45	127.38	39	5.10	44
ACC-PCS (PK)			5.04	5.04	46	50.42	49	5.04	45
Poka Lambro (PK)	0.06	1.34	3.29	4.69	47	74.67	46	4.69	46
DCC PCS (PK)			4.49	4.49	48	44.85	50	4.49	47
US Unwired	1.29	0.47	2.44	4.21	49	70.85	48	3.99	48
Texas Utilities		3.96		3.96	50	118.66	42	3.96	49

Notes:
(1) All of the operators' POPs equals their total net POPs. Net POPs are calculated for each individual license by multiplying that license's population by the operator's percentage ownership of the license.
(2) Broadband POPs are the sum of cellular, ABC block PCS, and DEF block PCS POPs.
(3) Broadband MHz-POPs equals cellular POPs multiplied by 25 MHz plus ABC block PCS POPs multiplied by 30 MHz plus DEF block PCS POPs multiplied by 10 MHz.
(4) Unduplicated POPs adjusts Broadband POPs to account for a licensee having multiple licenses in the same geographic area.
(5) Sprint PCS' licenses include the combined holdings of American Personal Communications, Sprint Corp, the PhilliCo partnership (owned by Sprint Corp (47.1%), TCI Communications (35.3%), and Cox Communications (17.6%)), and the Sprint Spectrum partnership (owned by Sprint Corp (40%), TCI Communications (30%), Comcast Corp (15%), and Cox Communications (15%)). Sprint PCS' unduplicated broadband POPs are calculated using 1990 POPs.
(6) SBC Communications has announced plans to merge with both Ameritech Corp. and Southern New England Telecommunications.
(7) PrimeCo is owned by Airtouch (25%), Bell Atlantic (50%), and US West Media Group (25%).
(8) On April 6, 1998, Airtouch completed its acquisition of US West Media Group's wireless properties.
(9) On March 16, 1998, 360 Communications and ALLTEL announced their intention to merge.
(10) Cook Inlet Western is a joint venture in which Western Wireless owns 49.9%.

Sources: Unless otherwise noted, Dennis Leibowitz et al, THE WIRELESS COMMUNICATIONS INDUSTRY, Donaldson, Lufkin & Jenrette, Fall 1997, at 95-160.
PK - Paul Kagan Associates, Inc., *Tops in Wireless POPs*, WIRELESS MARKET STATS, Aug. 25, 1997, at 8-9.
SEC - Filings made with the Securities and Exchange Commission.
Nextel Broadband POPs - Paul Kagan Associates, Inc., *Tops in Wireless POPs*, WIRELESS MARKET STATS, Aug. 25, 1997, at 8.
Nextel Broadband MHz-POPs - Calculated assuming an average of 10 MHz across all licenses. *See* John M. Bensche & Briar Mewbourne, *Nextel Communications: Initiating Coverage*, Wireless Services, Lehman Brothers, Sep. 3, 1997, at 8.

Tables 5A - 5E: Mobile Telephone Industry Growth Projections: 1998-2002

The Commission has produced an projection of how the mobile telephone industry will grow in the coming years based upon estimates made by ten wireless telecommunications industry analyst firms.

- Estimates made by these analyst firms of the year-end national penetration for all cellular, broadband PCS and digital SMR operators were averaged together for the years 1998 to 2002, shown in Table 5B.

- To show the variance in these eight analyst firms' estimates, Tables 5A and 5C show for each category in each year the lowest and highest estimates made by any of the analysts.

- The average penetration figures were then multiplied by estimates of the U.S. population made by the U.S. Department of Commerce's Census Bureau to estimate total mobile telephone subscribership, shown in Table 5D.

- These total subscribership figures were then used to calculate the net new subscribers added by each service in each year, shown in Table 5E.

Table 5A
Lower Bound Estimates of National Penetration Rate

Year	Cellular	Broadband PCS	Digital SMR	Total
1998	20.90%	1.58%	0.28%	24.20%
1999	22.80%	2.77%	0.35%	28.10%
2000	24.30%	4.51%	0.42%	31.52%
2001	24.52%	6.39%	0.49%	34.75%
2002	24.69%	7.70%	0.55%	37.56%

Table 5B
Average Estimates of National Penetration Rate

Year	Cellular	Broadband PCS	Digital SMR	Total
1998	22.16%	2.36%	0.84%	25.37%
1999	24.37%	4.23%	1.29%	29.89%
2000	25.94%	6.39%	1.70%	34.02%
2001	27.04%	8.63%	2.08%	37.75%
2002	28.03%	10.60%	2.41%	41.03%

Table 5C
Upper Bound Estimates of National Penetration Rate

Year	Cellular	Broadband PCS	Digital SMR	Total
1998	23.34%	3.20%	1.10%	27.40%
1999	25.80%	6.10%	1.64%	32.90%
2000	27.80%	9.70%	2.30%	37.90%
2001	29.40%	12.60%	2.88%	42.50%
2002	30.70%	14.60%	3.35%	46.70%

Table 5D
Total Year-End Subscribership (mil.)

Year	Census Bureau Population	Cellular	Broadband PCS	Digital SMR	Total
1998	270,002	59,844	6,381	2,262	68,488
1999	272,330	66,364	11,517	3,513	81,393
2000	274,634	71,228	17,549	4,666	93,443
2001	276,918	74,891	23,889	5,751	104,530
2002	279,189	78,244	29,588	6,719	114,551

Table 5E
New Subscribers per Year (mil.)

Year	Cellular		Broadband PCS		Digital SMR		Total
	New Subs	% of Total	New Subs	% of Total	New Subs	% of Total	
1998	7,731	60.9%	3,895	30.7%	1,061	8.4%	12,686
1999	6,519	50.5%	5,135	39.8%	1,251	9.7%	12,906
2000	4,864	40.4%	6,033	50.1%	1,153	9.6%	12,049
2001	3,663	33.0%	6,340	57.2%	1,085	9.8%	11,088
2002	3,353	33.5%	5,699	56.9%	968	9.7%	10,021

Sources for cellular, Broadband PCS, and digital SMR figures in Tables 5A-5D:
- Dennis H. Leibowitz et al, *Nextel Communications (NXTL): The Window of Opportunity Remains Wide Open; Rating Upgrade to Buy*, Equity Research - Wireless Communications - Company Analysis, Donaldson, Lufkin & Jenrette, Jan. 21, 1998, at 24.
- David Freedman, *Wireless Telecommunications: Catalytic Conversion*, Equity Research, Bear Stearns, Apr. 1997, at 25.
- Kurt Abkemeier, *Omnipoint: The Best is Yet to Come*, Equity Research - Portfolio Manger's Snapshot, JP Morgan, Jul. 25, 1997, at 35.
- Thomas J. Lee, *Wireless Services: Initiating Coverage ... An Industry in Transition*, Wireless Services, Smith Barney, Apr. 7, 1997, at 18 ("Scenario B").
-Steven R. Yanis & Ann Henry, *Wireless World: The Mobile Telephone Industry*, Wireless Services Research, Robertson, Stephens & Company, Aug. 1, 1997, at 9.
- Paul Kagan Associates, Inc., *Kagan's 10-Year Wireless Industry Projections*, WIRELESS TELECOM INVESTOR, Jul. 28, 1997, at 7.
- John M. Bensche & Briar Mewbourne, *The PCS Report: Coverage Initiated on the Personal Communications Services Industry*, Wireless Services, Lehman Brothers, Nov. 11, 1997, at 23.
- Cynthia M. Motz & Robert J. Hordon, *The EMSR Industry*, Industry: Wireless Telecommunications Services, Credit Suisse First Boston, Dec. 23, 1997, at 29.

- Kevin Condon, *Wireless Telecommunications: Mobile Telephone Overview*, UBS Global Research, Feb. 19, 1998, at 11.
- Linda J. Runyon et.al., *The Next Generation II: Wireless in the US*, United States - Telecommunications/Wireless, Merrill Lynch, Mar. 10, 1998, at 36.

Source for Census Bureau Population - "Middle Series", taken from: *Resident Population Projections of the United States: Middle, Low, and High Series, 1996 - 2050*, U.S. Department of Commerce, U.S. Bureau of the Census (visited Dec. 15, 1997), <http://www.census.gov/population/projections/nation/npaltsrs.txt>.

Table 6: Tower Siting Moratoria Summary as of September 25, 1997

State	Number of Moratoria	Population Impacted (in thousands)
NY	38	281.9
FL	28	1,837.4
CT	28	795.3
OH	18	241.4
MN	18	167.8
MI	13	443.2
MA	10	209.2
WA	9	356.6
CA	9	330.2
PA	6	69.8
NC	5	69.5
IL	4	115.1
KY	3	23.3
AL	2	61.0
GA	2	17.1
ME	2	15.7
WI	2	8.9
MD	1	692.1
ID	1	205.8
IN	1	43.6
CO	1	29.4
MS	1	25.9
RI	1	5.4
Total	202	6,045.5

Source: *CTIA Siting Report Statistics, September 25, 1997* , Cellular Telecommunications Industry Association, Sep. 25, 1997.

Tables 7A - 7E: Cellular Industry Financial Summary

Table 7A:
Cellular Operator Year-End Subscribership - 1994 to 1997 (1)

Operator	1994	Percent Change	1995	Percent Change	1996	Percent Change	1997	Percent Change
AT&T (2)	2,800,000	47.4%	3,950,000	41.1%	5,204,000	31.7%	6,019,000	15.7%
Bell Atlantic Mobile (3) (4)	2,340,000	45.0%	3,356,000	43.4%	4,410,000	31.4%	5,356,000	21.5%
SBC Communications	2,992,000	46.0%	3,659,000	22.3%	4,398,000	20.2%	5,068,000	15.2%
BellSouth	2,735,996	37.5%	3,558,662	30.1%	4,460,000	25.3%	4,900,000	9.9%
GTE (2)	2,339,000	47.6%	3,011,000	28.7%	3,749,000	24.5%	4,487,000	19.7%
Airtouch (4) (5)	1,560,000	49.1%	2,262,000	45.0%	3,403,000	50.4%	4,309,000	26.6%
Ameritech	1,299,000	51.0%	1,891,000	45.6%	2,512,000	32.8%	3,177,000	26.5%
360 Communications (6)	1,039,989	59.4%	1,501,757	44.4%	2,156,412	43.6%	2,582,613	19.8%
US West Media Group (4) (5)	968,000	61.1%	1,463,000	51.1%	2,043,000	39.6%	2,374,000	26.7%
United States Cellular Corp	421,000	61.3%	710,000	68.6%	1,073,000	51.1%	1,710,000	59.4%
ALLTEL (6)	468,542	70.0%	624,542	33.3%	795,000	27.3%	941,226	18.4%
Comcast	501,000	55.1%	665,000	32.7%	762,000	14.6%	783,000	2.8%
Vanguard Cellular	245,000	85.2%	381,000	55.5%	513,000	34.6%	645,000	25.7%
Southern New England Tele.	166,000	88.6%	323,000	94.6%	392,000	21.4%	457,000	16.6%
Century Tele. Enterprises	211,710	81.8%	290,075	37.0%	368,233	26.9%	569,983	54.8%
Western Wireless	112,800	276.0%	209,500	85.7%	324,200	54.7%	520,000	60.4%
Price Communications (7)	117,224	78.3%	211,985	80.8%	279,816	32.0%	309,606	10.6%
CommNet Cellular (8)	99,002	55.9%	151,482	53.0%	211,278	39.5%	289,841	26.1%
Centennial Cellular (9)	112,530	74.2%	135,000	20.0%	187,000	38.5%	268,600	43.6%
Pricellular	17,344	75.4%	78,227	351.0%	150,328	92.2%	250,441	66.6%
Aliant Communications (4)	29,989	55.8%	122,852	309.7%	165,233	34.5%	205,915	24.6%
Corecomm (10)	68,300	120.3%	115,500	69.1%	159,300	37.9%	196,400	23.3%
Sygnet Wireless	24,124	33.7%	44,665	85.1%	106,574	138.6%	142,934	34.1%
Dobson Communications	21,481	40.6%	26,614	23.9%	34,306	28.9%	100,093	191.8%
Rural Cellular	17,402	86.1%	26,764	53.8%	45,094	68.5%	84,600	87.6%
Powertel	28,624	170.3%	38,582	34.8%	47,617	23.4%	25,848	(45.7%)
Total	20,736,057	49.9%	28,807,207	38.9%	37,949,391	31.7%	45,773,100	21.1

Source: Publicly available company documents such as news releases and filings made with the Securities and Exchange Commission.

Notes:
(1) Unless otherwise noted all figures are consolidated domestic subscribers. No corrections have been made for mergers and acquisitions.
(2) AT&T and GTE 1997 figures include subscribers on broadband PCS systems.
(3) Known as Bell Atlantic NYNEX Mobile prior to Bell Atlantic's merger with NYNEX.
(4) Proportionate subscribers.
(5) On April 6, 1998, Airtouch completed its acquisition of US West Media Group's wireless properties.
(6) On March 16, 1998, 360 Communications and ALLTEL announced their intention to merge.
(7) Formerly known as Palmer Wireless, Price Communications acquired Palmer on Oct. 6, 1997.
(8) Managed subscribers.
(9) Centennial Cellular's figures are as of November 30 of each year.
(10) Changed name from Cellular Communications of Puerto Rico.

Table 7B:
Cellular Operator Year-End Subscriber Penetration - 1994 to 1997

	1994	Percent Change	1995	Percent Change	1996	Percent Change	1997	Percent Change
AT&T	n/a	n/a	5.90%	n/a	7.70%	30.5%	n/a	n/a
Bell Atlantic Mobile (1)	4.20%	n/a	6.00%	42.9%	7.80%	30.0%	9.40%	21.5%
SBC Communications (2)	7.40%	29.8%	9.00%	21.6%	10.80%	20.0%	12.20%	13.0%
BellSouth	5.50%	37.2%	7.13%	29.6%	8.90%	24.8%	10.20%	14.6%
GTE (3)	4.80%	45.5%	6.30%	31.3%	7.80%	23.8%	9.10%	16.7%
Airtouch	4.41%	47.0%	5.99%	36.0%	7.85%	30.9%	9.94%	26.6%
Ameritech (3)	n/a	n/a	7.22%	n/a	9.53%	32.0%	12.15%	26.5%
360 Communications	5.30%	55.9%	7.63%	44.0%	8.91%	16.8%	10.66%	19.6%
US West Media Group	4.40%	n/a	6.70%	52.3%	9.20%	37.3%	11.41%	24.1%
United States Cellular Corp	1.98%	46.7%	3.18%	60.6%	4.94%	55.3%	7.11%	43.9%
ALLTEL	5.90%	63.9%	7.60%	28.8%	9.40%	23.7%	10.60%	12.8%
Comcast	6.80%	54.5%	8.50%	25.0%	9.30%	9.4%	9.50%	2.2%
Vanguard Cellular	3.65%	56.0%	5.34%	46.3%	6.77%	26.8%	8.51%	25.7%
Southern New England Tele.	4.15%	n/a	5.87%	41.5%	7.13%	21.4%	8.31%	16.6%
Century Tele. Enterprises	3.33%	43.5%	4.22%	26.7%	5.19%	23.0%	6.30%	21.4%
Western Wireless	2.20%	57.1%	3.60%	63.6%	5.40%	50.0%	6.97%	29.0%
Price Communications (4)	4.58%	31.6%	6.41%	40.0%	7.45%	16.2%	9.40%	26.2%
CommNet Cellular	2.53%	46.3%	3.59%	41.6%	5.15%	43.4%	6.35%	23.3%
Centennial Cellular (5)	2.08%	5.9%	2.52%	21.2%	3.39%	34.5%	n/a	n/a
Pricellular	0.95%	79.2%	2.20%	131.6%	3.80%	72.7%	5.20%	36.8%
Aliant Communications	7.50%	54.6%	10.00%	33.3%	13.20%	32.0%	16.30%	23.5%
Corecomm (6)	2.00%	106.5%	3.40%	70.0%	4.10%	20.6%	5.10%	24.4%
Sygnet Wireless	3.30%	32.0%	4.40%	33.3%	4.49%	2.0%	6.03%	34.3%
Dobson Communications	6.45%	39.3%	8.02%	24.3%	5.51%	(31.3%)	6.08%	10.3%
Rural Cellular	2.90%	81.3%	4.50%	55.2%	7.50%	66.7%	7.60%	1.3%
Powertel	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Source: Publicly available company documents such as news releases and filings made with the Securities and Exchange Commission.

Notes:
(1) Known as Bell Atlantic NYNEX Mobile prior to Bell Atlantic's merger with NYNEX.
(2) SBC and GTE's 1997 penetration rates do not include the broadband PCS subscribers included in Table 7A.
(3) Ameritech's 1997 penetration was estimated using its 1996 POPs.
(4) Formerly known as Palmer Wireless, Price Communications acquired Palmer on Oct. 6, 1997.
(5) Centennial Cellular's figures are as of May 31 of each year.
(6) Changed name from Cellular Communications of Puerto Rico.

Table 7C:
Cellular Operator Annual Revenues - 1994 to 1997
(in millions) (1)

	1994	Percent Change	1995	Percent Change	1996	Percent Change	1997	Percent Change
AT&T(2)	n/a	n/a	$2,787.000	n/a	$3,262.000	17.0%	$3,657.000	12.1%
Bell Atlantic Mobile (3) (4)	$1,478.700	n/a	$1,928.400	30.4%	$2,439.300	26.5%	$2,858.500	17.2%
SBC Communications (5) (6)	$1,748.700	36.4%	$2,247.100	28.5%	$2,676.000	19.1%	$3,151.000	17.8%
BellSouth (4) (7)	$1,465.090	27.4%	$1,888.259	28.9%	$2,312.289	22.5%	$2,520.101	9.0%
GTE (5) (6)	$1,539.000	42.2%	$2,019.000	31.2%	$2,347.000	16.2%	$2,549.000	8.6%
Airtouch (4) (5)	$1,160.100	30.1%	$1,523.300	31.3%	$1,984.200	30.3%	$2,363.000	19.1%
Ameritech	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
360 Communications	$626.475	52.6%	$834.415	33.2%	$1,095.872	31.3%	$1,347.172	22.9%
US West Media Group	$752.000	48.3%	$941.000	25.1%	$1,183.000	25.7%	$1,428.000	20.7%
United States Cellular Corp	$332.404	34.4%	$492.395	48.1%	$707.820	43.8%	$876.965	23.9%
ALLTEL (5)	$287.300	58.7%	$398.100	38.6%	$475.100	19.3%	$542.700	14.2%
Comcast (7)	$286.137	41.6%	$374.880	31.0%	$426.053	13.7%	$444.900	4.4%
Vanguard Cellular	$168.001	35.5%	$236.071	40.5%	$302.054	28.0%	$374.518	24.0%
Southern New England Tele.	$101.500	44.9%	$160.900	58.5%	$213.100	32.4%	$220.900	3.7%
Century Tele. Enterprises	$147.879	83.7%	$197.494	33.6%	$250.243	26.7%	$307.742	23.0%
Western Wireless	$63.108	204.4%	$146.555	132.2%	$221.307	51.0%	$302.848	36.8%
Price Communications (8)	$68.979	66.4%	$104.906	52.1%	$159.743	52.3%	$185.449	16.1%
CommNet Cellular	$80.731	46.8%	$113.084	40.1%	$148.517	31.3%	$183.705	23.7%
Centennial Cellular (9)	$69.217	40.1%	$101.057	46.0%	$125.286	24.0%	$169.123	35.0%
Pricellular	$5.209	36.8%	$41.504	696.8%	$112.616	171.3%	$181.000	60.7%
Aliant Comm. (4) (5)	$14.865	54.1%	$38.929	161.9%	$70.924	82.2%	$85.185	20.1%
Corecomm (10)	$67.141	130.4%	$108.668	61.9%	$133.818	23.1%	$148.494	11.0%
Sygnet Wireless	$18.048	24.7%	$24.577	36.2%	$44.796	82.3%	$85.634	91.2%
Dobson Communications	$15.169	36.8%	$18.990	25.2%	$26.107	37.5%	$78.826	201.9%
Rural Cellular	$15.532	91.6%	$19.834	27.7%	$29.624	49.4%	$53.903	82.0%
Powertel	$21.762	132.8%	$29.312	34.7%	$34.652	18.2%	$22.918	(33.9%)
Total (11)	$10,533.046	39.7%	$16,775.729	32.8%	$20,781.422	23.9%	$24,138.582	16.2%

Source: Publicly available company documents such as news releases and filings made with the Securities and Exchange Commission.

Notes:
(1) Unless otherwise noted, all figures are for consolidated domestic holdings and include service plus equipment revenues. No corrections have been made for mergers and acquisitions.
(2) AT&T's 1997 revenue was estimated using the 12.1% growth it reported for core cellular operations.
(3) Known as Bell Atlantic NYNEX Mobile prior to Bell Atlantic's merger with NYNEX.
(4) The figures for Bell Atlantic, BellSouth, Airtouch, and Aliant are for their proportionate holdings.
(5) The figures for SBC, GTE, ALLTEL, and Aliant include only service revenues.
(6) Includes broadband PCS operations.
(7) The figures for BellSouth and Comcast include service revenue plus equipment revenues net of the cost of the equipment.
(8) Formerly known as Palmer Wireless, Price Communications acquired Palmer on Oct. 6, 1997.
(9) Centennial Cellular's figures are for the twelve months ending November 30 of each year.
(10) Changed name from Cellular Communications of Puerto Rico. Revenues include paging operations.
(11) The percentage increase for the total revenue figures are calculated using only the operators for whom data was available for both years in question.

Table 7D:
Cellular Operator Annual Operating Cash Flow - 1994 to 1997
(in millions) (1)

	1994	Percent Change	1995	Percent Change	1996	Percent Change	1997	Percent Change
AT&T	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Bell Atlantic Mobile (2) (3)	$363.000	n/a	$655.000	80.4%	$873.700	33.4%	$1,158.700	32.6%
SBC Communications (4)	n/a	n/a	n/a	n/a	$1,104.000	n/a	$979.000	(11.3%)
BellSouth (3)	$631.438	30.7%	$823.618	30.4%	$1,004.111	21.9%	$1,156.728	15.2%
GTE (4)	$543.000	57.4%	$742.000	36.6%	$846.000	14.0%	$854.000	0.9%
Airtouch (3)	$479.000	26.2%	$605.200	26.3%	$821.400	35.7%	$1,056.000	28.6%
Ameritech	n/a	n/a	n/a	n/a	n/a	n/a		n/a
360 Communications	$178.013	87.8%	$260.119	46.1%	$366.686	41.0%	$458.544	25.1%
US West Media Group	$180.000	44.0%	$268.000	48.9%	$390.000	45.5%	$533.000	36.7%
United States Cellular Corp	$82.839	127.8%	$132.213	59.6%	$196.199	48.4%	$261.922	33.5%
ALLTEL	$121.476	71.7%	$176.363	45.2%	$220.323	24.9%	$260.822	18.4%
Comcast	$109.442	24.6%	$137.810	25.9%	$154.001	11.7%	$175.400	13.9%
Vanguard Cellular	$35.939	42.2%	$68.028	89.3%	$102.563	50.8%	$123.145	20.1%
Southern New England Tele.	$14.800	-8.1%	($10.800)	n/a	$31.300	389.8%	$61.100	95.2%
Century Tele. Enterprises	$52.698	147.8%	$82.436	56.4%	$101.487	23.1%	$129.208	27.3%
Western Wireless	$2.102	291.4%	$28.929	1276.3%	$60.289	108.4%	$103.875	72.3%
Price Communications (5)	$24.900	93.8%	$41.586	67.0%	$66.190	59.2%	$80.980	22.3%
CommNet Cellular	$14.296	347.2%	$25.947	81.5%	$47.499	83.1%	$70.255	47.9%
Centennial Cellular (6)	$22.664	7.8%	$46.286	104.2%	$58.588	26.6%	$77.400	32.14%
Pricellular	($3.502)	n/a	$9.347	n/a	$38.47	311.6%	$69.233	80.0%
Aliant Communications (3)	$5.934	93.7%	$15.748	165.4%	$30.481	93.6%	$40.060	31.4%
Corecomm (7)	$13.878	620.8%	$26.678	92.2%	$37.419	40.3%	$44.184	18.1%
Sygnet Wireless	$5.950	33.7%	$8.401	41.2%	$17.539	108.8%	$38.105	117.3%
Dobson Communications	$3.923	46.4%	$5.439	38.6%	$7.005	28.8%	$28.517	307.1%
Rural Cellular	$3.612	1705.8%	$5.740	58.9%	$8.779	53.0%	$14.293	62.8%
Powertel	$7.720	122.5%	$11.992	55.3%	$16.461	37.3%	$9.434	(42.7%)
Total (8)	$2,893.122	45.8%	$4,166.079	44.0%	$6,600.496	31.9%	$7,783.906	17.9%

Source: Publicly available company documents such as news releases and filings made with the Securities and Exchange Commission.

Notes:
(1) Unless otherwise noted, all figures are for consolidated domestic holdings. No corrections have been made for mergers and acquisitions.
(2) Known as Bell Atlantic NYNEX Mobile prior to Bell Atlantic's merger with NYNEX.
(3) The figures for Bell Atlantic, BellSouth, Airtouch, and Aliant are for their proportionate holdings.
(4) Includes broadband PCS operations.
(5) Formerly known as Palmer Wireless, Price Communications acquired Palmer on Oct. 6, 1997.
(6) Centennial Cellular's figures are for the twelve months ending November 30 of each year.
(7) Changed name from Cellular Communications of Puerto Rico. Cash flow includes paging operations.
(8) The percentage increase for the total revenue figures are calculated using only the operators for whom data was available for both years in question.

Table 7E:
Cellular Operator Annual Operating Cash Flow Margin - 1994 to 1997 (1)

	1994	Percent Change	1995	Percent Change	1996	Percent Change	1997	Percent Change
AT&T	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Bell Atlantic Mobile (2) (3)	24.5%	n/a	34.0%	38.8%	35.8%	5.3%	40.5%	13.1%
SBC Communicataions	n/a	n/a	11.9%	n/a	14.6%	22.2%	16.9%	16.1%
BellSouth (3)	43.1%	2.6%	43.6%	1.2%	43.4%	(0.4%)	45.9%	5.7%
GTE	35.3%	10.6%	36.8%	4.2%	36.0%	(1.9%)	33.5%	(7.1%)
Airtouch (3)	41.3%	(3.0%)	39.7%	(3.8%)	41.4%	4.2%	44.7%	8.0%
Ameritech	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
360 Communications	28.4%	23.0%	31.2%	9.7%	33.5%	7.3%	34.0%	1.7%
US West Media Group	23.9%	-2.9%	28.5%	19.0%	33.0%	15.8%	37.3%	13.2%
United States Cellular Corp	24.9%	69.4%	26.9%	7.7%	27.7%	3.2%	29.9%	7.7%
ALLTEL	42.3%	8.2%	44.3%	4.8%	46.4%	4.7%	48.1%	3.6
Comcast	38.2%	(12.0%)	36.8%	(3.9%)	36.1%	(1.7%)	39.4%	9.1%
Vanguard Cellular	21.4%	4.9%	28.8%	34.7%	34.0%	17.8%	32.9%	(3.2%)
Southern New England Tele.	14.6%	(36.5%)	-6.7%	n/a	14.7%	n/a	27.7%	88.3%
Century Tele. Enterprises	35.6%	34.9%	41.7%	17.1%	40.6%	(2.8%)	42.0%	3.5%
Western Wireless	3.3%	28.6%	19.7%	492.6%	27.2%	38.0%	34.3%	25.9%
Price Communications (4)	36.1%	16.5%	39.6%	9.8%	41.4%	4.5%	43.7%	5.4%
CommNet Cellular	17.7%	204.6%	22.9%	29.6%	32.0%	39.4%	38.2%	19.6%
Centennial Cellular (5)	32.7%	(23.1%)	45.8%	39.9%	46.8%	2.1%	45.8%	(2.1%)
Pricellular	-67.2%	n/a	22.5%	n/a	34.2%	51.7%	38.3%	12.0%
Aliant Communications (3)	39.9%	25.7%	40.5%	1.3%	43.0%	6.2%	47.0%	9.4%
Corecomm (6)	20.7%	n/a	24.6%	18.8%	28.0%	13.9%	29.8%	6.4%
Sygnet Wireless	33.0%	7.2%	34.2%	3.7%	39.2%	14.5%	44.5%	13.7%
Dobson Communications	25.9%	7.0%	28.6%	10.7%	26.8%	(6.3%)	36.2%	34.8%
Rural Cellular	23.3%	842.6%	28.9%	24.4%	29.6%	2.4%	26.5%	(10.5%)
Powertel	35.5%	(4.4%)	40.9%	15.3%	47.5%	16.1%	41.2%	(13.3%)
Total (7)	34.6%	3.8%	35.8%	3.3%	37.3%	4.2%	39.0	4.7%

Source: Publicly available company documents such as news releases and filings made with the Securities and Exchange Commission.

Notes:
(1) Unless otherwise noted, all figures are for consolidated domestic holdings. No corrections have been made for mergers and acquisitions.
(2) Known as Bell Atlantic NYNEX Mobile prior to Bell Atlantic's merger with NYNEX.
(3) The figures for Bell Atlantic, BellSouth, Airtouch, and Aliant are for their proportionate holdings.
(4) Formerly known as Palmer Wireless, Price Communications acquired Palmer on Oct. 6, 1997.
(5) Centennial Cellular's figures are for the twelve months ending November 30 of each year.
(6) Changed name from Cellular Communications of Puerto Rico. Cash flow margin includes paging operations.
(7) The percentage increase for the total revenue figures are calculated using only the operators for whom data was available for both years in question

Table 8: Broadband PCS Industry Subscriber Growth

Operator	Launch Date	95Q4	96Q1	96Q2	96Q3	96Q4	97Q1	97Q2	97Q3	97Q4
APC/Sprint	Nov-95	31,667	60,000	90,000	117,500	158,333	180,833	200,833	224,500	(4)
Western Wireless	2/28/96		2,200	6,400	17,600	35,500	49,000	74,400	101,000	128,600
BellSouth	7/18/96				12,000	51,000	80,500	106,000	126,000	141,000
Powertel	10/15/96					14,892	34,886	45,271	66,066	118,757
SBC Comm. (1)	10/29/96					10,000	26,500	137,000	287,000	365,000
PrimeCo	11/13/96					36,000	108,000	188,000	244,000	387,000
Omnipoint	11/14/96					n/a	16,000	42,000	80,000	141,000
Centennial Cell. (2)	12/12/96						6,900	16,900	32,800	50.700
Sprint PCS	12/16/96					1,333	46,000	116,000	281,000	838,333
GTE (3)	2/18/97						n/a	n/a	n/a	n/a
Aerial Comm.	3/27/97						n/a	28,000	65,000	125,000
Airadigm	5/3/97							n/a	n/a	n/a
AT&T (3)	6/5/97							n/a	n/a	60,000
Horizon PCS	8/29/97								n/a	n/a
US West Comm.	9/23/97								n/a	n/a
Eatel	Oct - 97									n/a
WirelessNorth	10/1/97									n/a
Third Kentucky Cell (5)	10/7/97									n/a
CFW Comm.	10/9/97									n/a
NPI Wireless	10/13/97									n/a
US Unwired (6)	Nov - 97									n/a
D&E Comm.	11/17/97									n/a
DIGIPH PCS	1/22/98									-
Poka Lambro	Jan - 98									-
ALLTEL	2/23/98									-
Southeast Telephone	2/8/98									-
3 Rivers Wireless	3/30/98									-
Hargrey Wireless	4/1/98									-
Blackfoot Comm.	4/8/98									-
Rural Cellular (7)	4/21/98									-
Conestoga Enterprises	5/1/98									-
Cincinnati Bell	5/5/98									-
Total		31,667	62,200	96,400	147,100	307,059	548,619	954,404	1,507,366	2,355,390
Net Adds		31,667	30,533	34,200	50,700	159,959	241,561	405,785	552,962	848,024

Sources:
- Except as noted below, all subscriber figures come from operator's news releases and filings made with the Securities and Exchange Commission.
- APC/Sprint and Sprint PCS subscriber totals are based on the average of estimates made by: Smith Barney, Paul Kagan Associates, Inc., and Merrill Lynch.

Notes:
(1) SBC Communication's information includes the PCS operations added with the acquisition of Pacific Telesis. SBC launched its lone existing broadband PCS license in Tulsa on 5/22/97.
(2) Centennial Cellular's reporting quarters end on February 28, May 31, August 31, and November 30.
(3) GTE and AT&T report their broadband PCS subscribers with their existing cellular operations.
(4) Sprint PCS acquired APC/Sprint Spectrum on January 6, 1998. APC/Sprint Spectrum's 4th quarter 1997 subscribers are included with Sprint PCS.
(5) Operates under the name Wireless 2000.
(6) US Unwired is using the same licenses as Eatel.
(7) Rural Cellular controls 51% of Wireless Alliance LLC, a joint venture between it and Aerial Communications.

Tables 9A- 9D: Broadband PCS Rollout Summary

Table 9A: Estimated Broadband PCS Rollouts by Number of Launches

Number of PCS Operators with Coverage in a BTA	Number of BTAs	POPs in Those BTAs (1)	% of Total US POPs
1	167	66,897,773	26.5%
2	67	120,352,612	47.7%
3	15	25,786,854	10.2%
4	0	0	0.0%
Total	249	213,037,239	84.4%

Table 9B: Estimated Broadband PCS Rollouts by Technology

Technology	Number of BTAs with Coverage	POPs in Those BTAs (1)	% of Total US
CDMA (2)	144	170,465,114	67.5%
GSM	163	143,068,342	56.6%
TDMA (3)	18	49,847,242	19.7%

Table 9C: Estimated Broadband PCS Rollouts by Service Block

Service Block	Number of BTAs with Coverage	POPs in Those BTAs (1)	% of Total US POPs
A	118	158,346,705	62.7%
B	174	186,943,590	74.0%
C (4)	33	17,432,328	6.9%
D	9	9,575,020	3.8%
E	8	9,816,195	3.9%
F	4	2,849,721	1.1%

Table 9D: Estimated Broadband PCS Rollouts by Market Size

Quartiles by BTAs' POPs	Number of BTAs with Coverage	Percent of BTAs in Quartile	POPs in Those BTAs (1)	Percent of POPs in Quartile
1st Quartile (123 largest BTAs)	110	89.4%	185,006,925	96.3%
2nd Quartile (2nd largest 123 BTAs)	70	56.9%	19,425,939	58.2%
3rd Quartile (3rd largest 123 BTAs)	42	34.1%	6,354,633	35.8%
4th Quartile (124 smallest BTAs)	27	21.8%	2,249,742	24.3%

Notes:
1) POPs from the 1990 Census.
2) The CDMA coverage totals include Sprint PCS' CDMA overlay in the Washington, DC and Baltimore, MD BTAs of the APC/Sprint Spectrum GSM-based network. Without this adjustment the totals would be 142; 163,915,923; and 64.9%.
3) There is also significant TDMA coverage by cellular licensees.
4) There are several BTAs where the C block licensee has established a joint venture with a DEF block licensee and the venture has launched service. It is currently unclear whether one or both of the licenses are in use. For the purposes of this table, those DEF block launches are included in the C block category.

Table 10: Growth of Nextel's Digital Mobile Telephone Service Since Relaunch

	3rd Quarter 1996	4th Quarter 1996	1st Quarter 1997	2nd Quarter 1997	3rd Quarter 1997	4th Quarter 1997	1st Quarter 1998
Net New Subscribers	52,000	72,300	122,600	201,500	322,200	324,100	370,800
Total Subscribers at End of Period	228,000	300,300	422,900	624,400	946,600	1,270,700	1,641,500

Source: SEC quarterly and annual financial filings.

Table 11: Top 20 Mobile Telephone Resellers: 1995 and 1996

Rank	1995		1996	
	Operator	Resale Subscribers	Operator	Resale Subscribers
1	MCI Communications	375,000	MCI Communications	400,000
2	CellNet Communications	70,000	Progressive Concepts	73,000
3	Progressive Concepts	67,000	CellNet Communications	60,000
4	Comtech Mobile	51,000	Connecticut Telephone	56,250
5	Connecticut Telephone	39,539	Comtech Wireless	54,000
6	Choice Cellular	35,000	Prime Matrix Wireless	50,500
7	American Cellular	14,980	Choice Cellular	45,000
8	Nentel	13,000	NW Communications	33,005
9	Cellnet of Ohio	12,000	Phase 2 Cellular	27,200
10	Cortelco Puerto Rico	11,920	Select Wireless	26,000
11	Advanced Cellular Sys.	11,000	Digital Communications	19,760
12	MobileOne Wireless	9,450	Cellular Plus Systems	18,000
13	Phase 2 Telesystems	8,000	American Cellular	15,000
14	San Diego Cellular	5,800	Cellnet of Ohio	15,000
15	All Cellular	5,505	Robo Cellular	14,000
16	Worldwide Mobilecom	5,500	MobileOne Wireless	11,500
17	The Mobile Phone	5,000	Cortelco Puerto Rico	10,162
18	Celtech International	4,100	One Source	10,000
19	Pacific Cellular	2,100	Cellular Dynamics	8,500
20	Robin Hood	2,100	American Comm. Net.	8,206
Total		**747,994**		**955,083**
MCI's Percentage of Top 20		50.1%		41.9%

Sources:
- 1995 - *RCR Top 20 Wireless Resellers*, RCR RADIO COMMUNICATIONS, Mar. 11, 1996, at 10.
- 1996 - *RCR Top 20 Wireless Resellers*, RCR RADIO COMMUNICATIONS, Mar. 17, 1997, at 10.

APPENDIX C:
PAGING/MESSAGING

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Table 1: 1993 - 1997 Paging Industry Numbers

Year	Paging Units (1)	Revenues	Average Monthly Revenue Per Unit	Number of Rental Paging Units	Number of Customer Owned And Maintained Paging Units
1993	19,300,000	$2,686,000,000	$13.76	11,190,000	8,110,000
1994	26,164,300	$3,233,000,000	$12.31	12,620,000	13,680,000
1995	34,426,868	$3,841,000,000	$10.51	15,870,000	18,630,000
1996	42,484,220	$4,404,000,000	$9.77	18,100,000	25,000,000
1997	49,800,000	$5,079,000,000	$9.11	18,960,000	30,940,000

Source: THE STATE OF THE U.S. PAGING INDUSTRY: 1997, The Strategis Group (1997), at 4, 32, 64, 146.

Notes:
(1) Paging units for 1994, 1995, and 1996 were adjusted for changes made to Table 2.

Table 2: 1994 - 1997 Number of Paging Units by Publicly-Held Company

Company	1994	growth	1995	growth	1996	growth	1997 (1)
PageNet	4,408,842	52.83%	6,737,907	26.92%	8,551,574	19.33%	10,204,743
Metrocall (2)	755,546	24.94%	944,013	126.94%	2,142,351	88.15%	4,030,836
Arch	538,000	272.86%	2,006,000	64.26%	3,295,000	18.06%	3,890,000
MobileMedia (3)	1,447,352	186.43%	4,145,696	6.13%	4,400,000	-22.73%	3,400,000
AirTouch	1,525,000	53.31%	2,338,000	21.90%	2,850,000	8.81%	3,101,000
PageMart	772,730	60.47%	1,240,024	49.31%	1,851,445	35.75%	2,513,337
ProNet	353,830	142.01%	856,302	48.42%	1,270,954	n/a	n/a
Ameritech	632,000	17.88%	745,000	53.02%	1,140,000	31.58%	1,500,000
AT&T	720,485	36.53%	983,668	18.21%	1,162,843	11.82%	1,300,341
SkyTel	400,900	107.23%	830,800	9.21%	907,300	20.90%	1,096,900
American Paging (4)	652,800	20.17%	784,500	-0.91%	777,400	4.33%	811,100
Preferred Networks	64,448	138.80%	153,901	462.44%	362,481	25.47%	454,795
Teletouch (5)	n/a	n/a	n/a	n/a	195,500	64.25%	321,100
Paging Partners	n/a	n/a	n/a	n/a	83,000	81.93%	151,000
Total U.S. Paging Units (6)	26,164,300	31.58%	34,426,868	23.59%	42,484,220	17.04%	49,800,000

Sources:
- Company information is based on publicly available company documents such as news releases and filings made with the Securities and Exchange Commission except as noted below.
- Total U.S. paging units include both one- and two-way pagers but do not include wireless phones with paging capability.
- Total U.S. paging units is based on THE STATE OF THE U.S. PAGING INDUSTRY: 1997, The Strategis Group (1997), at 32, 181 (*Strategis Paging Report*) adjusted as noted below.

Notes:
(1) Based on Fall 1997 data, the following privately-held firms would be ranked by paging units in service as follows: TSR Paging, Inc. (see note 4) and SourceOne Wireless ranked eleventh following American Paging. In addition, between Teletouch and Paging Partners are a number of privately-held companies as well as Bell Atlantic which does not report its paging operations in its SEC Form 10-K. For a list of the top 20 paging carriers (publicly and privately held) by paging units in service as of the Fall 1997, *see, RCR's Top 20 Paging Carriers*, RCR RADIO COMMUNICATIONS REPORT, Dec. 15, 1997, at S16.
(2) Metrocall's 1997 year-end pagers in service include ProNet.
(3) MobileMedia's number of pagers in service for year-end 1995 include MobileComm pagers acquired January 4, 1996. Therefore, the Top 10 in 1995 includes only the top 9 companies listed. Separately, MobileMedia has 2,369,101 pagers in service and MobileComm had 1,776,595. MobileMedia Communications, Inc., Form 10-K, Dec. 31, 1995, at 8. In 1994, MobileComm had 1,614,000 pagers in service and was the second largest paging carrier by units in service. BellSouth Corporation, Form 10-K, Dec. 31, 1995, at 28.
(4) In April 1998, TSR Paging announced its combination with American Paging to form TSR Wireless LLC.
(5) Teletouch files its SEC Form 10-KSB on a fiscal year ended May 31.
(6) Strategis' reported total U.S. paging units for 1994-1996 were adjusted for differences in company numbers used herein as compared to company numbers reported by Strategis: PageNet's numbers for 1996 were restated

for fourth quarter 1996 after Strategis published their totals; PageMart's 1996 numbers were adjusted for removal of 7,962 units attributable to international business; SkyTel's 1994 through 1997 numbers were adjusted to remove SkyTalk units which are not incremental units but an add-on voice mail feature to other paging services (per company-supplied information on May 21, 1998); Ameritech's 1995 units in service were restated consistent with Ameritech 1995 Fact Book; AT&T's numbers were provided by AT&T and for 1995 and 1996 differ from those reported by Strategis.

Table 3: 1994 - 1997 Revenues by Publicly-Held Company (000s) (1)

Company	1994	growth	1995	growth	1996	growth	1997
PageNet (2)	$489,684	31.93%	$646,022	27.32%	$822,487	16.84%	$960,971
Metrocall (3)	$57,855	91.62%	$110,859	35.27%	$149,957	92.96%	$289,364
Arch	$75,903	114.21%	$162,590	103.81%	$331,370	19.76%	$396,841
MobileMedia (4)	$203,149	24.54%	$252,996	153.25%	$640,710	-17.69%	$527,392
AirTouch (2)	$227,000	16.74%	$265,000	29.43%	$343,000	7.58%	$369,000
PageMart (2)	$109,833	44.94%	$159,191	39.20%	$221,592	25.35%	$277,778
ProNet	$34,521	75.85%	$60,704	60.03%	$97,144	n/a	n/a
Ameritech (5)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AT&T (5)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SkyTel	$160,785	46.70%	$235,870	40.01%	$330,240	14.27%	$377,366
American Paging (6)	$92,065	16.39%	$107,150	-2.77%	$104,187	-9.38%	$94,413
Preferred Networks	$4,082	80.13%	$7,353	81.56%	$13,350	169.52%	$35,981
Teletouch (7)	n/a	n/a	$8,674	265.75%	$31,725	30.46%	$41,389
Paging Partners	n/a	n/a	$5,474	26.23%	$6,910	31.24%	$9,069

Source: Publicly available company documents such as news releases and filings made with the Securities and Exchange Commission.

Notes:
(1) Revenues include service, rents, maintenance, and equipment revenues.
(2) PageNet (beginning in 1996), PageMart (all years), and AirTouch (all years) include results from international operations.
(3) Metrocall's 1997 revenue number does not include the effect of the merger with ProNet.
(4) MobileMedia did not file an SEC Form 10-K for the year ended December 31, 1996 or December 31, 1997. The 1996 and 1997 amounts in the table above are from MobileMedia's May 1, 1998 SEC Form 8-K. The amounts are unaudited.
(5) AT&T and Ameritech do not separately report paging financial numbers in their SEC Form 10-Ks.
(6) In April 1998, TSR Paging announced its combination with American Paging to form TSR Wireless LLC.
(7) Teletouch files its SEC Form 10-KSB on a fiscal year ended May 31.

Table 4: 1994 - 1997 EBITDA/Operating Cash Flow by Publicly-Held Company (000s) (1)

Company	1994	growth	1995	growth	1996	growth	1997
PageNet (2)	$140,035	43.63%	$201,131	27.70%	$256,837	20.52%	$309,550
Metrocall (3)	$16,152	71.94%	$27,771	17.93%	$32,751	115.17%	$70,469
Arch	$17,969	162.60%	$47,186	124.22%	$105,801	23.19%	$130,332
MobileMedia (4)	$47,772	29.30%	$61,771	68.99%	$104,386	-23.54%	$79,816
AirTouch (2)	$66,400	12.35%	$74,600	17.69%	$87,800	23.01%	$108,000
PageMart (2)	($25,219)	n/a	($10,076)	n/a	$8,623	216.14%	$27,261
ProNet	$8,701	74.05%	$15,144	38.27%	$20,939	n/a	n/a
Ameritech (5)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AT&T (5)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SkyTel	$6,643	-94.87%	$341	3747.80%	$12,780	447.93%	$70,026
American Paging (6)	$17,009	-7.73%	$15,695	-118.15%	($2,849)	n/a	($3,267)
Preferred Networks	($504)	n/a	($2,153)	n/a	($8,600)	n/a	($11,336)
Teletouch (6)	n/a	n/a	$1,720	442.85%	$9,337	32.83%	$12,402
Paging Partners (7)	n/a	n/a	($1,555)	n/a	($1,500)	n/a	($47)

Source: Publicly available company documents such as news releases and filings made with the Securities and Exchange Commission.

Notes:
(1) EBITDA is the company's earnings before interest, taxes, depreciation and amortization and is a standard measure of financial performance.
(2) PageNet (beginning in 1996), PageMart (all years), and AirTouch (all years) include results from international operations.
(3) SkyTel's 1997 EBITDA number does not include the effect of the merger with ProNet.
(4) MobileMedia did not file an SEC Form 10-K for the year ended December 31, 1996 or December 31, 1997. The 1996 and 1997 amounts in the table above are from MobileMedia's SEC Form 8-K, filed May 1, 1998. The amounts are unaudited.
(5) AT&T and Ameritech do not separately report paging financial numbers in their SEC Form 10-Ks.
(6) In April 1998, TSR Paging announced its combination with American Paging to form TSR Wireless LLC.
(7) Teletouch files its SEC Form 10-KSB on a fiscal year ended May 31.

Table 5: 1994 - 1997 EBITDA/Operating Cash Flow Margin

Company	1994	growth	1995	growth	1996	growth	1997
PageNet	28.60%	8.87%	31.13%	0.30%	31.23%	3.16%	32.21%
Metrocall	27.92%	-10.27%	25.05%	12.82%	21.84%	11.51%	24.35%
Arch	23.67%	22.59%	29.02%	10.02%	31.93%	2.86%	32.84%
MobileMedia	23.52%	3.83%	24.42%	2.36%	24.99%	-27.41%	18.14%
AirTouch	29.25%	-3.76%	28.15%	-9.07%	25.60%	14.34%	29.27%
PageMart	-22.96%	n/a	-6.33%	n/a	3.89%	152.20%	9.81%
ProNet	25.20%	-1.02%	24.95%	13.60%	21.55%	n/a	n/a
Ameritech	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AT&T	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SkyTel	4.13%	-96.50%	0.14%	2576.82%	3.87%	379.51%	18.56%
American Paging	18.47%	-20.72%	14.65%	118.67%	-2.73%	n/a	-3.46%
Preferred Networks	-12.35%	n/a	-29.28%	n/a	64.42%	n/a	31.51%
Teletouch	n/a	n/a	19.83%	48.42%	29.43%	1.81%	29.96%
Paging Partners	n/a	n/a	-28.41%	n/a	21.71%	n/a	-0.52%

Source: EBITDA margin, or cash flow margin, equals the company's EBITDA divided by its total revenue. It is used as a measure of a company's efficiency and profitability.

Table 6: Narrowband PCS Deployment

Carrier	Deployment
SkyTel	Two-way (September 1995) and guaranteed messaging (April 1997) offered throughout the United States.
PageNet	Reselling SkyTel services. Voice messaging (February 1997) offered in Dallas/Ft. Worth, Atlanta, and several cities in Northern California and Nevada. Launching of Chicago announced for 1998.
CONXUS	Voice messaging operational in Washington D.C./Baltimore and S. Florida (November 1997); Dallas/Ft. Worth, Houston, Tampa/St. Petersburg, and Orlando (February 1998); Los Angeles and Chicago (March 1998); Atlanta (April 1998). Deployment of text messaging expected in 1998.
AT&T	Assessing options.
MobileMedia	Reselling SkyTel and CONXUS services. Deployment expected for 1998.
PageMart	Testing in Dallas and Austin. Deployment expected in 1998, starting with Texas cities in second quarter.
AirTouch	Reselling SkyTel services. Deployment expected in 1998.
American Paging	Reselling SkyTel services. Deployment expected in 1998.
Benbow PCS (Arch)	Reselling SkyTel and CONXUS services. Plans to begin network implementation in 1998.
Insta-Check	Operating in Puerto Rico with Amtel.
Ameritech	Reselling SkyTel services.

Sources:
- Mark Dziatkiewicz, *Narrowband PCS Ninety-Eight Update: Where Are They Now*, WIRELESS WEEK, Jan. 26, 1998, at 22-23A.
- Brad Smith, *Two-Way Transforming Industry*, WIRELESS WEEK, Apr. 6, 1998, at 22 and 25 .

- *Conxus Dominates Voice Paging Market, But PageNet Still In Running*, COMMUNICATIONS TODAY, *available in* 1998 WL 5265290, (Mar. 31, 1998).
- THE STATE OF THE U.S. PAGING INDUSTRY: 1997, The Strategis Group, (1997), at 294.
- Publicly available company documents such as news releases and filings made with the Securities and Exchange Commission.

Table 7: Narrowband PCS subscribers and Prices

Service	Current Subscribers	Monthly Price	Included Services
SkyWord Plus	107,700	$34.95	Messaging unit + 600, 10 character message blocks.
SkyTel 2-way	50,300	$39.95	Messaging unit + 600, 10 character message blocks.
Pocketalk	15,000	$27.90	Messaging unit + unlimited calls, 30 second message length.
VoiceNow	2,843	$19.95	Messaging unit + 200 calls per month.

Source: Company information and news articles as noted below.

- Monthly price assumes lease of messaging unit. Pricing data is from company web sites and facsimiles. Pocketalk is $24.95 plus $2.95 for Pocketalk Protection and a $50 equipment deposit. *Order Pocketalk* (visited Jan. 8, 1998), <http:commerce.mindspring.com/www.pocketalk.com/order2.html>. SkyWord Plus is $24.95 plus $10 for pager. SkyTel 2-way (also called SkyWriter) is $24.95 plus $15 for AccessLink messaging unit. *SkyTel Service Pricing* (visited Jan. 20, 1998) <http://www.mtel.com/SKYTEL.NSF/df7...4f4006d05e9?OpenDocument#SkyWriter>. Facsimile from PageNet (Dallas/Ft. Worth), Jan. 8, 1998.
- Subscriber information is from the following company sources: Facsimile from Mobile Telecommunication Technologies Corp. (now known as "SkyTel"), May 21, 1998; *PageNet Reports Record-Setting Fourth Quarter Performance; Achieves Free Cash Flow for Consolidated Business in Quarter and Core Domestic Business for the Year*, Press Release, Paging Network, Inc., Feb. 9, 1998; Brad Smith, *Conxus Learning From PageNet*, WIRELESS WEEK, Apr. 6, 1998, at 20.

Table 8: Estimated Narrowband PCS Rollouts by Number of Launches (1)

Number of Narrowband PCS Operators with Coverage in a BTA	Number of BTAs	POPs in Those BTAs (2)	Percent of Total U.S. POPs
3	2	7,527,095	3.0%
2	16	51,366,124	20.3%
1	253	155,608,688	61.6%
Total	271	214,501,907	84.9%

Notes:
(1) There are several important caveats to note when using these data. First, to be considered as having "coverage," only a portion of a BTA territory needs to be covered. This means that some of the BTAs included in this summary have only a small amount of coverage, possibly resulting from the buildout of a neighboring market. Second, because of the size of some of the BTAs in the Western U.S., the maps included in this report overstate the actual coverage. Third, multiple operators shown in the same market are not necessarily providing service to the same areas. Fourth, the POPs figures used in this analysis include all of the POPs in a BTA with coverage. This results in an overstatement of the total number of POPs actually covered.
(2) POPs from the 1990 Census.

APPENDIX D:
TRADITIONAL DISPATCH SERVICES

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Table 1: Growth of the Specialized Mobile Radio Industry

SMR Industry: 1993-1997

		1993	1994	1995	1996	1997
Subscribers	Dispatch-only	1,165,00	1,408,00	1,600,00	1,700,00	1,740,000
	Dispatch and Interconnected	368,000	385,000	400,000	600,000	1,580,000
	Total	1,533,00	1,809,000	2,000,000	2,300,000	3,320,000
Revenue (mil.)	Dispatch-only	$188	$227	$314	$328	N/A
	Dispatch and Interconnected	$217	$238	$240	$356	N/A
	Total	$405	$465	$554	$684	$951

Nextel Communications: 1993-1997

		3/31/94	1994	1995	1996	1997
Subscribers	Analog: (Mostly Dispatch)	203,100	310,000	820,000	814,200	583,000
	Digital: (Interconnected)	0	13,500	85,000	300,300	1,270,700
	Total	203,100	323,500	905,000	1,114,500	1,853,700
Percent of Industry	Analog: (Mostly Dispatch)	17.4%	22.0%	51.3%	47.9%	33.5%
	Digital: (Interconnected)	0.0%	3.5%	21.3%	50.1%	80.4%
	Total	13.2%	17.9%	45.3%	48.5%	55.8%

Sources:
- SMR Industry 1993 and 1994 data - Christy Phillips et al, *The SMR Industry in the U.S.*, Wireless Telecommunications, Smith Barney, Aug. 13, 1996, at 73.
- SMR Industry 1995, 1996 and 1997 data - American Mobile Telecommunications Association.
- Nextel Communications: 1993-1997 - SEC filings and news releases.

Table 2: SMR Average Revenue Per Month 1995 - 1997

	1995	1996	1997
Dispatch: Analog	$16.50	$16.60	$16.80
Dispatch: Digital	$20.30	$26.50	$34.90
Interconnected: Analog	$48.50	$45.80	$40.30
Interconnected: Digital	$41.70	$62.50	$76.50

Source: Stephen A. Virostek, *The State of SMR & Digital Mobile Radio: 1997*, Presentation made at AMTEX '97 Conference & Exposition, Nov. 7, 1997.

Table 3: 1996 Top 20 SMR Operators

Operator	Number of Subscriber Units	# of Interconnected Units	# of Dispatch/Two-Way Units
1 Nextel Communications	1,100,000	300,000	800,000
2 Pittencrieff Communications	92,000	36,800	55,200
3 Industrial Comm. &	55,000	11,000	44,000
4 Crescent Communications	33,603	1,009	32,594
5 Southern Communications	30,000	n/a	n/a
6 Fisher Communications	18,000	1,700	16,300
7 21st Century Wireless Group	14,000	2,800	11,200
8 Lagorio Communications	12,000	4,000	8,000
9 Constant Communication	9,850	1,460	8,390
10 Advanced Communications	7,200	1,500	5,700
11 Cellular Design	7,000	0	7,000
12 Triangle Communications	4,100	100	4,000
13 Applied Technology Group	3,703	326	3,377
14 Sierra Communications	3,560	90	3,470
15 Wireless Plus	3,150	0	3,150
16 Porta-Phone	3,060	706	2,354
17 SMR Direct	3,000	n/a	n/a
18 Skitronics	2,617	0	2,617
19 Advanced Electronics	2,525	0	2,525
20 RSC Communications	2,350	300	2,050
Total	1,406,718	361,791	1,011,927

Source: *RCR Top 20 SMRs*, RCR RADIO COMMUNICATIONS, Feb. 10, 1997, at 14.

APPENDIX E:
MOBILE DATA

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Table 1: Prices for Mobile Data Transmission (1)

Type	Data (2) (3)	E-Mail (2)	Speed	Start Up Costs (4)
Paging (SkyTel prices) (5)	n/a	$2.40-6.00	512-6400 bps	Pager $150 to $250. Less than $350 for a PCMCIA card to use with a PC.
CSCD (GTE prices) (6)	$.75-1.35	$.50-.90	1200-14400 bps	Modem $150-$350. Interface $50-$300.
CDPD (GTE prices)	$3.00-12.00	$.02-.08	4800-12000 bps	Modem $350-$1500. Software may be required
RAM (now known as BellSouth Mobile Data)	$28.00-39.00	$.16-.23	4800 bps	PC Card Modem and e-mail service $88 per month (after 12 months $39 per month) /Modem $499-$800
Ardis	$12.00-25.00	$0.15	1200-9600 bps	Total costs $300-$2,000 including wireless modem, software and cables. Equipment can be leased for as little as $70 per month.
Metricom (7)	(1)	(1)	9600-28800 bps (network) 10000-40000 bps (peer-to-peer)	Modem $299 with one year subscription (or $10 per month)/$45 activation
Geostationary (SKYCELL prices)	$10.50	$3.00	hundreds of bps	Phones range from $2,000 (land mobile) to $15,000 (aeronautical)
Big LEO (IRIDIUM prices) (8)	$21.00	$6.00	2400 bps	Phone $3,000
Little LEO (ORBCOMM prices)	n/a	$6.00	2400-4800 bps	Hand-held message station starts at $400

Sources:
- THE BISHOP COMPANY, WIRELESS DATA NETWORKS, A GUIDE TO MOBILE COMPUTING, (1997) (*Bishop Report*).

Notes:
(1) The Commission is aware that the numbers reported by the *Bishop Report* are now more than one year old (collected January 1997). Bishop is working on an update of their report, but it was not completed as of the date of this report. Therefore, we have attempted to provide supplemental information where available. - *Paging* - Bishop quoted $19.95 per month for local/regional service and $49.95 for nationwide services (including 5,000 characters). SkyTel's prices are now in the range of $11.95 to $55.00 (price varies depending on extent of coverage) and include fewer characters (2,000 to 3,000 per month). Using the same methodology as Bishop results in a price of $2.39 to $16.50 per 600 character e-mail. *SkyTel Service Pricing* (visited Apr. 14, 1998) <http://www.mtel.com/SKYTEL.NSF/df7...6d05e9?OpenDocument# SkyPager+and+s>. A recent report quotes average pager prices of $58 to $132. WIRELESS PRICING 1998, The Strategis Group, (1998).
- *CSCD* - No updated information.
- *CDPD* - Based on GTE's current prices, the upper bound cost of an e-mail is $.072 and up to $12.00 for a four page data transmission. *Wireless Packet Data Service* (visited Mar. 24, 1998) <http://www.gte.com/c/wds/wdsrates.html>. GTE lists the price of modems at between $450 and $1,600. *GTE Wireless Data (CDPD) FAQs* (visited Apr. 7, 1998) <http://www.gte.com/e/ehcdpd.html#modems>. Bell Atlantic Mobile is offering unlimited CDPD AirBridge Internet Access for $54.95 per month within Bell Atlantic's service territory. *Bell Atlantic Mobile Wireless Data Homepage* (visited May 4, 1998) <http://www.bam.com/amy_data/web1.htm>. For Bell Atlantic's other CDPD pricing plans, *see Bell Atlantic Mobile Wireless Data Homepage* (visited May 26, 1998) <http://www.bam.com/amy_data/pricplan.htm>. AT&T PocketNet service provides data transmission at a rate of $.05 per kilobyte resulting in an e-mail price of $.03 and $6.00 for a four page data transmission. *AT&T PocketNet Service - Product Information* (visited May 1, 1998) <http://www.attws.com/nohost/data/pocketnet/pricing.html>.
- *BellSouth Mobile Data* - One report quotes prices of 30 cents per kb (compared to Bishop's 28 to 40 cents) resulting in prices of $30.00 for a four page data transmission and $.18 for an e-mail. The same report indicates modems (some with monthly service plans) in the range of $395 to $580 (Mobidem starting price). *Strategis Mobile Data Report*, at 125.
- *Ardis* - The prices for Mobile Office Plan have not changed. *Ardis Mobile Office Plan Rate* (visited Apr. 6, 1998) <http://www.ardis.com/pricing.html>. Strategis lists modems ranging from $527 to $545. *Strategis Mobile Data Report*, at 121.
- *Metricom* - Service and modem prices have not changed, but the monthly rental of a modem is now $15.00. *Ricochet Price List* (visited Apr. 7, 1998) <http://www.ricochet. net/ricochet/order/pricing/metro.html#Modems>.
- *GEOs* - Bishop used $1.49 per minute and a recent report quotes $1.49 to $2.75 per minute. John M. Bensche & Kevin M. Fogarty, *Cell Cites in the Sky: The Emerging Mobile Satellite Communication Industry*, Wireless Services - Satellites, Lehman Brothers, Dec. 8, 1997, at 10. Terminals cost $2,600. *Id*.
- *Big LEOs* - The *Bishop Report* assumed that Iridium planned to charge $3.00 per minute. A recent analysts' report states quotes that rates will be market based and goes on to quote $2.50 to $4.00 per minute (with $2.50 quoted as the wholesale rate) and $2,500 to $3,000 for a handset. Using this range, a four page data transmission would cost $15.00 to $28.00 and a 600 character e-mail would cost $5.00 to $8.00. John M. Bensche & Kevin M. Fogarty, *Cell Cites in the Sky: The Emerging Mobile Satellite Communication Industry*, Wireless Services - Satellites, Lehman Brothers, Dec. 8, 1997, at 10, 69, and 87. A Wall Street Journal cited $1.75 per minute plus applicable long-distance charges computed from the land line points nearest the caller and the person receiving the call. Quentin Hardy, *Iridium Creates New Plan for Global Cellular Service*, THE WALL STREET JOURNAL, *available in* 1997 WL-WSJ 2431848, (Aug. 18, 1997).
- *Little LEOs* - ORBCOMM reports that its wholesale pricing for ORBCOMM services are application and market specific and based on three factors, registration, access, and/or usage fees. The company indicates that value-added resellers and others selling directly to end users would also charge for these three components and have similar rate plans that combine one or more of these components. ORBCOMM further states that a non-hand held or monitoring and tracking device ranges from $250 - $750. Information provided by Mary Ellen Seravalli, Esq. of ORBCOMM on April 23, 1998.
(2) The sample e-mail is 600 characters and the data transfer is a 4 page (100 kilobyte or "kb") file. *Bishop*

Report, at 24.
(3) The data speed takes into account overhead, interference, static, and time waiting for space on the network. *Bishop Report*, at 19.
(4) The *Bishop Report* notes if the customer does not already own a computer, it would have to be purchased. The *Bishop Report* quotes computer prices from $1,500 to $8,000 as of January 1997. *Bishop Report*, at 25. Another study cites lists prices of hand held personal computing (HPCs) devices (for use with Windows CE) of $500 to $700 and prices for personal digital assistants (PDAs) of $400 to $950. *Strategis Mobile Data Report*, at 186-189. In addition, for a voice network (prices for satellite phones are included above where available) if the customer did not own a wireless phone, it would also have to be purchased. The *Bishop Report* quotes prices from zero to more than $600. *Bishop Report*, at 25. Some carriers may charge activation and monthly fees which are not included in the equipment start up costs shown above. *See e.g., Bishop Report*, at 25, 35, and 47.
(5) A 600 character alphanumeric page may require stringing together several individual pages of less than 600 characters.
(6) The Bishop Company notes that some CSCD carriers offer data call billing in 1/10th of a minute increments which would lower transmission costs and that some carriers are also offering rates of 10 to 15 cents per minute which are lower than used by Bishop (25 to 45 cents per minute). *Bishop Report*, at 24.
(7) Metricom's monthly price of $29.95 includes data and e-mail transmission. *Bishop Report*, at 81.
(8) The Iridium prices used by Bishop are the anticipated prices once Iridium launches. *Bishop Report*, at 77.

APPENDIX F:
FIXED WIRELESS SERVICES

As its name implies, services under the umbrella of CMRS are mobile services. However, as Congress and the Commission have looked for new ways to promote competition in the telecommunications industry, it has become clear that CMRS licensees providing fixed wireless services have the potential to create facilities-based competition in numerous industries beyond the traditional mobile markets. For this report, the discussion of fixed wireless services is trifurcated into the following categories: fixed telephony, often referred to as Wireless Local Loop ("WLL"); fixed data; and upperband services.

It is also important to note that some of these services are not being operated in spectrum that is generally used to offer CMRS. They are mentioned here in order to present a complete picture of competition in these markets.

A. Fixed Wireless Telephony: Wireless Local Loop

In a fixed wireless telephone system, a provider attaches a radio transmitter to a customer's premises that communicates with a central antenna site. This antenna site acts as the gateway into the PSTN. This technology functions as a replacement for the "last mile" of copper wire that has traditionally provided individual customers with telecommunications services, thus allowing a wireless provider to compete with a LEC.

This strategy for providing local exchange service has several benefits. WLLs afford competitors direct access to an individual customer's building, limiting the reliance on LECs. WLLs can often be constructed in less time and at a lower cost than a wireline network.[1] Depending on the competitive local exchange carrier's ("CLEC") business plan, some of these lower costs may be passed through to the customers in the form of lower prices. WLLs can be launched in much smaller segments than wireline systems (potentially one tower at a time) allowing a CLEC using wireless technology to start delivering service and generating revenue sooner than with a wireline network.

WLLs, however, do not eliminate the need for interconnection agreements with LECs to allow for termination and origination in the wireline network. As for all CLECs, the successful negotiation of these agreements on favorable terms is essential to the success of WLL. In addition, in the near term, providers of WLL will still need to rely on LECs for many of the unbundled network elements required to provide telephone service (e.g., switching and

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[1] A Deloitte & Touche analyst has estimated that wireless networks can be built in one-third the time at one-third the cost of wireline networks. *See* Mark Landler, *Wireless Technology Is Not Yet the Way of the Future*, STAR-TRIBUNE: NEWSPAPER OF THE TWIN CITIES, Mar. 9, 1997.

operator services).

1. Current Domestic Operations

While WLL services have been available domestically for a number of years through such services as Basic Exchange Telecommunications Radio Service,[2] the domestic market for WLL is still in an early stage of development. However, there are operators with plans to use more generally WLL, including AT&T, Winstar Communications, Inc. ("Winstar"), Advanced Radio Telecom Corp. ("ART"), and Centennial Cellular Corp. ("Centennial").

AT&T. AT&T has developed a proprietary, all-digital technology capable of providing a customer two telephone lines. Depending on the location, AT&T plans to use either D and E block broadband PCS licenses or 10 MHz of its 30 MHz A and B block broadband PCS licenses. With these licenses, AT&T covers over 93 percent of the US population.[3] AT&T plans to initially target this service only at single-dwelling residential homes and small businesses. AT&T has been running a field test of its technology in the Chicago area since late 1997.[4]

WinStar/ART. WinStar and ART are beginning to use the 38 GHz band to provide WLL services to small and medium sized businesses.[5] For example, WinStar began marketing its Wireless Fiber service in New York City in January 1997. When a customer subscribes to this service, WinStar installs a transmitter on its building which connects it to WinStar's own wireline fiber optic network and from there to its 5ESS switch. At the end of 1997, WinStar commented that 50 percent of its customer lines in New York City, which is its first and largest market, were using its Wireless Fiber network.[6]

Centennial. In mid-August, Centennial launched a WLL service on the island of Puerto Rico

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[2] Basic Exchange Telecommunications Radio Service allows certified LECs to provide WLL service to high-cost, rural areas.

[3] *AT&T's Breakthrough Wireless Technology New Alternative for Local Service*, News Release, AT&T, Feb. 25, 1997.

[4] *Fixed Wireless Service: Questions & Answers*, AT&T Promotional Brochure, May, 1997.

[5] Paul Korzeniowski, *They Can Get It For You Wholesale -- Trio Gets Milage From Wireless Local Access*, COMMUNICATIONS WEEK, Aug. 4, 1997.

[6] *WinStar Reports Fourth Quarter Revenue More Than Doubled*, News Release, WinStar Communications, Inc., Feb. 23, 1998.

using its broadband PCS license.[7] Currently, Centennial's "Home Phone" service had approximately 6,800 subscribers.[8] Because mobile telephone usage in Puerto Rico peaks in the early afternoon while the WLL usage peaks in the early morning and evening, Centennial is using Home Phone as a way to generate revenue on its PCS network during hours when mobile usage is low.[9]

2. Growth Potential

The fundamental concept of WLL has been shown to work in numerous developing countries around the world. WLL is particularly attractive to countries where there are no wireline networks or such networks are antiquated. Given the lower investment requirements associated with WLL, many governments are bypassing wireline technology for WLL when deploying new local telephone networks. According to recent Department of Commerce estimates, there are over 1.6 million WLL subscriber lines in 50 countries worldwide.[10] Some of these countries have a significant number of subscriber lines. For example, Spain, Hungary, and Indonesia have 400,000, 200,000, and 153,000 WLL subscribers, respectively.[11]

Estimates of the impact that WLL technology will have in the United States vary considerably. For example, one analyst has projected that domestic WLL activity will build slowly, having only 1.5 million subscribers by the end of 2002, but then grow to nearly 30.8 million by the end of 2007.[12] Another analyst has projected a faster launch of WLL, with the industry gaining over five million subscribers by 2002, but then believes growth will slow

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[7] Linda Runyun et al, *What's Going on in Puerto Rico?*, Equity Research, United States: Telecommunications/Wireless, Merrill Lynch, Oct. 27, 1997, at 19.

[8] Karissa Todd, *The WLL to Succeed*, WIRELESS WORLD, May 31, 1998.

[9] Linda Runyun et al, *What's Going on in Puerto Rico?*, Equity Research, United States: Telecommunications-Wireless, Merrill Lynch, Oct. 27, 1997, at 19.

[10] *World Wireless Local Loop Systems*, Hand-out, New Frontiers on the Information Superhighway: Wireless Local Loop Forum, U. S. Department of Commerce, International Trade Administration, Office of Telecommunications, Dec. 17, 1997.

[11] *Id*.

[12] Paul Kagan Associates, Inc., *Kagan's 10-Year Wireless Industry Projections*, WIRELESS TELECOM INVESTOR, Jul. 28, 1997, at 9.

thereafter, with only eight million WLL subscribers by the end of 2006.[13]

B. Fixed Wireless Data

Just as the product category of mobile data is not a homogenous group of services, the fixed wireless data category is equally difficult, if not more so, to define. The Commission has long granted licenses to be used for different types of fixed data purposes. But these usually were for private, high-volume data networks and did not result in the provision of commercial services. In the past few years, however, the low installation costs of fixed wireless networks have lead to the creation of new commercial services. This report is focusing on two such services: Internet access and fixed wireless telemetry.

1. Internet Access

The rise in demand for both residential and business Internet access has been a driving force in the telecommunications industry over the past few years. It has contributed to a sharp rise in the demand for second lines[14] which are often dedicated to a home computer. A number of wireless operators are attempting to leverage their facilities to provide high-bandwidth Internet access to a wide range of customers. These operators are hoping that their lower initial costs will afford them a price advantage over incumbent LECs and cable operators who must make costly upgrades to their networks to provide higher bandwidth connections. The operators who are currently providing Internet access with fixed wireless facilities are discussed below in three groups: fixed wireless telephony providers, wireless multichannel video providers, and miscellaneous access providers.

a) Fixed Wireless Telephony Providers

A number of the WLL operators mentioned above either provide or plan to provide Internet access over their networks. AT&T has stated that while the initial generations of its WLL technology will be for providing local telephone service, its expects that future generations will allow for Internet access initially at speeds up to 128 kilobits per second with future upgrades offering even higher speeds.[15] Similarly, Winstar, in addition to its local telephone service, offers a range of Internet and other data services over its 38 GHz network. Because of its high-bandwidth technology, Winstar can offer its customers extremely fast Internet connections.

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[13] The Strategis Group, *LMDS Marketplace: 1997 Telephony, Internet & Video*, Sep. 1997, at 101.

[14] The percentage of homes with a second line increased to 16.5 percent in 1996. *See Trends in Telephone Service*, Industry Analysis Division, Common Carrier Bureau, Federal Communications Commission, Feb. 1998, at 84.

[15] *Fixed Wireless Service: Questions & Answers*, AT&T Promotional Brochure, May, 1997, at 4.

b) Wireless Multichannel Video Providers

Internet access has traditionally been a service provided by companies using the telephone network. Recently, a new segment of the telecommunications industry, the multichannel video providers, have begun to enter this market using either Multichannel Multipoint Distribution Service ("MMDS") or Local Multipoint Distribution Service ("LMDS") licenses.

Multichannel Multipoint Distribution Service. MMDS systems, often referred to as "wireless cable," transmit programming to subscribers through frequencies in the 2 GHz band. The Commission authorized the use of digital technology with MMDS licenses in July 1996. The Commission has also proposed to amend its rules to facilitate the ability of MMDS operators to provide two-way transmission of Internet and other digital high-speed data services that may further enhance the competitiveness of wireless cable with other multichannel video providers.[16]

To date, several operators have already received waivers from the Commission, allowing them to start providing Internet access services in several cities across the country.[17] In general, the MMDS operators use their wireless technology to broadcast data to customers. The customers then use a wireline based connection to transmit information back to the operator's Internet connection (referred to as the return path). One exception to this is Wireless One, Inc. which has plans to launch a completely wireless-based solution, using WCS spectrum to serve as the return path instead of a wireline connection.[18]

Local Multipoint Distribution Service. The nation's only currently licensed LMDS operator, Cellularvision USA, Inc. ("Cellularvision"), recently began using its license to offer Internet access in New York City, in addition to its existing multichannel video operations. Cellularvision, which originally launched a 500 kilobit per second service in June 1997,[19] recently announced that it will start offering a 48 megabit per second service and will shift its

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[16] For a detailed summary of these regulatory efforts, *See* Annual Assessment of the Status of Competition in Markets for the Delivery of Video Programming, CS Docket No. 97-141, *Fourth Annual Report*, FCC 97-423, (rel. Jan. 13, 1998), at 34-36.

[17] *See* Table 1, page F-14 below, for a list of the operators and the locations where they have launched service.

[18] *Two New Wireless Products Unveiled*, Wireless One, Inc., (visited Feb. 6, 1998) <http://www.wirelessone.com/home/main.html>.

[19] *CellularVision USA Begins Commercial Offering of Wireless High Speed Internet Service; New Service is Four Times Faster than ISDN and Lower Priced*, News Release, Cellularvision USA, Inc., Jun. 23, 1997.

sales efforts away from video services to Internet access.[20] With the recent completion of the Commission's LMDS auction, more companies are expected to provide Internet access using LMDS spectrum. For example, Winstar Communications, Inc. and WNP Communications, Inc. have both stated that Internet access and other high speed data services are among their planned LMDS service offerings.[21]

c) Miscellaneous Access Providers

There are several other operators offering wireless-based Internet access.[22] There are several other operators offering wireless-based Internet access. These entities tend to be startup companies who are attempting to offer Internet access using either MMDS or low power television licenses. For example, Interjetnet, Inc. was formed in January 1997 to provide high speed Internet access using wireless technologies.[23] Since that time, Interjetnet has launched service in Salt Lake City, Utah and Beaumont, Texas.[24]

2. Fixed Wireless Telemetry: Remote Monitoring

There are a number of industries which require the periodic monitoring of remote sensor devices such as electric utility meter reading. Traditionally, this monitoring task has been performed by sending employees to each device to record new measurements. However, in recent years, a new market has developed specializing in developing sensor devices which use wireless technology to transmit the measurements back to a central location. This new technology is often referred to as fixed wireless telemetry.[25] The development of the fixed wireless telemetry is an excellent example of wireless telecommunications having an effect beyond its traditional arenas. The primary uses of fixed wireless telemetry include the monitoring of gas, electric and water utility meters (often referred to as automatic meter reading ("AMR") devices), gas and oil pipelines, environmental controls, vending machines,

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[20] *CellularVision USA Intensifies Internet Focus in 1998*, News Release, Cellularvision USA, Inc., Jan. 26, 1998.

[21] *See WinStar Wins 15 LMDS Licenses in FCC Auction*, News Release, WinStar Communications, Inc., Mar. 26, 1998; Jeannine Aversa, *Licenses for Wireless Service Auctioned*, THE WASHINGTON POST, Mar. 26, 1998, at C3.

[22] *See* Table 1, page F-14 below, for a list of the operators and the locations where they have launched service.

[23] Interjetnet, Inc., *Investor Relations*, (visited Feb. 9, 1998), <http://www.interjetnet.com/warp_drive/main_06fs.htm>.

[24] *Id.*

[25] Telemetry is the transmission and measurement of data from a remote source.

alarm systems, parking meters, photo copiers, and railway and other transportation systems.

One of the driving forces in the development of this technology has been the deregulation of various segments of the utility industry. In the past few years, many states have shifted their utility rate setting policies away from asset-based rate-of-return systems to performance-based systems which base rates on factors such as costs, efficiency and quality of service. Fixed wireless telemetry devices can help the utilities in all of these areas.[26]

a) Current Market Structure

Currently, the leading providers of fixed wireless telemetry devices are several companies which are not CMRS licensees.[27] The dominant provider in the market is Itron, Inc., which had shipped 11.1 million AMR devices to utility companies by the end of 1997[28] and has approximately 76 percent of the market for AMR devices.[29] The next largest provider, CellNet Data Systems, Inc., had only approximately 1 million devices installed at the end of 1997.[30] The rest of the providers in the market combined only have a 17 percent market share.[31]

While most providers of fixed wireless telemetry are not CMRS licensees, several CMRS licensees are attempting to enter this market. For example, in the past year Mtel has started using its narrowband PCS licenses to provide fixed wireless telemetry and had almost 100,000 devices in service by the end of 1997.[32] Other operators, such as BellSouth Corp. and Aeris Communications, Inc., are offering products which use the control channels of cellular telephone systems. Bell Atlantic recently signed joint marketing agreement with Comverge Technologies to offer AMR services using Bell Atlantic's CDPD network.[33]

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[26] *See* CellNet Data Systems, Inc., Form 10-K, Dec. 31, 1996, at 4-5.

[27] *See* Table 2, page F-15 below, for an overview of some of the providers of fixed wireless telemetry services.

[28] *Itron Announces Fourth Quarter and Year-end Results*, News Release, Itron, Inc., Feb. 3, 1998.

[29] *Strategis Mobile Data Report*, at 298.

[30] *CellNet Data Systems Announces 1997 Fourth-Quarter and Year-end Results*, News Release, CellNet Data Systems, Inc., Feb. 9, 1998.

[31] *Strategis Mobile Data Report*, at 298.

[32] *$20 Million Fourth Quarter Cash Flow Caps Stellar Year for Mtel*, News Release, Mobile Telecommunications Technologies Corp., Jan. 28, 1998.

[33] *Bell Atlantic Mobile and Comverge Technologies Announce Alliance for Utility Industry*, News Release, Bell Atlantic Mobile, Mar. 9, 1998.

b) Potential Growth

Even though there are many millions of fixed wireless telemetry devices already in service, there is a great potential for further growth. For example, there are over 268 million utility meters in North America, of which approximately only 5 percent use some sort of AMR technology.[34] In addition, in each of the past few years, over 700,000 coin operated vending machines are shipped by U.S. manufacturers.[35] One analyst estimates that the total number of fixed wireless telemetry units in service such as gas and electric utility meters, vending machines, alarm monitors and parking meters will increase almost tenfold to 95.8 million by 2002.[36]

C. New Fixed Wireless Competition: Upperband Services

1. Overview

As described above, the markets for WLL and fixed wireless Internet access are just beginning to develop. There are several new services that the Commission has recently licensed or is in the process of licensing which have the potentially to greatly expand the volume of fixed wireless services being offered to consumers. This report discusses three such services: Digital Electronic Message Service ("DEMS"), Local Multipoint Distribution Service ("LMDS"), and 38 GHz.[37]

The 24 GHz (24.25-24.65 GHz) band contains relocated licenses from the 18 GHz band for the provision of DEMS.[38] The Commission defines DEMS as point-to-multipoint microwave networks designed to communicate information between a fixed main (nodal) station and a number of fixed user terminals. Thus far, 400 MHz of spectrum has been licensed nationwide.

The 28 and 31 GHz bands (27.5-28.35 GHz, 29.1-29.25 GHz, and 31.1-31.3 GHz) has been

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[34] Itron, Inc., Form 10-K, Dec. 31, 1997, at 3.

[35] *See* Bureau of the Census, U.S. Department of Commerce, *Manufacturing Profiles: 1995*, Jun. 1997, at 9-42 and Bureau of the Census, U.S. Department of Commerce, *Manufacturing Profiles: 1994*, Aug. 1997, at 9-38.

[36] *Strategis Mobile Data Report*, at 293.

[37] *See* Table 3, page F-16 below, for a table summarizing many of the important details of these bands, along with current service providers.

[38] *See* Amendment of the Commission's Rules to Relocate the Digital Electronic Message Service From the 18 GHz Band to the 24 GHz Band and to Allocate the 24 GHz Band For Fixed Service, *Order*, ET Docket No. 97-99 (rel. Mar. 14, 1997).

designated for LMDS, a fixed broadband point-to-multipoint microwave service. On March 25, 1998, the Commission completed an auction for 1300 MHz of spectrum in the 28 and 31 GHz bands.[39] This spectrum is divided into two blocks of 1150 MHz and 150 MHz. The LMDS auction constituted the largest block of contiguous spectrum ever auctioned by the Commission.

The 39 GHz band (38.6-40.0 GHz), which is referred to as "38 GHz service," represents the most commercially-used broadband today. On October 24, 1997, the Commission adopted service area and licensing rules for this band, along with competitive bidding rules to assign whatever unencumbered spectrum remains in this band.[40] The Commission recently approved rules permitting point-to-multipoint operations by 38 GHz licensees in addition to their existing point-to-point operation.[41]

2. Current Licensees and Service Offerings

The broadband fixed wireless industry is in an early stage of development. Only a handful of these licensees have deployed service to date. The licensees are WinStar, ART, and Teleport Communications Group Inc. ("Teleport") in the 38 GHz service; Teligent Corp. ("Teligent") at 24 GHz; and CellularVision USA, Inc. ("CellularVision") in the LMDS service.[42]

WinStar. The largest holder of 38 GHz licenses, WinStar provides a broad array of telecom services, including CLEC service to small and medium sized businesses, and the resale of its networks to other telecommunication carriers.[43] WinStar is a facilities-based carrier, which means that it deploys switching platforms to offer full local service. Winstar has also recently

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[39] The auction, which began on February 18, 1998, closed after 128 rounds raising a total net revenue of $578,663,029. "Local Multipoint Distribution Service Auction Closes," News Release, Wireless Telecommunications Action, Report No. WT 98-9, Mar. 25, 1998. *See* Appendix A, Table 6, p. A-6 for a summary of the auction's high bidders.

[40] *See* Amendment of the Commissions's Rules Regarding the 37.0-38.6 GHz and 38.6-40.0 GHz Bands, ET Docket No. 95-183, Implementation of Section 309(j) of the Communications Act -- Competitive Bidding, 37.0-38.6 GHz and 38.6-40.0 GHz, PP Docket No. 93-253, *Report and Order and Second Notice of Proposed Rule Making*, FCC 97-391, (rel. Nov. 3, 1997) *recon. pending*.

[41] Amendment of the Commission's Rules Regarding the 37.0-38.6 GHz and 38.6-40.0 GHz Bands (ET Docket No. 95-183, RM-8553); Implementation of Section 309(j) of the Communications Act -- Competitive Bidding, 37.0-38.6 GHz and 38.6-40.0 GHz (PP Docket No. 93-253), *Report and Order and Second Notice of Proposed Rulemaking*, FCC 97-391 (rel. Nov. 3, 1997), at para. 20.

[42] *See* Table 4, page F-17 below, for further information of these companies.

[43] These other carriers include CLECs, Competitive Access Providers ("CAPs"), inter-exchange carriers ("IXCs"), LECs, and Internet Service Providers ("ISPs").

announced it intention to acquire a stake in Advanced Radio Telecom.[44]

Advanced Radio Telecom. As second largest holder of 38 GHz licenses, ART provides last mile connectivity between end users and telecommunication providers. ART is essentially a wholesale carrier of other telecommunications operators' traffic, serving CAPs, CLECs, LECs, ISPs, and mobile telephony operators.

Teleport. The first and largest fiber based CLEC in the United States, Teleport gained 38 GHz service through its recent acquisition of Biztel Communications, Inc.[45] Teleport primarily uses fiber optic digital networks to deliver its services. These licenses allow Teleport to connect customers to its fiber networks, provide temporarily installation when its fiber network goes down, and provide stand-alone facilities where the Company does not have fiber optic networks.[46]

Teligent. Teligent is the only major licensee at 24 GHz. It will primarily target small and medium sized businesses with an integrated package of local and long distance service, high speed data connectivity, Internet access, and video conferencing. It plans to launch service later this year.

CellularVision. As the first company in the United States to receive a license to operate an LMDS system, CellularVision received its license in 1991 for the New York Primary Metropolitan Statistical Area ("PMSA"). It has, thus far, been operating a 49-channel wireless television system in portions of the New York PMSA, and an Internet access service. It intends to expand its service offerings to include wireless local loop telephone services, high speed data transmission, video teleconferencing, and interactive television.[47]

3. Competitive Assessment

The broadband fixed wireless industry has the potential to present major competition to the wireline telecommunication companies in the local loop. One analyst estimates that by 2007

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[44] *WinStar to Purchase 14.9% of Advanced Radio Telecom Corp.*, News Release, Winstar Communications Inc., Apr. 27, 1998.

[45] On January 8, 1998, Teleport announced that it was merging with AT&T. *See AT&T and TCG to Merge; TCG to Become Core of AT&T's Local Services Unit*, News Release, AT&T, Jan. 8, 1998.

[46] Teleport Communications Group, Inc., Form 10-K, Dec. 31, 1996.

[47] CellularVision USA, Inc., *Proposed Future Two-Way Interactive Services*, (visited May 12, 1998) <http://www.cellularvision.com/future.html>.

there will be 25.9 million fixed wireless subscribers.[48]

A variety of positive developments, thus far, demonstrate that broadband fixed wireless providers have great potential to bring significant competition into the local loop. However, these providers face a number of key operational challenges in implementing their networks.

a) Competitive Strengths

Lower Network Deployment Costs. Broadband wireless networks have a significantly lower cost structure than fiber-based systems for the following reasons. First, wireless networks are free of the installation and maintenance costs incurred with wires.[49] Second, unlike a wireline network in which an entire market must be wired before initiating service, the capital expenditures of a wireless network can be incrementally incurred as more customers are added.

Because of this lower cost structure, these licensees have been able to deliver lower prices for monthly telephone service in certain markets. For example, in the eight markets where WinStar provides local service, its rates are 15 percent to 25 percent lower than those charged by the regional Bell carriers in those markets.[50]

Higher Data Speeds. The frequencies offer great bandwidth, with data transfer rates of up to 55 Mbs (DS-3 capability), which is 1,500 times faster than the standard dial-up modems (28.8 Kbps) and 350 times faster than the ISDN line currently in use (128 Kbps). Once point-to-multipoint technology is implemented, transmission speed will be even faster. According to WinStar, point-to-multipoint makes it possible for a 100 MHz channel to support data rates at three times the speed of point-to-point.[51] Such speed is favorable to bandwidth intensive "multi-media" applications such as voice and video clips which are becoming more popular on the Internet.

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[48] Paul Kagan Associates, Inc., *10-Year Wireless Projections*, WIRELESS TELECOM INVESTOR, Feb. 18, 1998, at 7.

[49] Daniel Taylor of the Aberdeen Group Inc., a Boston consultancy, states a wireless connection to a customer's premises cost approximately $700-$800, versus $5,000 for a wireline connection. *See* Paul Korzeniowski, *They Can Get It For You Wholesale -- Trio Gets Mileage From Wireless Local Access*, COMMUNICATIONS WEEK, Aug. 4, 1997.

[50] Rob Perez, *Wireless Local Phone Service Carrier Gets OK*, HONOLULU STAR-BULLETIN, Oct. 8, 1997, at B4.

[51] On April 13, 1998, Winstar announced that it had activated a point-to-multipoint broadband, fixed wireless trial network carrying voice, data and video services in Washington, D.C. *WinStar Initiates First Fully Integrated Fixed Wireless Multipoint Metropolitan Area Network*, News Release, Winstar Communications, Inc., Apr. 13, 1998.

Several other factors bode well for broadband fixed wireless providers. These include: a faster time to market advantage over fiber based networks;[52] key strategic relationships with wireline CAPs and CLECs who wish to extend their fiber networks to end users not currently connected; initial service to a niche customer base of small-medium sized business customers, many of which are not served by fiber facilities provided by CLECs or CAPs, who unlike larger companies;[53] and, the ability to bundle services from a versatile spectrum base that is already used to offer local, long-distance and Internet access services in one package.

b) Competitive Challenges

Broadband fixed wireless providers, especially those offering facilities-based competition, have to cross many steps before they can put a customer onto their network. Along with the competitive advantages described above, broadband fixed wireless providers face a number of challenges in completing these steps. The challenges mentioned below are in addition to those faced by all CLECs such as needed interconnection agreements.

Technical Issues. The propagation and technical characteristics of the upperband frequencies present two major challenges. First, the upperband signals must follow an unobstructed, line-of-sight transmission path between the transmitting and receiving antenna. This is because the signals bounce off of large structures. Thus, more transmitters are needed to reduce unobstructed paths. It is for this reason broadband wireless is considered ideal for densely-populated markets.[54] Second, upperband signals can be partially blocked by rain. In order to mitigate this concern, the distance between an operator's transmitter and the receiver on a customer's building must be decreased.

Access Barrier Issues. These providers have noted a number of barriers to access, or entry, to the customer's premise. Such barriers include roof rights and related inside facilities and inside wiring.

Broadband fixed wireless providers need rooftop access on apartment and office buildings to place their transmitting and receiving antennas. Providers also need access to inside conduits and physical pathways from the building owner. In addition, providers require access to the building's inside wiring and riser cables to connect to the customer's telephone system.

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[52] Winstar Communications, Inc., Form 10-K, Dec. 31, 1997, at 3.

[53] WinStar believes small and medium sized businesses constitute 60 percent of all businesses in the United States and represent a market opportunity in excess of $30 billion per year. *Id*. at 6.

[54] The Strategis Group estimates that no more than 50 percent of businesses and residences nationwide will ever be able to receive LMDS. Even within individual markets, only 56 percent of homes and businesses, on average, will be able to pick up LMDS signals because they will be out of range or behind obstructions. *See LMDS Marketplace: 1997 - Telephony, Internet & Video*, The Strategis Group, Sep. 1997, at 14.

Obtaining access can represent a long and tedious process, as individual contracts must be negotiated. Moreover, WinStar, Teligent, and others have claimed that certain building owners and managers have started to charge excessive fees not based on a reasonable cost for access to roof and inside facilities, as an opportunity to gather revenues. Such prices are discriminatory, they claim, since established incumbent LECs and cable providers are not asked to pay such fees.[55]

State and Local Government Right-of-Way Requirements. Certain state and local governments have started to assess right-of-way franchise requirements and right-of-way fees on broadband fixed wireless licensees.[56] Since they do not use the public rights-of-way, wireless carriers believe that this is unfair and that they should be exempt from franchise requirements. WinStar believes the effect of such actions will delay and possibly prohibit the provision of competitive local exchange service by new wireless entrants.

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[55] *See* "WinStar Comments at 5-5 and Teligent Comments at 6-8, Commission Actions Critical to the Promotion of Efficient Local Exchange Competition," (CCB Pol 97-9), *Public Notice*, DA 97-1519 (rel. Jul. 18, 1997).

[56] WinStar argues it should not have to pay rights of way fees since its network is deployed on rooftops, which are private property, rather than the public rights-of way. *See* "WinStar Comments at 3-4, Commission Actions Critical to the Promotion of Efficient Local Exchange Competition," (CCB Pol 97-9), *Public Notice*, DA 97-1519 (rel. Jul. 18, 1997).

Table 1: Overview of Fixed Wireless Internet Providers

Company	Location	Status	Speed
Wireless Cable Operators			
American Telecasting, Inc.	Colorado Springs, CO	Launched Sep. 1997	Broadcast at 750 kbps, telephone or ISDN return path.
	Denver, CO; Portland, OR	Launched Feb. 1998	Same
CAI Wireless Systems, Inc.	Boston, MA; Rochester, NY; New York, NY	Launched	Broadcast at up to 27 Mbps, telephone return path.
CFW Communications	Charlottesville, VA	Launched Sep. 1997	Broadcast at up to 27 Mbps, telephone return path.
CS Wireless Systems, Inc.	Dallas, TX	Limited launch in fall of 1997	Broadcast at up to 4 Mbps, telephone or ISDN return path.
MagnaVision Corp.	New York, NY	Signed letter of intent to provide high speed access to Fordham U.	Details not available
People's Choice TV Corp.	Detroit, MI	Launched in Oct. 1997	Broadcast at up to 36 Mbps, telephone or ISDN return path.
	Phoenix, AZ	Launched in Mar. 1998	Same
Sioux Valley Wireless	Sioux Falls, SD	Launched in Dec. 1997	Broadcast at up to 10 Mbps, telephone or ISDN return path.
Wireless Broadcasting Systems of America	Sacramento, CA	Planning service	Broadcast at up to 1.5 Mbps
Wireless One, Inc.	Jackson, MS	Plans to launch in 1998	Broadcast on MDS spectrum, WCS return path.
LMDS Operators			
Cellularvision, Inc.	New York, NY	Jun. 1997 1st Q 1998	500 kbps 48 Mbps
Other Providers			
DirectNET	South Florida	Launched Aug. 1997	Broadcast at 1-2 Mbps, telephone return path.
InterJetNet	Salt Lake City, UT	Aug. 1997	Broadcast at up to 10 Mbps, telephone return path.
	Beaumont, TX	Sep. 1997	Same.
Metro.Net	Northern California	N/A	Broadcast at up to 10 Mbps, telephone or ISDN return path.
UltimateCom	Atlanta, GA	Launched Mar. 1998	N/A
Warp Drive Networks	Seattle, WA; San Jose, CA	1997	Broadcast at up to 10 Mbps, telephone or ISDN return path.

Sources: Publicly available documents including filings made with the Securities and Exchange Commission, news releases, and information on Internet World Wide Web sites.

Table 2: Overview of Fixed Wireless Telemetry Providers

Company	Product Name	Spectrum Block	Potential Coverage	Activity/Units in Service
Aeris Communications	MicroBurst	800 MHz Cellular license control channels	41 million POPs through agreements with Ameritech, Western Wireless and Century Telephone Enterprises	n/a
Bell Atlantic and ComVerge Tech.	CDPD	800 MHz Cellular licenses	Bell Atlantic AirBridge CDPD network	Joint marketing agreement
BellSouth	Cellemetry	800 MHz Cellular license control channels	130 million POPs through agreements with 11 cellular operators in North America	n/a
CellNet Data Systems	n/a	Multiple Address System at 928-952 MHz and unlicensed at 902-928 MHz	Focuses on top 60 MSAs	1 million units installed with backlog of 2.4 million units
Itron	Genesis	Licensed to operate fixed service at 1427-1429 MHz	Nationwide	11.1 million units installed with 327 utilities
Metricom	UtiliNet	unlicensed 902-928 MHz	Nationwide	Over 100 installations
SkyTel (formerly Mtel)	n/a	Narrowband PCS	Nationwide	104,500 units under contract (3.3% installed)

Sources: Publicly available documents including filings made with the Securities and Exchange Commission and news releases.

Table 3: Description of UpperBands

Frequency ---------- Features	24 GHz	28 GHz	39 GHz
Name of Band	Digital Electronic Messaging Service (DEMS)	Local Multipoint Distribution Service (LMDS)	38 GHz
Prominent Licensees	Teligent	Baker Creek Communications, Eclipse Communications, NEXTBAND Communications, and WNP Communications	WinStar, Teleport, and Advanced Radio Telecom
Bandwidth	80-400 MHz licensed thus far	Two blocks: 1150 MHz, 150 MHz	14 paired 50 MHz channel blocks, with a spacing of 700 MHz between transmit and receive channels.
Assignment Method	Ruled To Be Determined	Auction: Completed March 25, 1997	Auction: Scheduled for Fall 1998
Service Rules	DEMS is licensed for both common carrier and private use.	Flexible	Flexible
Small Business Provisions	TAD	* Bidding credits ranging from 25%-45% for entrepreneurs and small businesses	* Bidding credits for entrepreneurs and small businesses
Other Noteworthy Rules		* ILECS and cable companies may not obtain in-region 1150 MHz licenses for three years. * Licensees must demonstrate in 10 years they are providing substantial service (coverage of 20% of population for P-MP service; 4 permanent links per million people for P-P service)	* Licensees that received their licenses before Aug. 1, 1996, would retain their existing license terms.

Table 4: Upperband Operator Summaries

Company Specifics	Teligent	CellularVision	WinStar	Advanced Radio Telecom	Teleport
Year Established	1996	1993	1993	1993	Acquired last 50.1% interest in BizTel Oct. 1997. Already acquired a 49.9% interest in Feb. 1996.
Band	24 GHz	28 GHz (LMDS)	38 GHz and LMDS	38 GHz	38 GHz
Licenses and Spectrum Held	74 markets with 130 million POPs and 50% of nation's business telephone lines with 80 to 400 MHz.	1 (NY PMSA license) covering 8.3 million POPs with 1150 MHz	38 GHz - Over 125 markets with 185 mil. POPs, averaging more than 750 MHz in top 30 markets. LMDS - 9 A and 6 B block licenses with 17 mil. total POPs.	210 markets with 186 million POPs with 100 to 500 MHz of capacity in 90 of the top 100 U.S. markets.	200 markets with 95 of the top 100.
Business Strategy (Customer Base & Services Provided)	Telephony, high speed data and Internet, video conferencing Primarily to small and medium-sized businesses.	Video, data, and eventually voice packaged for business and residential users.	Telephony, high speed data and Internet, video conferencing to end users and other telecomm. carriers.	- Serves CAPs, CLECs, LECs, ISPs, PCS/cellular carriers and provides "last mile" connectivity for voice, data, and video traffic. - 1st Q of 98, ART began deploying and selling services to end users.	Plans to connect customers in markets already served by its fiber optic networks, provide network redundancy, and provide stand alone facilities where it does not have fiber optic networks.
Operating Activity	Plans to launch service in 10 cities during 1998 and 30 by the end of 1999.	Multichannel video service (49 channels) - 16,000 subscribers; Internet service - 1,000 subscribers.	- Operational in about 160 cities; CLEC service in 21 metro areas. - CLEC authority in 29 jurisdictions, CAP in 38, IXC in 47.	Plans to serve up to 100 of top markets over next five years, beginning in 1998 in Seattle, WA and Washington, D.C.	
1997 Revenue	Minimal service based revenue.	$4.9 million up from $2.2 million in 1996.	$79.6 million up from $48.6 million in 1996.	$1.1 million down from $2.9 million in 1996.	$494.3 million, up from $283.4 million in 1996.

Sources: Publicly available documents including filings made with the Securities and Exchange Commission and news releases.

APPENDIX G:
MOBILE SATELLITE SERVICES INDUSTRY

Satellite services, and in particular mobile satellite services ("MSS"), are also becoming a significant feature of the competitive landscape.[57] MSS systems, both operating and planned, have a wide range of technical capabilities and contemplated service offerings. These systems may have a significant impact on the development of telecommunications markets, by introducing new technical capabilities that compete with or enhance existing product offerings. This section provides an overview of MSS, the U.S. licensees, and future Commission proceedings.

To date, the Commission has licensed three types of MSS providers:

- Geo-stationary L-band MSS offer voice, data, dispatch, and position reporting.
- Little Low Earth Orbitals ("Little LEOs") are non-voice, non-geostationary mobile satellite services ("NVNG MSS"). Little LEOs use one or more low-Earth orbiting satellites to provide commercial radio location and two-way data messaging services to potential customers anywhere in the world.
- Big Low Earth Orbitals ("Big LEOs") use constellations of LEO satellites to provide global voice-and-data communications via hand held telephones, fixed telephone stations, or pagers and between such terminals and PSTN users.

1. Existing Licensees

There are currently licenses issued for one Geo-stationary L-band MSS system, five Little LEO, and four Big LEOs.

American Mobile Satellite Corp. ("AMSC") is the licensed Geo-stationary L-Band system. Its license was issued in the late 1980's. It offers a wide array of mobile services, including voice, data, dispatch, and position reporting. AMSC services primarily business entities with nationwide communications needs. As of December 31, 1997, it had 32,400 subscribers.[58]

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[57] We note that Section 332(c)(4) and (5) of the Communications Acts provide that the Commission's regulatory authority over CMRS does not alter or affect the regulatory treatment required by title IV of the Communications Satellite Act of 1962 and that the Commission has the authority to determine whether the provision of space segment capacity by satellite systems to providers of CMRS shall be treated as common carriage. *See Communications Act of 1934* § 332(c)(4) and (5). This section is not intended to deal with, or signal a change in, the regulatory treatment of MSS. Rather, this section will identify the potential sources of additional competition to terrestrial CMRS providers as a result of MSS deployment.

[58] American Mobile Satellite Corporation, Form 10-K, Dec. 31, 1997, at F-4.

The Commission has licensed two rounds of Little LEOs, with a current total of five licensees: Orbital Communication Corp. (which offers services under the name Orbcomm), Volunteers in Technical Assistance, Leo One USA Corporation, E-SAT Inc. and Final Analysis Communications Services Inc.[59] Little Leo services include two-way data messaging, vehicle tracking, remote meter reading and paging to users in the United States and around the world. Orbcomm is the only licensee currently providing service commercially. It currently uses a limited number of the total number satellites contemplated for its system. At this time, the service is limited to "store-and-forward" type applications.

There are currently four licensed Big LEOs. Two were licensed on January 31,1995, Motorola Satellite Communications Inc. (operating under the name Iridium) and Loral/QUALCOMM (operating under the name Globalstar). On June 30, 1997, FCC licenses were also issued to Mobile Communications Holdings, Inc. and Constellation Communications, Inc.[60] None of the Big LEO systems have commenced offering commercial service. However, the Iridium system has launched most of the satellites contemplated for its system, and plans to commence full commercial service this fall. Globalstar has begun launching satellites as well and expects to commence service in 1999.

2. Outstanding Licensing Proceedings

The Commission is reviewing nine requests received to provide new MSS in the 2 GHZ band. The parties are Boeing, Celsat, Globalstar, Iridium, MCHI, Constellation, TMI, Inmarsat, and ICO. It is noteworthy that the 2 GHz filings include requests for both new systems and for additional frequencies to be used in connection with licensed Big LEO systems.

3. INMARSAT/COMSAT

INMARSAT has an existing constellation of Geo-stationary L-band satellites capable of providing mobile telecommunications service worldwide. Due to limited L-band spectrum,

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[59] *See* In the Matter of Application of Orbital Communications Corp., *Order and Authorization*, 9 FCC Rcd 6476 (1994); In the Matter of Application of Volunteers in Technical Assistance, Inc., *Order and Authorization*, 11 FCC Rcd 1358 (1995); In the Matter of Application of Leo One USA Corporation, *Order and Authorization*, 13 FCC Rcd 2801 (1998); In the Matter of Application of E-SAT, Inc., *Order and Authorization*, DA 98-619 (rel. Apr. 1, 1998); *and* In the Matter of Application of Final Analysis Communication Services, Inc., *Order and Authorization*, DA 98-616 (rel. Apr. 1, 1998).

[60] *See* In re Application of Motorola Satellite Communications, Inc., *Order and Authorization*, 10 FCC Rcd. 2268 (1995); In re Application of Loral/Qualcomm Partnership, L.P., *Order and Authorization*, 10 FCC Rcd 2333 (1995); In re Application of Mobile Communications Holdings, Inc., *Order and Authorization*, 12 FCC Rcd 9663 (1997); *and* In re Application of Constellation Communications, Inc., *Order and Authorization*, FCC Rcd 9651 (1997).

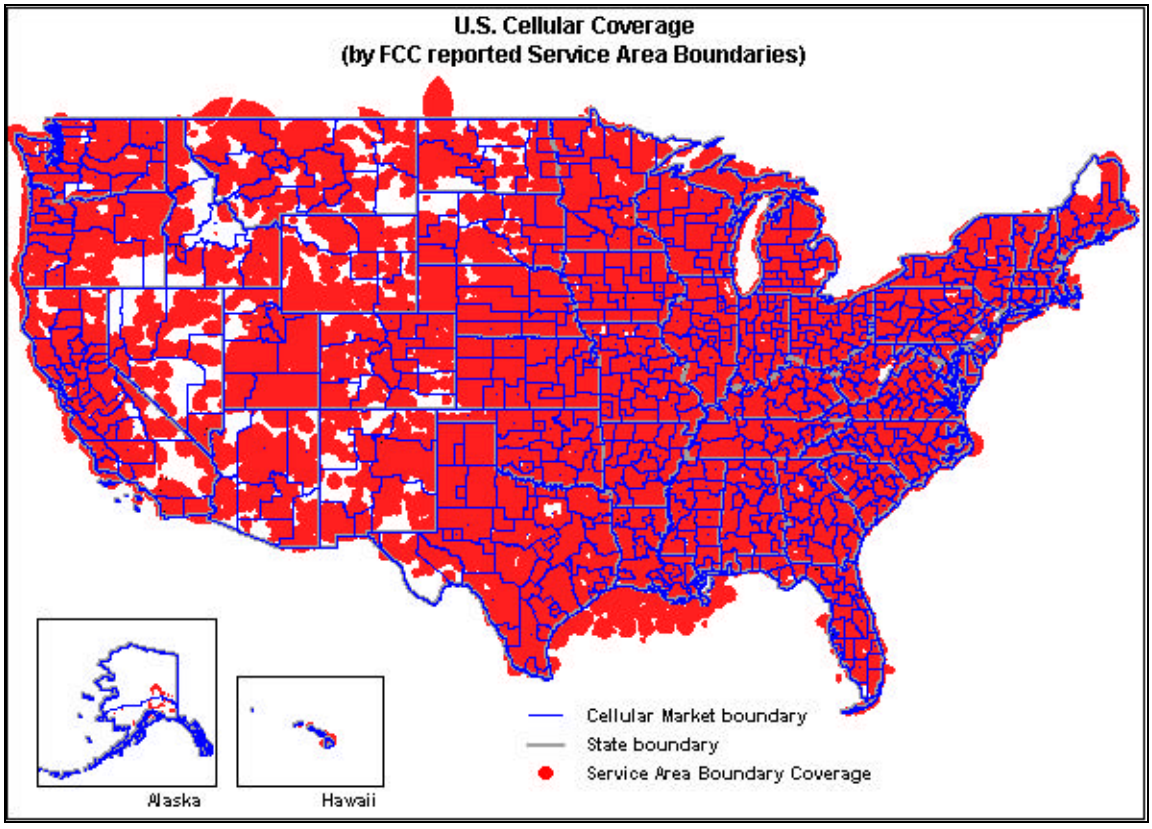
however, INMARSAT and the United States signatory, COMSAT, have not been allowed to provide mobile service in the United States. The Commission recently indicated, however, that it would entertain a request to provide such services.[61]

[61] Amendment of the Commission's Regulatory Policies to Allow Non-U.S. Licensed Space Stations to Provide Domestic and International Satellite Service in the United States, *Report and Order*, FCC 97-399 (rel. Nov. 26, 1997), at para. 126.

APPENDIX H:
ADDITIONAL MAPS

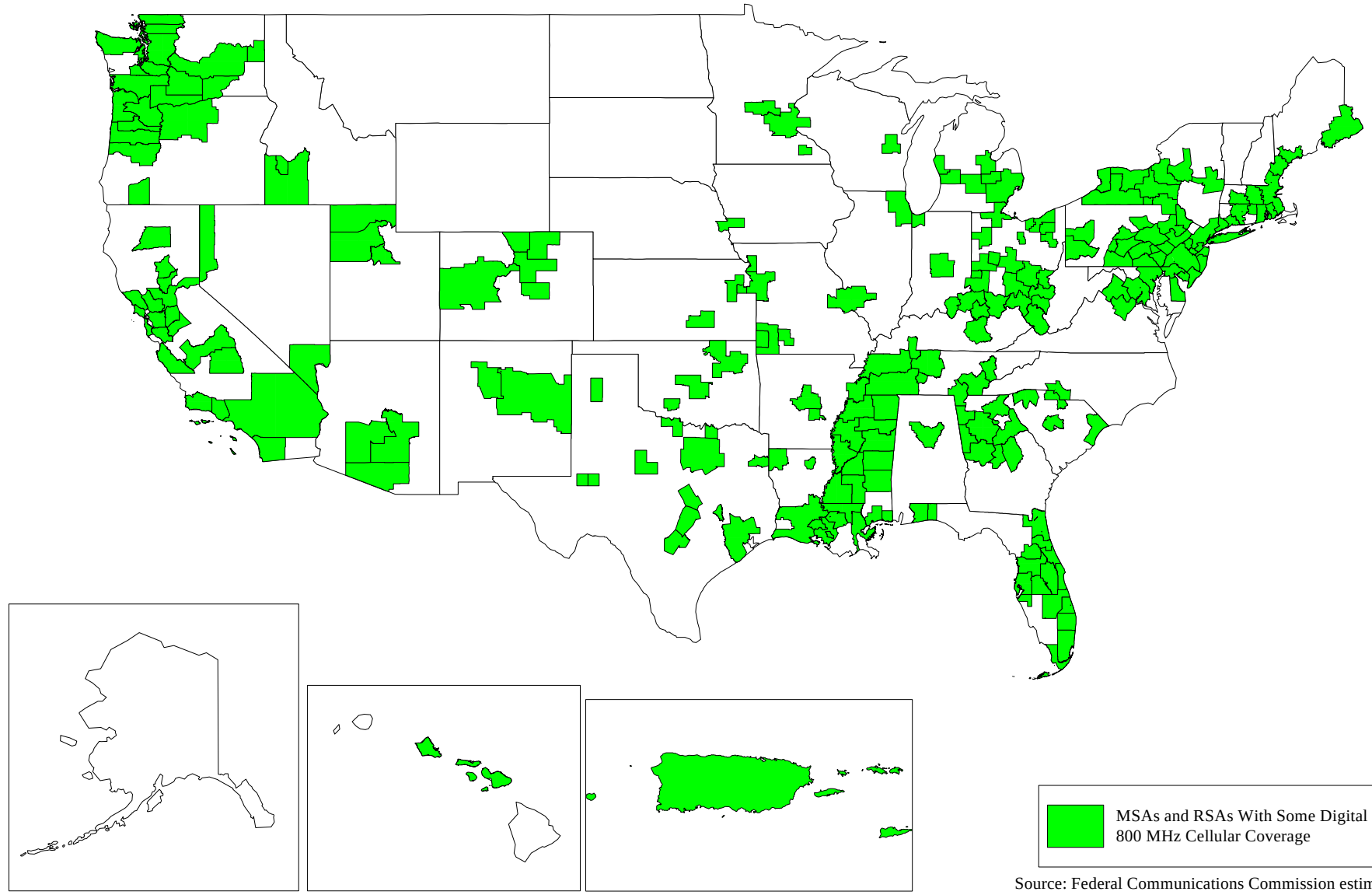
Table of Contents

Map 1: U.S. 800 MHz Analog Cellular Coverage



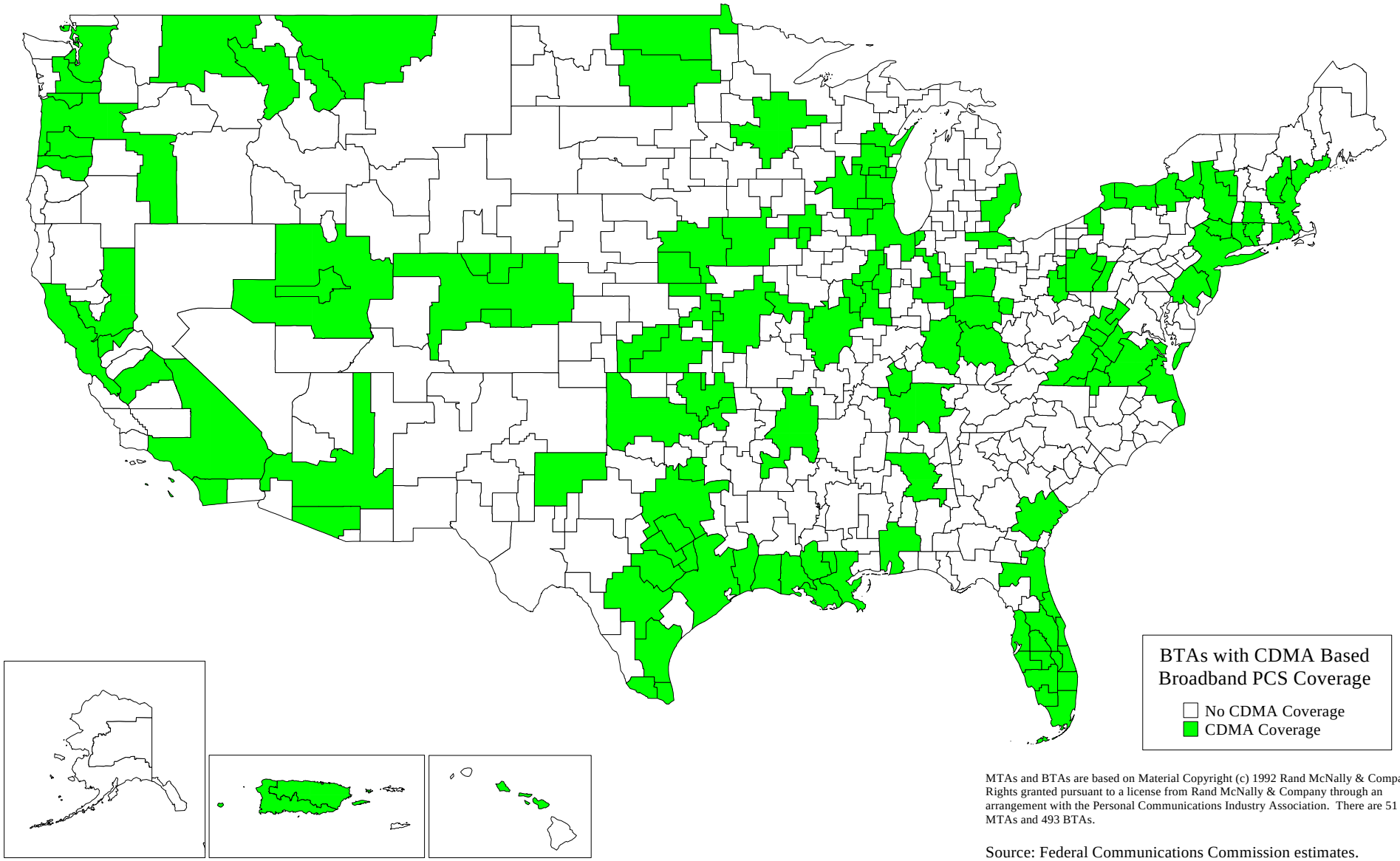
Source: Federal Communications Commission

Map 2: Estimated MSAs and RSAs with Digital 800 MHz Cellular Coverage



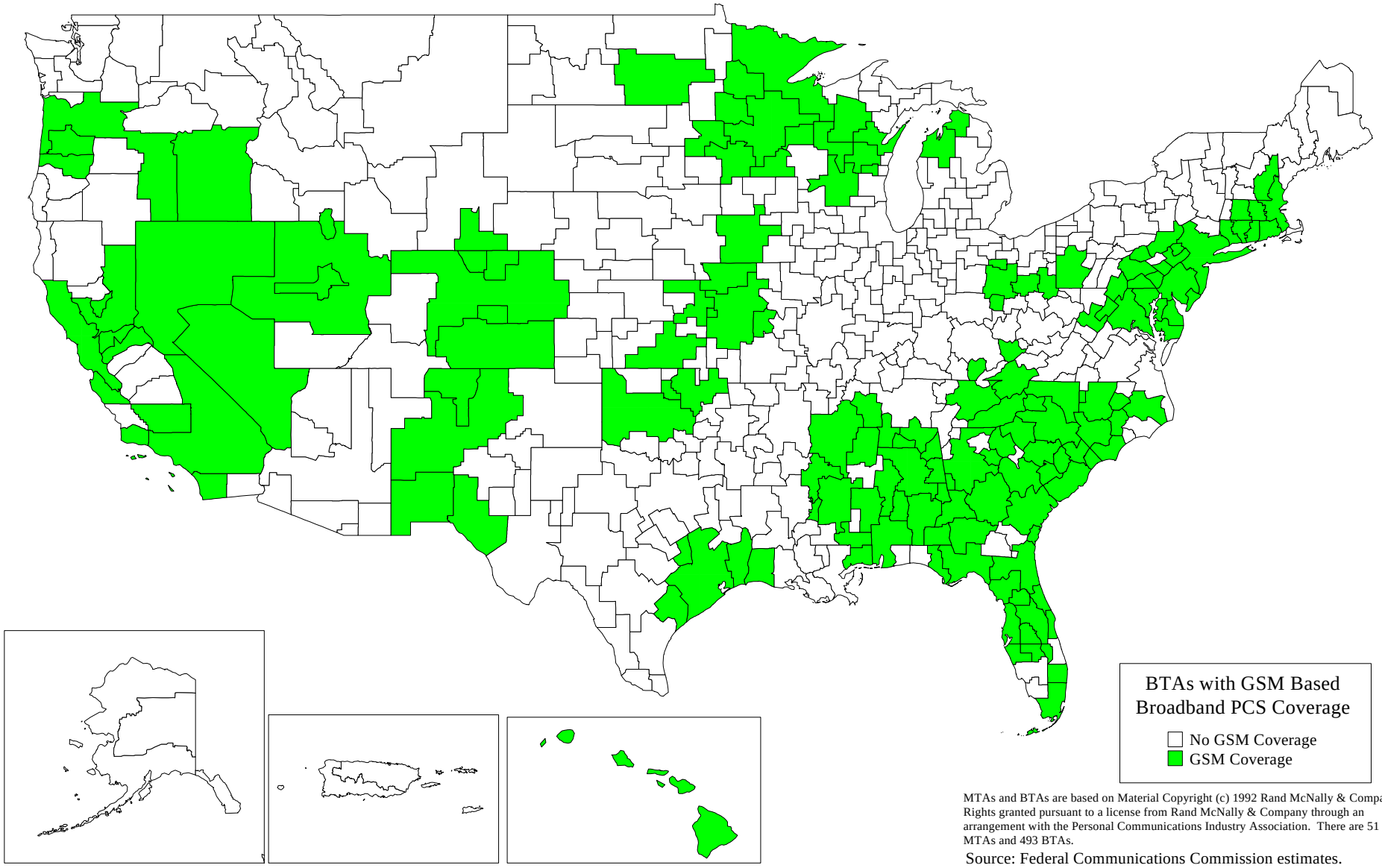
Source: Federal Communications Commission estimates.

Map 3: Estimated BTAs with Some Level of CDMA Based Broadband PCS Coverage



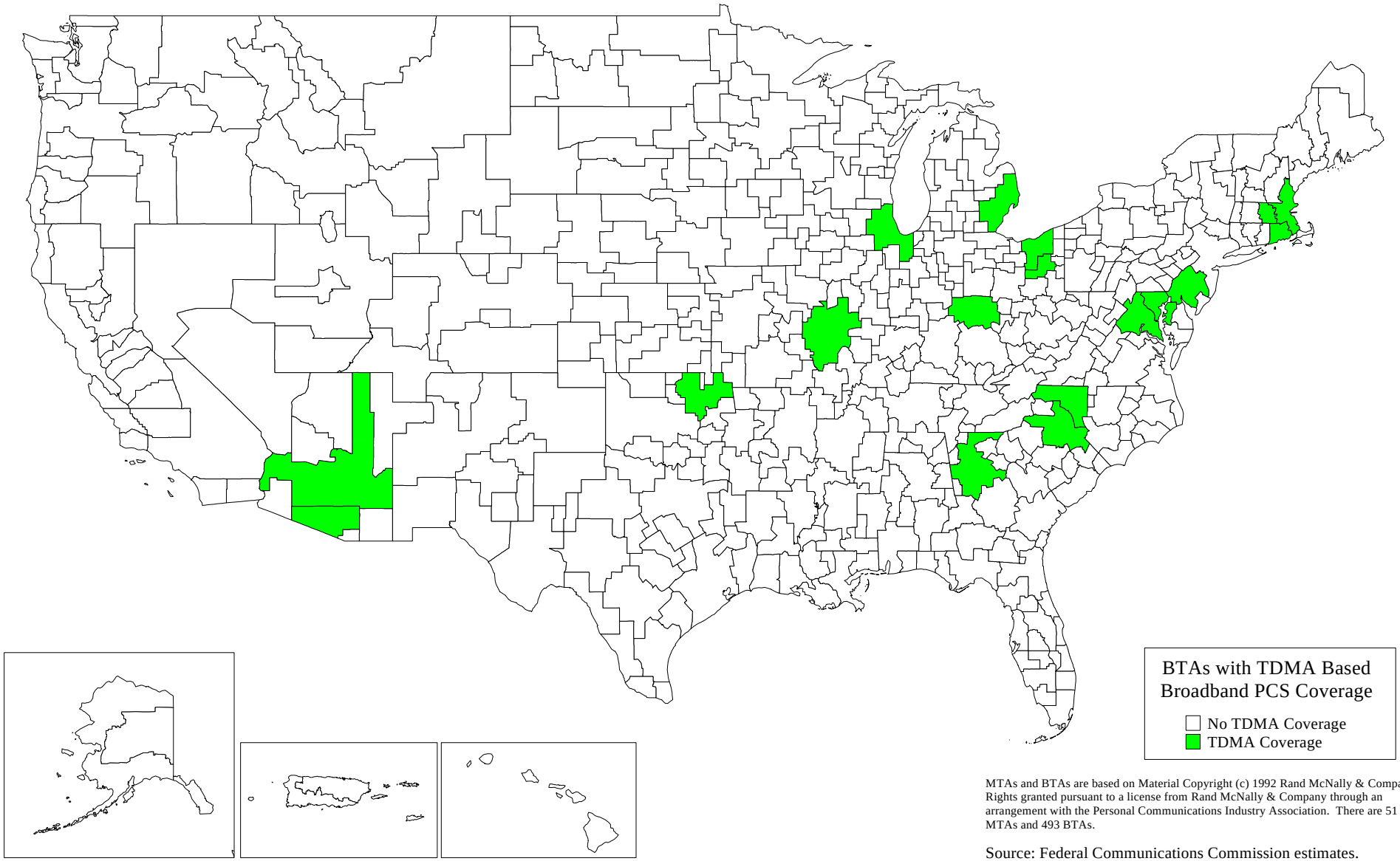
Source: Federal Communications Commission estimates.

Map 4: Estimated BTAs with Some Level of GSM Based Broadband PCS Coverage



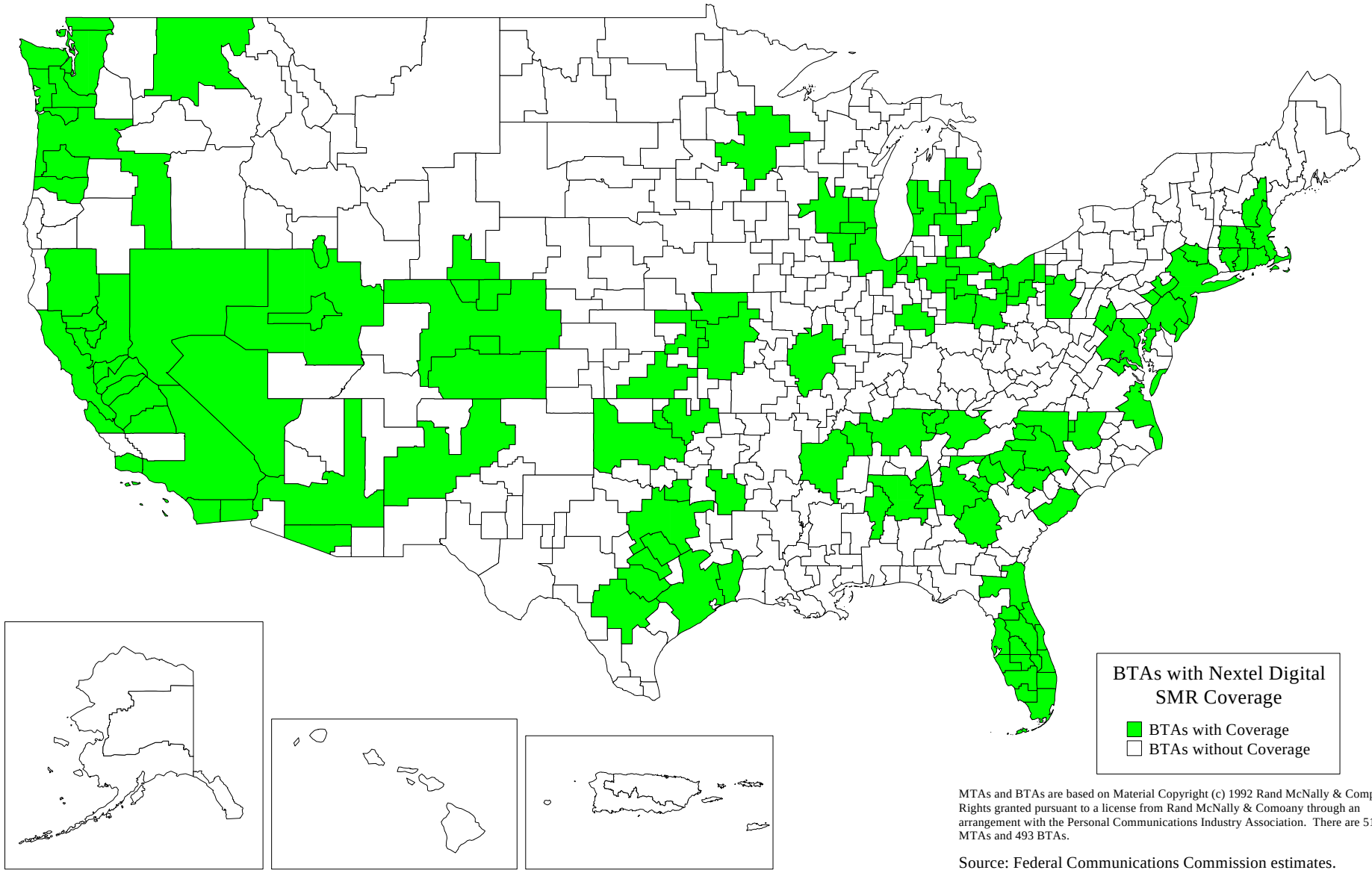
Source: Federal Communications Commission estimates.

Map 5: Estimated BTAs with Some Level of TDMA Based Broadband PCS Coverage



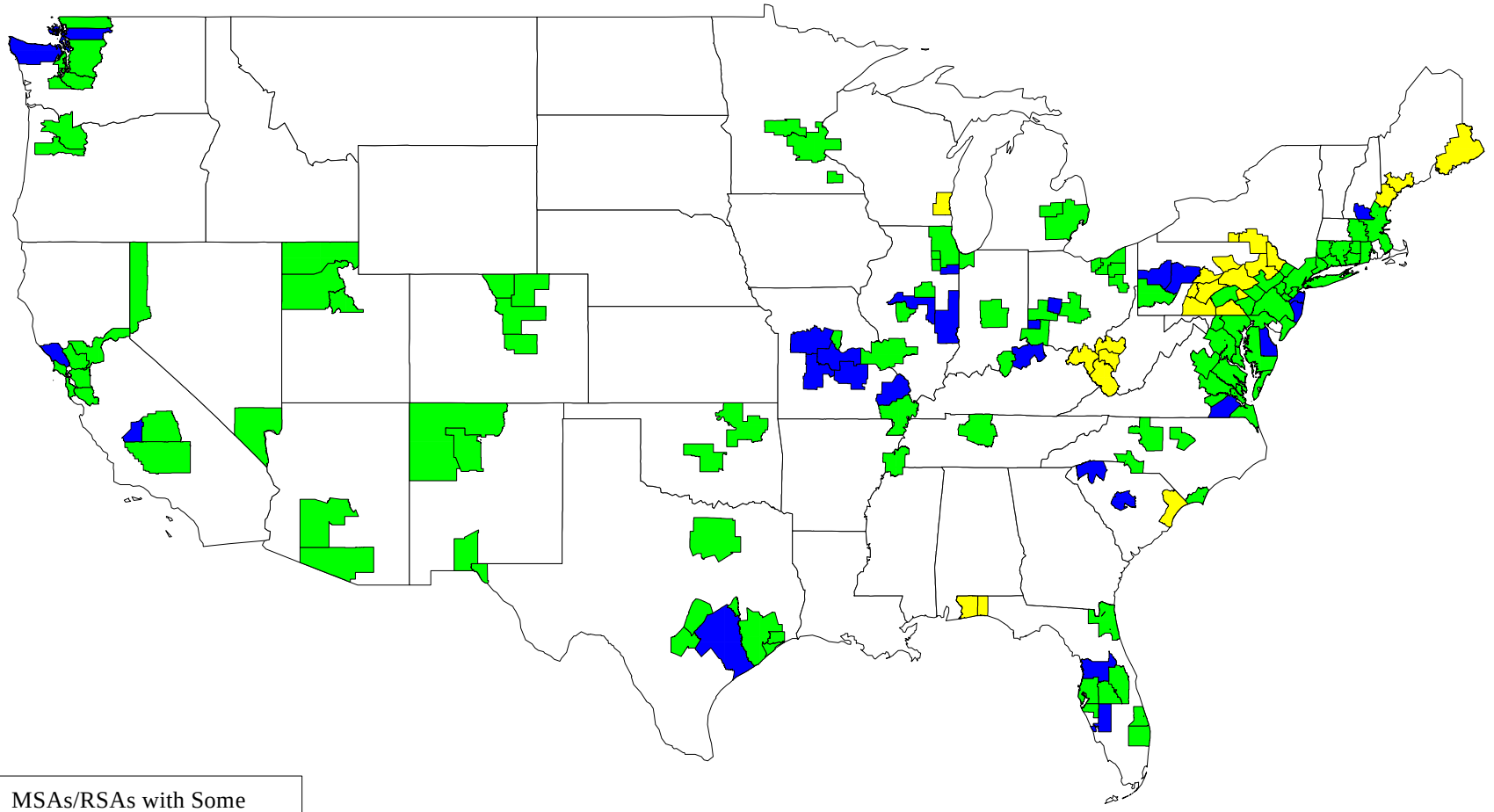
Source: Federal Communications Commission estimates.

Map 6: Estimated Nextel Communications Inc. Digital SMR Network Coverage



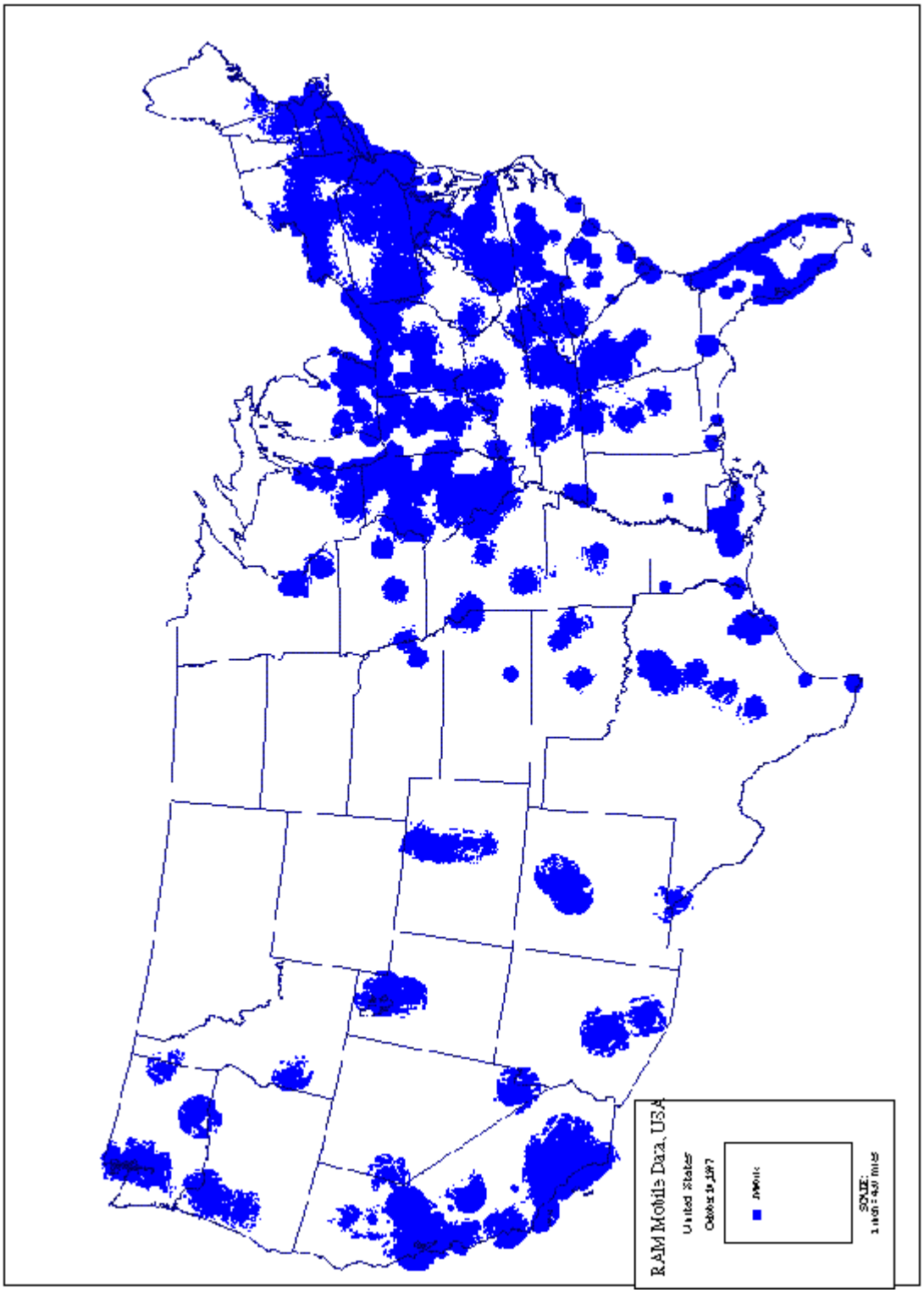
Source: Federal Communications Commission estimates.

Map 7: Estimated CDPD Coverage



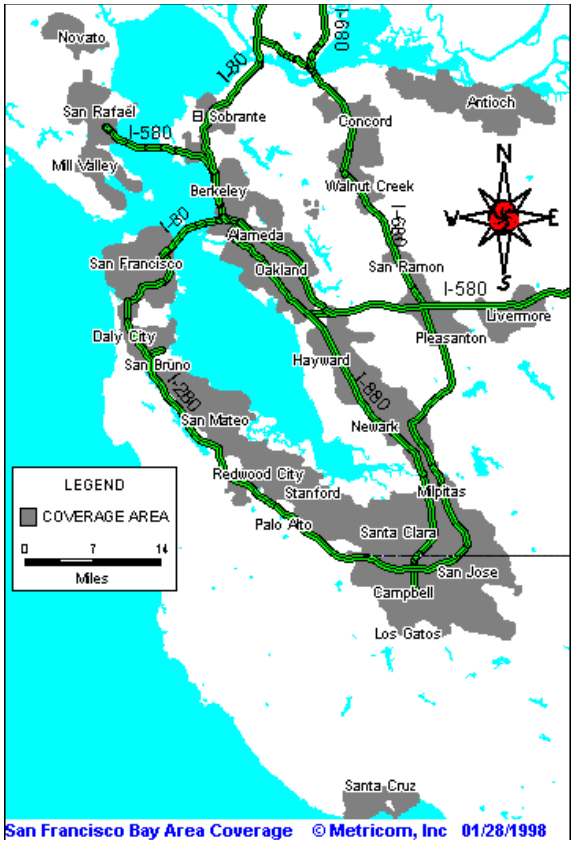
Source: Wireless Data Forum, 3rd Quarter CDPD Survey
(visited May 16, 1998) <http:ww2.wirelessdata.org/public/newsroom/report_card/>.

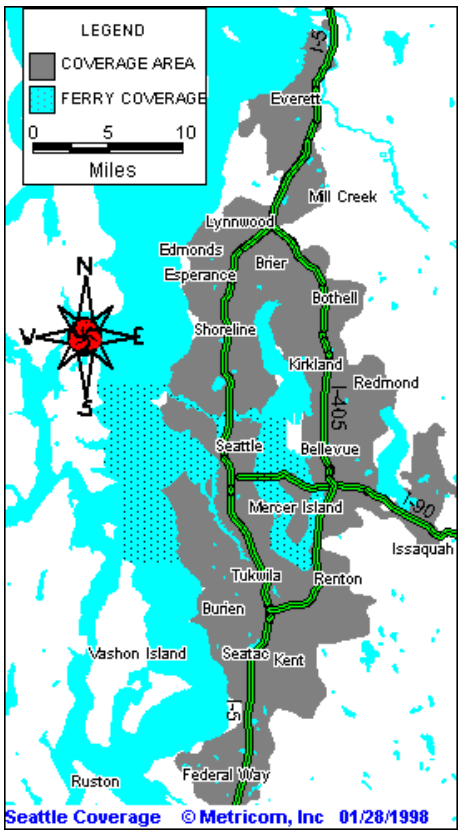
Map 8: BellSouth Wireless Data Coverage

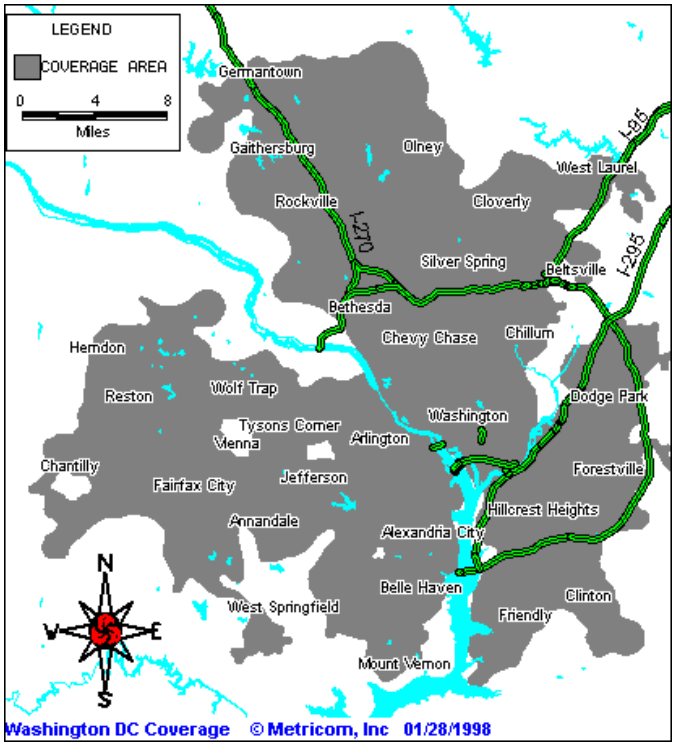


Source: BellSouth Wireless Data (formerly known as RAM Mobile Data)

Map 9: Metricom's Ricochet Coverage Area







APPENDIX I:
CELLULAR LICENSE OWNERSHIP

Below are the cellular licenses owned by a selection of mobile telephone operators. This information was gathered from either public sources, such as filings with the Securities and Exchange Commission and operators' World Wide Web sites, or from through contacts with the operators themselves. Some of this information may no longer be accurate due to mergers, acquisitions, and exchanges, some of which are noted. When available, the following information is provided for each license:

MSA/RSA Name: The market name for a license.
MSA/RSA Number: The market's number. Markets 1 through 306 are Metropolitan Statistical Areas ("MSAs"). Markets 308 through 724 are Rural Service Areas ("RSAs"). Market 307 is for the Gulf of Mexico.
Frequency Block: For each market, there are two 25 MHz licenses. They are referred to as A block (or non-wireline) and B block (or wireline).
Submarket: For various reasons, the licenses for some markets have been further subdivided (refered to as either Submarkets 1, 2, 3, etc. or A, B, C, etc).
As of Date: The date on which a license was owned by an operator. Unless the operator provided a specific "as of date," the date was assumed to be: the period for which a filing was made with the Securities and Exchange Commission, the date a World Wide Web site was visited, the date a list was provided by an operator, or the date an acquisition or exchange was completed.
% Owned: Percentage of license the operator claimed to control.
POPs: The population covered by license as reported by the operator. POPs reported by different operators can be for different time periods and from different sources. Multiple operators can report different POPs for the same license area.
Net POPs: Equals POPs multiplied by the percentage ownership.

360 Communications Co.

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
New York, NY-NJ/Nassau-Suffolk, NY/Newark, Jersey City and Paterson-Clifton-Passaic, NJ	1	B	1	12/31/97	10.00%	(2)	(2)
Chicago, IL	3	B	1	12/31/97	5.00%	(2)	(2)
Houston, TX	10	B	1	12/31/97	8.80%	(2)	(2)
Cleveland, OH	16	B	1	12/31/97	3.50%	(2)	(2)
Cincinnati, OH-KY-IN	23	B	1	12/31/97	1.20%	(2)	(2)
Kansas City, MO-KS	24	B	1	12/31/97	19.00%	(2)	(2)
Columbus, OH	31	B	1	12/31/97	1.20%	(2)	(2)
Hartford-New Britain-Bristol, CT	32	B	1	12/31/97	0.10%	1,112,760	1,113
Dayton, OH	40	B	1	12/31/97	1.20%	(2)	(2)
Bridgeport-Stamford-Norwalk-Danbury, CT	42	B	1	12/31/97	0.10%	830,330	830
Norfolk-Virginia Beach-Portsmouth, VA/NC	43	A	1	12/31/97	100.00%	1,048,667	1,048,667
Greensboro-Winston-Salem-High Point, NC	47	B	1	12/31/97	61.80%	983,707	607,931
Toledo, OH-MI	48	B	1	12/31/97	85.10%	792,921	674,776
New Haven-West Haven-Waterbury-Meriden, CT	49	B	1	12/31/97	0.10%	791,830	792
Akron, OH	52	B	1	12/31/97	3.50%	(2)	(2)
Gary-Hammond-East Chicago, IN	54	B	1	12/31/97	5.00%	(2)	(2)
Northeast Pennsylvania, PA	56	B	1	12/31/97	78.90%	659,594	520,420
Allentown-Bethlehem-Easton, PA-NJ	58	B	1	12/31/97	20.80%	708,126	147,290
Richmond, VA	59	B	1	12/31/97	24.60%	802,859	197,503
Orlando, FL	60	B	1	12/31/97	24.60%	(2)	(2)
New Brunswick-Perth Amboy-Sayreville, NJ	62	B	1	12/31/97	10.00%	(2)	(2)

Springfield-Chicopee-Holyoke, MA	63	B	1	12/31/97	0.10%	591,653	592
Omaha, NE-IA	65	B	1	12/31/97	27.90%	630,141	175,809
Youngstown-Warren, OH	66	B	1	12/31/97	96.90%	491,908	476,659
Greenville-Spartanburg, SC	67	B	1	12/31/97	89.20%	686,113	612,013
Long Branch-Asbury Park, NJ	70	B	1	12/31/97	10.00%	(2)	(2)
Raleigh-Durham, NC	71	B	1	12/31/97	92.00%	827,723	761,505
Austin, TX	75	B	1	12/31/97	0.80%	940,500	7,524
Harrisburg, PA	84	B	1	12/31/97	100.00%	499,994	499,994
Johnson City-Kingsport-Bristol, TN-VA	85	B	1	12/31/97	100.00%	456,168	456,168
Canton, OH	87	B	1	12/31/97	3.50%	(2)	(2)
Charleston-North Charleston, SC	90	B	1	12/31/97	75.00%	526,281	394,711
Las Vegas, NV	93	B	1	12/31/97	72.20%	1,018,224	735,158
Fort Wayne, IN	96	B	1	12/31/97	25.00%	437,208	109,302
York, PA	99	B	1	12/31/97	100.00%	450,097	450,097
Beaumont-Port Arthur, TX	101	B	1	12/31/97	8.80%	(2)	(2)
Peoria, IL	103	B	1	12/31/97	100.00%	344,465	344,465
Newport News-Hampton, VA	104	A	1	12/31/97	100.00%	480,498	480,498
Lancaster, PA	105	B	1	12/31/97	100.00%	449,868	449,868
Huntington-Ashland, WV/KY/OH	110	B	1	12/31/97	100.00%	317,680	317,680
Reading, PA	118	B	1	12/31/97	15.90%	351,468	55,883
South Bend-Mishawaka, IN	129	B	1	12/31/97	100.00%	303,760	303,760
Erie, PA	130	B	1	12/31/97	3.50%	(2)	(2)
Lorain-Elyria, OH	136	B	1	12/31/97	3.50%	(2)	(2)
Melbourne-Titusville-Palm Bay, FL	137	B	1	12/31/97	24.60%	(2)	(2)
Charleston, WV	140	B	1	12/31/97	85.00%	256,504	218,028
Johnstown, PA	143	B	1	12/31/97	100.00%	238,787	238,787
Daytona Beach, FL	146	B	1	12/31/97	24.60%	(2)	(2)
Fayetteville, NC	149	B	1	12/31/97	92.00%	291,322	268,016
New London-Norwich, CT	154	B	1	12/31/97	0.10%	248,221	248
Lima, OH	158	B	1	12/31/97	85.10%	221,480	188,479
Killeen-Temple, TX	160	B	1	12/31/97	66.90%	300,940	201,329
Hickory, NC	166	B	1	12/31/97	100.00%	237,102	237,102
Tallahassee, FL	168	B	1	12/31/97	100.00%	278,223	278,223
Galveston-Texas City, TX	170	B	1	12/31/97	8.80%	(2)	(2)
Wheeling, WV-OH	178	B	1	12/31/97	100.00%	157,197	157,197
Waco, TX	194	B	1	12/31/97	66.90%	200,740	134,295
Cedar Rapids, IA	195	B	1	12/31/97	100.00%	180,058	180,058
Steubenville-Weirton, OH-WV	199	B	1	12/31/97	100.00%	139,291	139,291
Parkersburg-Marietta, OH-WV	200	B	1	12/31/97	100.00%	158,115	158,115
Waterloo-Cedar Falls, IA	201	B	1	12/31/97	88.50%	146,645	129,781
Lynchburg, VA	203	B	1	12/31/97	100.00%	158,437	158,437
Longview-Marshall, TX	206	B	1	12/31/97	60.00%	169,960	101,976
Wilmington, NC	218	B	1	12/31/97	100.00%	202,394	202,394
Elkhart-Goshen, IN	223	B	1	12/31/97	100.00%	167,253	167,253
Altoona, PA	225	B	1	12/31/97	100.00%	132,079	132,079
Anderson, SC	227	B	1	12/31/97	89.20%	155,628	138,820
Mansfield, OH	231	B	1	12/31/97	100.00%	128,300	128,300
Petersburg-Colonial Heights-Hopewell, VA	235	A	1	12/31/97	73.90%	136,960	101,213
Tyler, TX	237	B	1	12/31/97	60.00%	162,194	97,316
Sharon, PA	238	B	1	12/31/97	96.90%	122,370	118,577
Williamsport, PA	251	B	1	12/31/97	100.00%	121,493	121,493
Charlottesville, VA	256	B	1	12/31/97	100.00%	143,749	143,749
Jacksonville, NC	258	B	1	12/31/97	100.00%	145,653	145,653
State College, PA	259	B	1	12/31/97	100.00%	131,792	131,792
Danville, VA	262	B	1	12/31/97	75.00%	110,259	82,694
Fort Walton Beach, FL	265	B	1	12/31/97	100.00%	167,808	167,808
Kankakee, IL	273	B	1	12/31/97	5.00%	(2)	(2)
St. Joseph, MO	275	B	1	12/31/97	20.00%	98,084	19,617
Burlington, NC	280	B	1	12/31/97	92.00%	115,453	106,217
Panama City, FL	283	B	1	12/31/97	100.00%	145,363	145,363
Dubuque, IA	286	B	1	12/31/97	85.00%	88,756	75,443
Iowa City, IA	296	B	1	12/31/97	100.00%	101,682	101,682
Lawrence, KS	301	B	1	12/31/97	19.00%	(2)	(2)
Aurora-Elgin, IL	303	B	1	12/31/97	5.00%	(2)	(2)
Joliet, IL	304	B	1	12/31/97	5.00%	(2)	(2)
Connecticut 1 - Litchfield	357	B	1	12/31/97	0.10%	180,107	180
Connecticut 2 - Windham	358	B	1	12/31/97	0.10%	104,079	104
Florida 8 - Jefferson	367	B	1	12/31/97	100.00%	46,924	46,924
Florida 9 - Calhoun	368	B	1	12/31/97	49.00%	40,388	19,790
Florida 10 - Walton	369	B	1	12/31/97	100.00%	112,525	112,525
Illinois 2 - Bureau	395	B	2	12/31/97	40.00%	81,146	32,458
Illinois 3 - Mercer	396	B	1	12/31/97	18.10%	203,087	36,759

Illinois 5 - Mason	398	B	1	12/31/97	100.00%	11,562	11,562
Indiana 2 - Kosciusko	404	B	1	12/31/97	75.00%	171,812	128,859
Indiana 3 - Huntington	405	B	1	12/31/97	20.00%	146,081	29,216
Iowa 1 - Mills	412	B	1	12/31/97	3.90%	62,300	2,430
Iowa 5 - Jackson	416	B	1	12/31/97	7.10%	108,984	7,738
Iowa 8 - Monona	419	B	1	12/31/97	2.30%	54,521	1,254
Iowa 14 - Kossuth	425	B	1	12/31/97	5.60%	107,028	5,994
Iowa 15 - Dickinson	426	B	1	12/31/97	6.70%	83,766	5,612
Iowa 16 - Lyon	427	B	1	12/31/97	8.30%	104,124	8,642
Massachusetts 1 - Franklin	470	B	1	12/31/97	0.10%	70,685	71
Missouri 1 - Atchison	504	B	1	12/31/97	14.30%	42,617	6,094
Missouri 4 - De Kalb	507	B	1	12/31/97	12.50%	69,073	8,634
Missouri 9 - Bates	512	B	1	12/31/97	19.60%	34,669	6,795
New Mexico 1 - San Juan	553	A	1	12/31/97	100.00%	257,276	257,276
New Mexico 2 - Colfax	554	A	1	12/31/97	100.00%	23,796	23,796
New Mexico 4 - Santa Fe	556	A	1	12/31/97	100.00%	263,381	263,381
New Mexico 5 - Grant	557	A	1	12/31/97	100.00%	59,226	59,226
North Carolina 2 - Yancey	566	B	2	12/31/97	100.00%	74,023	74,023
North Carolina 5 - Anson	569	B	2	12/31/97	100.00%	35,403	35,403
North Carolina 6 - Chatham	570	B	1	12/31/97	100.00%	157,106	157,106
North Carolina 7 - Rockingham	571	B	1	12/31/97	100.00%	141,715	141,715
North Carolina 7 - Rockingham	571	B	2	12/31/97	100.00%	141,715	141,715
North Carolina 8 - Northampton	572	B	1	12/31/97	100.00%	287,499	287,499
North Carolina 9 - Camden	573	B	1	12/31/97	100.00%	119,126	119,126
North Carolina 10 - Harnett	574	B	1	12/31/97	100.00%	281,768	281,768
North Carolina 11 - Hoke	575	B	1	12/31/97	100.00%	223,100	223,100
North Carolina 12 - Sampson	576	B	1	12/31/97	100.00%	128,210	128,210
North Carolina 13 - Greene	577	B	1	12/31/97	100.00%	239,785	239,785
North Carolina 14 - Pitt	578	B	1	12/31/97	100.00%	240,647	240,647
North Carolina 15 - Cabarrus	579	B	1	12/31/97	67.00%	193,617	129,723
Ohio 1 - Williams	585	B	1	12/31/97	100.00%	127,464	127,464
Ohio 2 - Sandusky	586	B	1	12/31/97	67.50%	206,685	139,512
Ohio 5 - Hancock	589	B	1	12/31/97	68.30%	235,219	160,655
Ohio 6 - Morrow	590	B	1	12/31/97	82.50%	450,273	371,475
Ohio 7 - Tuscarawas	591	B	2	12/31/97	100.00%	170,742	170,742
Ohio 10 - Perry	594	B	2	12/31/97	100.00%	111,865	111,865
Ohio 11 - Columbiana	595	B	1	12/31/97	100.00%	112,518	112,518
Pennsylvania 1 - Crawford	612	B	1	12/31/97	80.00%	197,624	158,099
Pennsylvania 3 - Potter	614	B	1	12/31/97	100.00%	37,517	37,517
Pennsylvania 3 - Potter	614	B	2	12/31/97	61.50%	59,328	36,487
Pennsylvania 4 - Bradford	615	B	1	12/31/97	100.00%	29,860	29,860
Pennsylvania 4 - Bradford	615	B	2	12/31/97	50.00%	68,489	34,245
Pennsylvania 5 - Wayne	616	B	1	12/31/97	40.00%	82,527	33,011
Pennsylvania 6 - Lawrence	617	B	1	12/31/97	57.10%	227,798	130,073
Pennsylvania 8 - Union	619	B	1	12/31/97	100.00%	406,342	406,342
Pennsylvania 10 - Bedford	621	B	1	12/31/97	100.00%	142,030	142,030
Pennsylvania 11 - Huntingdon	622	B	1	12/31/97	100.00%	21,776	21,776
Pennsylvania 12 - Lebanon	623	B	1	12/31/97	100.00%	117,171	117,171
South Carolina 1 - Oconee	625	B	1	12/31/97	100.00%	61,928	61,928
South Carolina 2 - Laurens	626	B	1	12/31/97	50.00%	227,027	113,514
South Carolina 4 - Chesterfield	628	B	1	12/31/97	50.00%	212,463	106,232
South Carolina 5 - Georgetown	629	B	1	12/31/97	50.00%	243,529	121,765
South Carolina 6 - Clarendon	630	B	1	12/31/97	50.00%	195,183	97,592
South Carolina 8 - Hampton	632	B	1	12/31/97	50.00%	173,664	86,832
Tennessee 4 - Hamblen	646	B	1	12/31/97	100.00%	128,224	128,224
Tennessee 8 - Johnson	650	B	1	12/31/97	100.00%	16,452	16,452
Texas 7 - Fanni	658	B	1	12/31/97	25.00%	126,305	31,576
Texas 7 - Fanni	658	B	2	12/31/97	97.50%	44,358	43,249
Texas 9 - Runnels	660	B	3	12/31/97	70.00%	29,663	20,764
Texas 10 - Navarro	661	B	2	12/31/97	75.00%	95,340	71,505
Texas 10 - Navarro	661	B	4	12/31/97	75.00%	95,340	71,505
Texas 11 - Cherokee	662	B	2	12/31/97	28.00%	107,932	30,221
Texas 15 - Concho	666	B	1	12/31/97	100.00%	90,377	90,377
Virginia 1 - Lee	681	B	1	12/31/97	100.00%	145,678	145,678
Virginia 2 - Tazewell	682	B	1	12/31/97	71.30%	136,224	97,128
Virginia 4 - Bedford	684	B	2	12/31/97	100.00%	105,996	105,996
Virginia 6 - Highland	686	B	2	12/31/97	100.00%	13,578	13,578
Virginia 7 - Buckingham	687	B	2	12/31/97	100.00%	50,873	50,873
Virginia 8 - Amelia	688	A	1	12/31/97	100.00%	83,244	83,244
Virginia 9 - Greensville	689	A	1	12/31/97	100.00%	87,605	87,605
Virginia 10 - Frederick	690	B	2	12/31/97	33.00%	233,327	76,998
Virginia 11 - Madison	691	B	2	12/31/97	100.00%	42,970	42,970

West Virginia 6 - Lincoln	706	B	1	12/31/97	100.00%	185,822	185,822
Total						74,545,107	26,07,975

(1) On March 16, 1998, 360 Communications and ALLTEL announced their intention to merge.
(2) POPs were not reported for these individual markets, but they are included in the company totals.

Airtouch Communications Inc. (1)

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Los Angeles-Long Beach/Anaheim-Santa Ana-Garden Grove/Riverside-San Bernardino-Ontario, CA	2	B	1	6/30/97	82.30%	14,978,000	12,326,894
Detroit/Ann Arbor, MI	5	A	1	6/30/97	100.00%	4,596,000	4,596,000
San Francisco-Oakland, CA	7	A	1	6/30/97	47.00%	3,925,000	1,844,750
Dallas-Forth Worth, TX	9	A	1	6/30/97	17.00%	4,498,000	764,660
Cleveland, OH	16	A	1	6/30/97	100.00%	1,835,000	1,835,000
Atlanta, GA	17	A	1	6/30/97	100.00%	3,235,000	3,235,000
San Diego, CA	18	B	1	6/30/97	100.00%	2,705,000	2,705,000
Cincinnati, OH-KY-IN	23	A	1	6/30/97	100.00%	1,519,000	1,519,000
Kansas City, MO-KS	24	A	1	6/30/97	50.00%	1,539,000	769,500
San Jose, CA	27	A	1	6/30/97	47.00%	1,600,000	752,000
Columbus, OH	31	A	1	6/30/97	100.00%	1,323,000	1,323,000
Sacramento, CA	35	B	1	6/30/97	49.88%	1,503,000	749,696
Dayton, OH	40	A	1	6/30/97	100.00%	846,000	846,000
Toledo, OH-MI	48	A	1	6/30/97	100.00%	794,000	794,000
Akron, OH	52	A	1	6/30/97	100.00%	686,000	686,000
Grand Rapids, MI	64	A	1	6/30/97	100.00%	745,000	745,000
Flint, MI	68	A	1	6/30/97	100.00%	507,000	507,000
Oxnard-Simi Valley-Ventura, CA	73	B	1	6/30/97	82.30%	724,000	595,852
Fresno, CA	74	B	1	6/30/97	1.10%	778,000	8,558
Lansing-East Lansing, MI	78	A	1	6/30/97	100.00%	498,000	498,000
Canton, OH	87	A	1	6/30/97	100.00%	405,000	405,000
Wichita, KS	89	A	1	6/30/97	100.00%	481,000	481,000
Las Vegas, NV	93	B	1	6/30/97	27.79%	983,000	273,176
Saginaw-Bay City-Midland, MI	94	A	1	6/30/97	100.00%	400,000	400,000
Bakersfield, CA	97	B	1	6/30/97	1.10%	637,000	7,007
Stockton, CA	107	B	1	6/30/97	49.88%	540,000	269,352
Vallejo-Fairfield-Napa, CA	111	A	1	6/30/97	50.00%	503,000	251,500
Santa Rosa-Petaluma, CA	123	A	1	6/30/97	40.18%	416,000	167,149
Santa Barbara-Santa Maria-Lompoc, CA	124	B	1	6/30/97	10.00%	392,000	39,200
Salinas-Seaside-Monterey, CA	126	A	1	6/30/97	42.96%	342,000	146,923
Lorain-Elyria, OH	136	A	1	6/30/97	100.00%	284,000	284,000
Modesto, CA	142	B	1	6/30/97	49.88%	429,000	213,985
Hamilton-Middletown, OH	145	A	1	6/30/97	99.60%	322,000	320,712
Visalia-Tulare-Porterville, CA	150	B	1	6/30/97	1.10%	363,000	3,993
Lima, OH	158	A	1	6/30/97	100.00%	221,000	221,000
Reno, NV	171	B	1	6/30/97	49.88%	302,000	150,638
Topeka, KS	179	A	1	6/30/97	78.01%	202,000	157,580
Springfield, OH	180	A	1	6/30/97	89.23%	186,000	165,968
Muskegon, MI	181	A	1	6/30/97	79.41%	186,000	147,703
Chico	215	B	1	6/30/97	49.88%	203,000	101,256
Mansfield, OH	231	A	1	6/30/97	100.00%	129,000	129,000
Athens, GA	234	A	1	6/30/97	86.84%	174,000	151,102
Redding, CA	254	B	1	6/30/97	48.43%	125,000	60,538
Yuba City, CA	274	B	1	6/30/97	49.88%	143,000	71,328
St. Joseph, MO	275	A	1	6/30/97	43.50%	97,000	42,195
Lawrence, KS	301	A	1	6/30/97	50.00%	92,000	46,000
California 1 - Del Norte	336	B	1	6/30/97	5.60%	213,000	11,928
California 2 - Modoc	337	B	1	6/30/97	25.00%	63,000	15,750
California 5 - San Luis Obispo	340	B	1	6/30/97	10.00%	233,000	23,300
California 8 - Tehama	343	B	1	6/30/97	49.88%	101,000	50,379
California 10 - Sierra	345	B	1	6/30/97	49.88%	93,000	46,388
Georgia 3 - Chattooga	373	A	1	6/30/97	100.00%	207,000	207,000
Georgia 4 - Jasper	374	A	1	6/30/97	100.00%	124,000	124,000
Nevada 2 - Lander	544	B	1	6/30/97	50.00%	52,000	26,000
Nevada 3 - Storey	545	B	1	6/30/97	49.88%	117,000	58,360
Nevada 4 - Mineral	546	B	1	6/30/97	50.00%	31,000	15,500
Nevada 5 - White Pine	547	B	1	6/30/97	100.00%	14,000	14,000
Ohio 3 - Ashtabula	587	A	1	6/30/97	100.00%	103,000	103,000
Ohio 4 - Mercer	588	A	1	6/30/97	100.00%	226,000	226,000
Ohio 6 - Morrow	590	A	1	6/30/97	100.00%	455,000	455,000

Ohio 8 - Clinton	592	A	1	6/30/97	100.00%	177,000	177,000
Total						59,600,000	43,361,819

(1) On April 8, 1998, Airtouch completed its acquisition of US West Media Group's wireless properties.

Aliant Communications Inc.

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Omaha, NE-IA	65	B	1	3/1/98	55.80%	634,489	354,045
Lincoln, NE	172	B	1	3/1/98	100.00%	231,114	231,114
Iowa 1 - Mills	412	B	1	3/1/98	16.10%	62,364	10,041
Nebraska 1 - Sioux	533	B	1	3/1/98	100.00%	(1)	(1)
Nebraska 2 - Cherry	534	B	1	3/1/98	100.00%	(1)	(1)
Nebraska 3 - Knox	535	B	1	3/1/98	100.00%	(1)	(1)
Nebraska 4 - Grant	536	B	1	3/1/98	100.00%	(1)	(1)
Nebraska 5 - Boone	537	B	1	3/1/98	100.00%	(1)	(1)
Nebraska 6 - Keith	538	B	1	3/1/98	100.00%	(1)	(1)
Nebraska 7 - Hall	539	B	1	3/1/98	100.00%	(1)	(1)
Nebraska 8 - Chase	540	B	1	3/1/98	100.00%	(1)	(1)
Nebraska 9 - Adams	541	B	1	3/1/98	100.00%	(1)	(1)
Nebraska 10 - Cass	542	B	1	3/1/98	100.00%	(1)	(1)
Total						1,776,333	1,443,566

(1) The Nebraska RSAs have a combined POPs of 848,366 which are included in the company total.

ALLTEL Corp. (1)

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Houston, TX	10	B	1	2/19/97	2.34%	3,977,290	93,069
St. Louis, MO-IL	11	B	1	2/19/97	2.00%	2,473,529	49,471
Pittsburgh, PA	13	B	1	2/19/97	1.93%	2,088,938	40,317
Rochester, NY	34	B	1	2/19/97	15.00%	1,037,866	155,680
Greensboro-Winston-Salem-High Point, NC	47	B	1	2/19/97	11.10%	983,707	109,191
Syracuse, NY	53	B	1	2/19/97	45.00%	673,310	302,990
Charlotte-Gastonia, NC	61	B	1	2/19/97	100.00%	865,754	865,754
Chattanooga, TN-GA	88	B	1	2/19/97	7.12%	454,735	32,377
Wichita, KS	89	B	1	2/19/97	40.00%	482,648	193,059
Little Rock-North Little Rock, AR	92	B	1	2/19/97	64.00%	547,406	350,340
Columbia, SC	95	B	1	2/19/97	53.60%	497,046	266,417
Beaumont-Port Arthur, TX	101	B	1	2/19/97	2.34%	376,781	8,817
Jackson, MS	106	B	1	2/19/97	26.75%	418,523	111,938
Augusta, GA/SC	108	B	1	2/19/97	100.00%	440,003	440,003
Montgomery, AL	139	B	1	2/19/97	100.00%	319,623	319,623
Savannah, GA	155	B	1	12/31/97	100.00%	282,837	282,837
Killeen-Temple, TX	160	B	1	2/19/97	23.61%	300,940	71,052
Springfield, MO	163	B	1	2/19/97	100.00%	272,218	272,218
Fort Smith, AK-OK	165	B	1	2/19/97	100.00%	234,418	234,418
Galveston-Texas City, TX	170	B	1	2/19/97	2.34%	241,736	5,657
Fayetteville-Springdale, AK	182	B	1	2/19/97	89.00%	255,554	227,443
Gainesville, FL	192	B	1	2/19/97	100.00%	220,689	220,689
Waco, TX	194	B	1	2/19/97	23.61%	200,740	47,395
Ocala, FL	245	B	1	2/19/97	100.00%	229,539	229,539
Albany, GA	261	B	1	2/19/97	100.00%	118,751	118,751
Florence, SC	264	B	1	2/19/97	53.60%	123,586	66,242
St. Joseph, MO	275	B	1	2/19/97	29.00%	98,084	28,444
Alabama 4 - Bibb	310	B	1	2/19/97	100.00%	140,259	140,259
Alabama 5 - Cleburne	311	B	2	2/19/97	100.00%	51,598	51,598
Alabama 6 - Washington	312	B	1	2/19/97	100.00%	121,283	121,283
Alabama 7 - Butler	313	B	1	2/19/97	100.00%	169,400	169,400
Alabama 8 - Lee	314	B	1	2/19/97	100.00%	76,554	76,554
Arkansas 1 - Madison	324	B	1	2/19/97	51.00%	35,882	18,300
Arkansas 1 - Madison	324	B	2	2/19/97	51.00%	39,771	20,283
Arkansas 2 - Marion	325	B	2	2/19/97	51.00%	7,508	3,829
Arkansas 4 - Clay	327	B	1	2/19/97	55.45%	200,169	110,994
Arkansas 5 - Cross	328	B	1	2/19/97	55.45%	118,707	65,823
Arkansas 6 - Cleburne	329	B	1	2/19/97	55.45%	101,780	56,437
Arkansas 7 - Pope	330	B	1	2/19/97	55.45%	114,094	63,265
Arkansas 8 - Franklin	331	B	1	2/19/97	51.00%	68,337	34,852
Arkansas 9 - Polk	332	B	1	2/19/97	100.00%	65,663	65,663

Arkansas 10 - Garland	333	B	1	2/19/97	55.45%	157,561	87,368
California 2 - Modoc	337	B	1	2/19/97	25.00%	58,937	14,734
Florida 4 - Citrus	363	B	3	2/19/97	100.00%	34,001	34,001
Florida 5 - Putnam	364	B	2	2/19/97	100.00%	70,046	70,046
Florida 6 - Dixie	365	B	1	2/19/97	100.00%	54,691	54,691
Florida 7 - Hamilton	366	B	1	2/19/97	100.00%	101,744	101,744
Florida 9 - Calhoun	368	B	1	2/19/97	51.00%	40,388	20,598
Georgia 8 - Warren	378	B	1	2/19/97	33.33%	156,741	52,247
Georgia 9 - Marion	379	B	2	2/19/97	50.00%	20,874	10,437
Georgia 9 - Marion	379	B	3	2/19/97	100.00%	22,672	22,672
Georgia 10 - Bleckley	380	B	2	2/19/97	50.00%	42,112	21,056
Georgia 11 - Toombs	381	B	1	2/19/97	100.00%	152,942	152,942
Georgia 12 - Liberty	382	B	1	2/19/97	41.67%	218,390	90,994
Georgia 13 - Early	383	B	1	2/19/97	100.00%	146,111	146,111
Georgia 14 - Worth	384	B	1	2/19/97	50.00%	247,291	123,646
Mississippi 3 - Bolivar	495	B	2	2/19/97	26.75%	30,788	8,235
Mississippi 4 - Yalobusha	496	B	2	2/19/97	26.75%	34,914	9,338
Mississippi 5 - Washington	497	B	2	2/19/97	26.75%	49,553	13,253
Mississippi 6 - Montgomery	498	B	1	2/19/97	26.75%	30,651	8,198
Mississippi 7 - Leake	499	B	1	2/19/97	26.75%	89,614	23,968
Mississippi 7 - Leake	499	B	2	2/19/97	26.75%	89,614	23,968
Mississippi 8 - Claiborne	500	B	2	2/19/97	26.75%	11,396	3,048
Mississippi 9 - Copiah	501	B	1	2/19/97	26.75%	80,205	21,452
Mississippi 10 - Smith	502	B	2	2/19/97	26.75%	50,139	13,410
Missouri 1 - Atchison	504	B	1	2/19/97	16.94%	42,617	7,219
Missouri 2 - Harrison	505	B	1	2/19/97	50.00%	34,132	17,066
Missouri 3 - Schuyler	506	B	1	2/19/97	100.00%	55,377	55,377
Missouri 4 - De Kalb	507	B	1	2/19/97	35.00%	69,073	24,176
Missouri 8 - Callaway	511	B	1	2/19/97	30.00%	102,474	30,742
Missouri 9 - Bates	512	B	2	2/19/97	100.00%	21,569	21,569
Missouri 10 - Benton	513	B	1	2/19/97	100.00%	95,397	95,397
Missouri 13 - Washington	516	B	1	2/19/97	2.00%	91,348	1,827
Missouri 14 - Barton	517	B	1	2/19/97	85.70%	101,839	87,276
Missouri 15 - Stone	518	B	1	2/19/97	71.00%	115,898	82,288
Missouri 16 - Laclede	519	B	1	2/19/97	100.00%	96,830	96,830
Missouri 18 - Perry	521	B	1	2/19/97	2.00%	118,937	2,379
Missouri 19 - Stoddard	522	B	1	2/19/97	2.00%	199,281	3,986
Nevada 2 - Lander	544	B	1	2/19/97	50.00%	51,005	25,503
Nevada 4 - Mineral	546	B	1	2/19/97	50.00%	30,242	15,121
North Carolina 4 - Henderson	568	B	2	2/19/97	50.00%	57,607	28,804
North Carolina 4 - Henderson	568	B	3	2/19/97	100.00%	89,982	89,982
North Carolina 5 - Anson	569	B	1	2/19/97	50.00%	92,847	46,424
North Carolina 15 - Cabarrus	579	B	1	2/19/97	33.00%	193,617	63,894
North Carolina 15 - Cabarrus	579	B	2	2/19/97	50.00%	225,423	112,712
Oklahoma 4 - Nowata	599	B	1	2/19/97	77.78%	90,489	70,382
South Carolina 3 - Cherokee	627	B	1	2/19/97	50.00%	134,070	67,035
South Carolina 7 - Calhoun	631	B	1	2/19/97	50.00%	152,787	76,394
South Carolina 9 - Lancaster	633	B	1	2/19/97	50.00%	201,482	100,741
Texas 8 - Gaines	659	B	1	2/19/97	14.29%	49,845	7,121
Texas 8 - Gaines	659	B	2	2/19/97	14.29%	48,879	6,983
Texas 9 - Runnels	660	B	1	2/19/97	15.38%	23,705	3,646
Texas 9 - Runnels	660	B	3	2/19/97	30.00%	37,380	11,214
Texas 9 - Runnels	660	B	4	2/19/97	15.38%	21,200	3,261
Texas 10 - Navarro	661	B	1	2/19/97	25.00%	40,493	10,123
Texas 10 - Navarro	661	B	2	2/19/97	25.00%	155,064	38,766
Texas 10 - Navarro	661	B	3	2/19/97	25.00%	29,715	7,429
Texas 10 - Navarro	661	B	4	2/19/97	25.00%	77,811	19,453
Texas 11 - Cherokee	662	B	1	2/19/97	18.00%	173,226	31,181
Texas 11 - Cherokee	662	B	2	2/19/97	18.00%	107,932	19,428
Texas 16 - Burleson	667	B	1	2/19/97	9.60%	322,312	30,942
Texas 17 - Newton	668	B	1	2/19/97	17.02%	246,993	42,041
Utah 6 - Piute	678	B	1	2/19/97	20.00%	27,914	5,583
Total						25,345,422	8,730,714

(1) On March 16,1998, ALLTEL and 360 Communications announced their intention to merge.

Ameritech Corp.

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Chicago, IL	3	B	1	12/31/96	95.00%	7,692,000	7,307,400

Detroit/Ann Arbor, MI	5	B	1	12/31/96	95.42%	4,635,000	4,422,856
St. Louis, MO-IL	11	A	1	12/31/96	85.00%	2,505,000	2,129,250
Milwaukee, WI	21	B	1	12/31/96	79.08%	1,489,000	1,177,427
Cincinnati, OH-KY-IN	23	B	1	12/31/96	52.79%	1,533,000	809,317
Columbus, OH	31	B	1	12/31/96	52.79%	1,333,000	703,731
Dayton, OH	40	B	1	12/31/96	52.79%	878,000	463,523
Gary-Hammond-East Chicago, IN	54	B	1	12/31/96	95.00%	631,000	599,450
Flint, MI	68	B	1	12/31/96	95.42%	502,000	479,023
Madison, WI	113	B	1	12/31/96	64.68%	400,000	258,724
Hamilton-Middletown, OH	145	B	1	12/31/96	52.79%	326,000	172,105
Springfield, IL	176	B	1	12/31/96	60.00%	199,000	119,400
Springfield, OH	180	B	1	12/31/96	52.79%	188,000	99,251
Racine, WI	189	B	1	12/31/96	79.08%	188,000	148,661
Champaign-Urbana-Rantoul, IL	196	B	1	12/31/96	60.00%	180,000	108,000
Janesville-Beloit, WI	216	B	1	12/31/96	64.68%	147,000	95,081
Decatur, IL	230	B	1	12/31/96	60.00%	117,000	70,200
Kenosha, WI	244	B	1	12/31/96	79.08%	141,000	111,496
Bloomington-Normal, IL	250	B	1	12/31/96	60.00%	141,000	84,600
Kankakee, IL	273	B	1	12/31/96	95.00%	101,000	95,950
Sheboygan, WI	277	B	1	12/31/96	79.08%	107,000	84,610
Columbia, MO	278	A	1	12/31/96	100.00%	124,000	124,000
Aurora-Elgin, IL	303	B	1	12/31/96	95.00%	45,000	42,750
Joliet, IL	304	B	1	12/31/96	95.00%	37,000	35,150
Hawaii 1 - Kauai	385	A	1	12/31/96	100.00%	59,000	59,000
Illinois 2 - Bureau	395	B	3	12/31/96	31.80%	253,000	80,454
Illinois 5 - Mason	398	B	2	12/31/96	60.00%	93,000	55,800
Illinois 6 - Montgomery	399	B	1	12/31/96	36.82%	197,000	72,528
Illinois 7 - Vermilion	400	B	1	12/31/96	36.82%	233,000	85,781
Indiana 1 - Newton	403	B	2	12/31/96	95.00%	213,000	202,350
Kentucky 7 - Trimble	449	B	2	12/31/96	52.79%	44,000	23,229
Missouri 7 - Saline	510	A	1	12/31/96	100.00%	161,000	161,000
Missouri 8 - Callaway	511	A	1	12/31/96	100.00%	102,000	102,000
Missouri 10 - Benton	513	A	1	12/31/96	100.00%	94,000	94,000
Missouri 11 - Moniteau	514	A	2	12/31/96	100.00%	n/a	n/a
Missouri 12 - Maries	515	A	1	12/31/96	100.00%	129,000	129,000
Missouri 18 - Perry	521	A	1	12/31/96	100.00%	119,000	119,000
Missouri 19 - Stoddard	522	A	1	12/31/96	100.00%	196,000	196,000
Ohio 4 - Mercer	588	B	1	12/31/96	52.79%	227,000	119,840
Ohio 7 - Tuscarawas	591	B	1	12/31/96	52.79%	82,000	43,290
Ohio 8 - Clinton	592	B	1	12/31/96	52.79%	174,000	91,860
Ohio 10 - Perry	594	B	1	12/31/96	52.79%	57,000	30,092
Wisconsin 9 - Columbia	716	B	1	12/31/96	71.88%	29,500	21,204
Wisconsin 9 - Columbia	716	B	2	12/31/96	71.88%	29,500	21,204
Total (1)						31,431,000	21,749,586

(1) Includes Ameritech's minority interests in 18 markets with 5.3 million combined POPs and 300,000 combined net POPs.

AT&T Corp.

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
New York, NY-NJ/Nassau-Suffolk, NY/Newark, Jersey City and Paterson-Clifton-Passaic, NJ	1	A	1	4/13/98	98.33%	15,127,968	14,875,331
Los Angeles-Long Beach/Anaheim-Santa Ana-Garden Grove/Riverside-San Bernardino-Ontario, CA	2	A	1	4/13/98	40.00%	15,144,272	6,057,709
San Francisco-Oakland, CA	7	A	1	4/13/98	50.00%	3,947,398	1,973,699
Dallas-Forth Worth, TX	9	A	1	4/13/98	83.01%	4,472,988	3,713,027
Houston, TX	10	A	1	4/13/98	56.30%	4,055,538	2,283,268
St. Louis, MO-IL	11	A	1	4/13/98	15.00%	(1)	(1)
Miami-Fort Lauderdale-Hollywood, FL	12	A	1	4/13/98	100.00%	3,628,484	3,628,484
Pittsburgh, PA	13	A	1	4/13/98	82.15%	2,086,082	1,713,716
Minneapolis-St. Paul, MN-WI	15	A	1	4/13/98	100.00%	2,661,422	2,661,422
Denver-Boulder, CO	19	A	1	4/13/98	100.00%	2,176,569	2,176,569
Seattle-Everett, WA	20	A	1	4/13/98	100.00%	2,861,282	2,861,282
Tampa-St. Petersburg, FL	22	A	1	4/13/98	100.00%	2,080,532	2,080,532
Kansas City, MO-KS	24	A	1	4/13/98	50.00%	1,539,305	769,653
Buffalo, NY	25	A	1	4/13/98	25.00%	(1)	(1)
San Jose, CA	27	A	1	4/13/98	50.00%	1,610,673	805,337
Portland, OR-WA	30	A	1	4/13/98	100.00%	1,652,397	1,652,397
San Antonio, TX	33	A	1	4/13/98	100.00%	1,483,755	1,483,755

Sacramento, CA	35	A	1	4/13/98	100.00%	1,494,384	1,494,384
Salt Lake City-Ogden, UT	39	A	1	4/13/98	100.00%	1,276,327	1,276,327
Oklahoma City, OK	45	A	1	4/13/98	100.00%	1,007,677	1,007,677
Jacksonville, FL	51	A	1	4/13/98	100.00%	1,029,590	1,029,590
Tulsa, OK	57	A	1	4/13/98	100.00%	798,851	798,851
Orlando, FL	60	A	1	4/13/98	100.00%	1,252,484	1,252,484
West Palm Beach-Boca Raton, FL	72	A	1	4/13/98	100.00%	1,011,309	1,011,309
Oxnard-Simi Valley-Ventura, CA	73	A	1	4/13/98	100.00%	730,935	730,935
Fresno, CA	74	A	1	4/13/98	100.00%	772,867	772,867
Austin, TX	75	A	1	4/13/98	100.00%	967,099	967,099
Tacoma, WA	82	A	1	4/13/98	100.00%	(2)	(2)
Las Vegas, NV	93	A	1	4/13/98	100.00%	1,064,941	1,064,941
Columbia, SC	95	A	1	4/13/98	2.63%	485,000	12,756
Shreveport, Louisiana	100	A	1	4/13/98	100.00%	379,247	379,247
Stockton, CA	107	A	1	4/13/98	100.00%	544,075	544,075
Spokane, WA	109	A	1	4/13/98	94.12%	416,774	392,268
Vallejo-Fairfield-Napa, CA	111	A	1	4/13/98	50.00%	502,304	251,152
Lakeland-Winter Haven, FL	114	A	1	4/13/98	100.00%	443,966	443,966
Colorado Springs, CO	117	A	1	4/13/98	100.00%	508,412	508,412
Santa Rosa-Petaluma, CA	123	A	1	4/13/98	50.18%	426,564	214,050
Santa Barbara-Santa Maria-Lompoc, CA	124	A	1	4/13/98	89.19%	390,160	347,984
Salinas-Seaside-Monterey, CA	126	A	1	4/13/98	52.36%	351,640	184,119
Eugene-Springfield, OR	135	A	1	4/13/98	100.00%	308,960	308,960
Melbourne-Titusville-Palm Bay, FL	137	A	1	4/13/98	93.69%	469,103	439,503
Modesto, CA	142	A	1	4/13/98	100.00%	429,438	429,438
Johnstown, PA	143	A	1	4/13/98	100.00%	238,214	238,214
Daytona Beach, FL	146	A	1	4/13/98	100.00%	419,894	419,894
Salem, OR	148	A	1	4/13/98	94.94%	323,642	307,266
Visalia-Tulare-Porterville, CA	150	A	1	4/13/98	95.00%	364,952	346,704
Provo-Orem, UT	159	A	1	4/13/98	93.47%	308,807	288,642
Killeen-Temple, TX	160	A	1	4/13/98	100.00%	308,640	308,640
Springfield, MO	163	A	1	4/13/98	100.00%	277,329	277,329
Sarasota, FL	167	A	1	4/13/98	92.03%	300,801	276,827
Galveston-Texas City, TX	170	A	1	4/13/98	50.59%	245,748	124,324
Reno, NV	171	A	1	4/13/98	91.75%	301,242	276,390
Santa Cruz, CA	175	A	1	4/13/98	22.37%	(1)	(1)
Wheeling, WV-OH	178	A	1	4/13/98	95.32%	156,633	149,303
Topeka, KS	179	A	1	4/13/98	10.49%	202,000	21,190
Muskegon, MI	181	A	1	4/13/98	7.91%	186,000	14,713
Anchorage, AK	187	A	1	4/13/98	89.44%	269,385	240,938
Boise City, ID	190	A	1	4/13/98	91.99%	267,646	246,208
Yakima, WA	191	A	1	4/13/98	93.58%	219,706	205,601
Waco, TX	194	A	1	4/13/98	100.00%	202,704	202,704
St. Cloud, MN	198	A	1	4/13/98	71.79%	217,255	155,967
Steubenville-Weirton, OH-WV	199	A	1	4/13/98	100.00%	138,605	138,605
Longview-Marshall, TX	206	A	1	4/13/98	100.00%	171,167	171,167
Fort Pierce, FL	208	A	1	4/13/98	100.00%	293,833	293,833
Fort Collins-Loveland, CO	210	A	1	4/13/98	91.74%	229,480	210,525
Bradenton, FL	211	A	1	4/13/98	93.52%	233,592	218,455
Bremerton, WA	212	A	1	4/13/98	97.53%	237,146	231,288
Pittsfield, MA	213	A	1	4/13/98	22.41%	136,000	30,478
Richland-Kennewick-Pasco, WA	214	A	1	4/13/98	100.00%	185,835	185,835
Chico	215	A	1	4/13/98	100.00%	198,881	198,881
Monroe, LA	219	A	1	4/13/98	100.00%	148,701	148,701
Anderson, SC	227	A	1	4/13/98	7.00%	(1)	(1)
Medford, OR	229	A	1	4/13/98	92.23%	172,554	159,147
Wichita Falls, TX	233	A	1	4/13/98	98.99%	135,516	134,147
Athens, GA	234	A	1	4/13/98	7.14%	174,000	12,424
Tyler, TX	237	A	1	4/13/98	97.00%	446,853	433,447
Joplin, MO	239	A	1	4/13/98	100.00%	146,143	146,143
Texarkana, TX - Texarkana, AR	240	A	1	4/13/98	89.71%	137,437	123,295
Olympia, WA	242	A	1	4/13/98	93.16%	203,177	189,280
Greeley, CO	243	A	1	4/13/98	90.62%	152,271	137,988
Ocala, FL	245	A	1	4/13/98	90.46%	235,121	212,690
Redding, CA	254	A	1	4/13/98	92.87%	167,120	155,204
Lawton, OK	260	A	1	4/13/98	100.00%	120,911	120,911
Bellingham, WA	270	A	1	4/13/98	92.78%	156,184	144,908
Yuba City, CA	274	A	1	4/13/98	96.01%	144,226	138,471
St. Joseph, MO	275	A	1	4/13/98	47.50%	98,093	46,594
Las Cruces, NM	285	A	1	4/13/98	15.92%	156,000	24,835
Bryan-College Station, TX	287	A	1	4/13/98	100.00%	135,791	135,791
Rochester, MN	288	A	1	4/13/98	86.32%	116,384	100,463

Sherman-Denison, TX	292	A	1	4/13/98	100.00%	98,783	98,783
Lawrence, KS	301	A	1	4/13/98	50.00%	92,266	46,133
Alaska 2 - Bethel	316	A	1	4/13/98	100.00%	160,805	160,805
California 3 - Alpine	338	A	1	4/13/98	100.00%	147,005	147,005
California 4 - Madera	339	A	1	4/13/98	24.98%	(1)	(1)
California 8 - Tehama	343	A	1	4/13/98	100.00%	99,782	99,782
California 12 - Kings	347	A	1	4/13/98	100.00%	117,010	117,010
Colorado 3 - Garfield	350	A	1	4/13/98	100.00%	287,867	287,867
Connecticut 1 - Litchfield	357	A	1	4/13/98	100.00%	181,002	181,002
Florida 2 - Glades	361	A	2	4/13/98	100.00%	129,572	129,572
Florida 4 - Citrus	363	A	1	4/13/98	85.00%	457,379	388,772
Florida 5 - Putnam	364	A	2	4/13/98	100.00%	43,911	43,911
Hawaii 2 - Maui	386	A	1	4/13/98	100.00%	120,233	120,233
Idaho 4 - Elmore	391	A	1	4/13/98	100.00%	146,783	146,783
Louisiana 1 - Claiborne	454	A	1	4/13/98	25.00%	(1)	(1)
Louisiana 2 - Morehouse	455	A	A	4/13/98	100.00%	24,122	24,122
Louisiana 3 - De Soto	456	A	2	4/13/98	100.00%	34,769	34,769
Minnesota 6 - Hubbard	487	A	2	4/13/98	100.00%	39,265	39,265
Missouri 14 - Barton	517	A	1	4/13/98	100.00%	103,186	103,186
Nevada 3 - Storey	545	A	1	4/13/98	100.00%	114,489	114,489
New Jersey 1 - Hunterdon	550	A	1	4/13/98	100.00%	119,793	119,793
Oklahoma 3 - Grant	598	A	1	4/13/98	100.00%	206,616	206,616
Oklahoma 5 - Roger Mills	600	A	1	4/13/98	100.00%	59,108	59,108
Oregon 2 - Hood River	607	A	1	4/13/98	89.72%	101,353	90,934
Texas 6 - Jack	657	A	1	4/13/98	100.00%	81,670	81,670
Texas 11 - Cherokee	662	A	1	4/13/98	97.00%	(3)	(3)
Texas 17 - Newton	668	A	1	4/13/98	100.00%	251,096	251,096
Utah 1 - Box Elder	673	A	1	4/13/98	100.00%	121,080	121,080
Washington 1 - Clallam	693	A	1	4/13/98	100.00%	274,984	274,984
Washington 5 - Kittitas	697	A	1	4/13/98	100.00%	124,561	124,561
Washington 6 - Pacific	698	A	1	4/13/98	100.00%	184,079	184,079
Washington 7 - Skamania	699	A	1	4/13/98	89.72%	(4)	(4)
Total						95,194,960	76,740,341

(1) POPs were not available for these individual markets and they are not included in the company totals.
(2) POPs are included with market 20.
(3) POPs are included with market 237.
(4) POPs are included with market 607.

Atlantic Cellular Corp. (1)

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Burlington, VT	248	A	1	2/17/98	100.00%	151,000	151,000
Massachusetts 1 - Franklin	470	A	1	2/17/98	100.00%	71,000	71,000
New Hampshire 1 - Coos	548	A	1	2/17/98	100.00%	225,000	225,000
New York 2 - Franklin	560	A	1	2/17/98	100.00%	236,000	236,000
Vermont 1 - Franklin	679	A	1	2/17/98	100.00%	212,000	212,000
Vermont 2 - Addison	680	A	1	2/17/98	100.00%	233,000	233,000
Total						1,128,000	1,128,000

(1) Atlantic Cellular has announced that it will be acquired by Rural Cellular Corp.

Bell Atlantic Corp.

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
New York, NY-NJ/Nassau-Suffolk, NY/Newark, Jersey City and Paterson-Clifton-Passaic, NJ	1	B	1	4/17/97	90.00%	15,072,000	13,564,800
Philadelphia, PA	4	B	1	4/17/97	100.00%	4,899,000	4,899,000
Boston-Lowell-Brockton-Lawrence-Haverhill, MA-NH	6	B	1	4/17/97	100.00%	4,021,000	4,021,000
Washington, DC-MD-VA	8	B	1	4/17/97	64.70%	3,829,000	2,477,363
Pittsburgh, PA	13	B	1	4/17/97	92.80%	2,109,000	1,957,152
Baltimore, MD	14	B	1	4/17/97	100.00%	2,431,000	2,431,000
Buffalo, NY	25	B	1	4/17/97	50.00%	1,200,000	600,000
Phoenix, AZ	26	A	1	4/17/97	100.00%	2,299,000	2,299,000
Hartford-New Britain-Bristol, CT	32	A	1	4/17/97	100.00%	1,121,000	1,121,000
Rochester, NY	34	B	1	4/17/97	42.50%	1,037,000	440,725
Providence-Warwick-Pawtucket, RI	38	B	1	4/17/97	100.00%	913,000	913,000
Bridgeport-Stamford-Norwalk-Danbury, CT	42	A	1	4/17/97	100.00%	830,000	830,000

Norfolk-Virginia Beach-Portsmouth, VA/NC	43	B	1	4/17/97	5.00%	1,037,000	51,850
Albany-Schenectady-Troy, NY	44	B	1	4/17/97	100.00%	850,000	850,000
New Haven-West Haven-Waterbury-Meriden, CT	49	A	1	4/17/97	100.00%	799,000	799,000
Syracuse, NY	53	B	1	4/17/97	27.50%	679,000	186,725
Worchester-Fitchburg-Leominster, MA	55	B	1	4/17/97	100.00%	713,000	713,000
Northeast Pennsylvania, PA	56	B	1	4/17/97	5.00%	658,000	32,900
Allentown-Bethlehem-Easton, PA-NJ	58	B	1	4/17/97	53.10%	711,000	377,541
Richmond, VA	59	B	1	4/17/97	5.00%	791,000	39,550
Charlotte-Gastonia, NC	61	A	1	4/17/97	100.00%	835,000	835,000
New Brunswick-Perth Amboy-Sayreville, NJ	62	B	1	4/17/97	90.00%	696,000	626,400
Springfield-Chicopee-Holyoke, MA	63	A	1	4/17/97	100.00%	601,000	601,000
Greenville-Spartanburg, SC	67	A	1	4/17/97	100.00%	671,000	671,000
Wilmington, DE-NJ-MD	69	B	1	4/17/97	100.00%	607,000	607,000
Long Branch-Asbury Park, NJ	70	B	1	4/17/97	90.00%	578,000	520,200
New Bedford-Fall River, MA	76	B	1	4/17/97	100.00%	510,000	510,000
Tuscon, AZ	77	A	1	4/17/97	100.00%	715,000	715,000
El Paso, TX	81	A	1	4/17/97	100.00%	659,000	659,000
Albuquerque, NM	86	A	1	4/17/97	100.00%	590,000	590,000
Columbia, SC	95	A	1	4/17/97	92.10%	485,000	446,685
Newport News-Hampton, VA	104	B	1	4/17/97	5.00%	468,000	23,400
Utica-Rome, NY	115	B	1	4/17/97	50.00%	320,000	160,000
Reading, PA	118	B	1	4/17/97	51.00%	349,000	177,990
Trenton, NJ	121	B	1	4/17/97	100.00%	330,000	330,000
Manchester-Nashua, NH	133	B	1	4/17/97	100.00%	346,000	346,000
Atlantic City, NJ	134	B	1	4/17/97	100.00%	333,000	333,000
Orange County, NY	144	B	1	4/17/97	70.00%	323,000	226,100
Poughkeepsie, NY	151	B	1	4/17/97	70.00%	266,000	186,200
New London-Norwich, CT	154	A	1	4/17/97	100.00%	243,000	243,000
Hickory, NC	166	A	1	4/17/97	100.00%	233,000	233,000
Pittsfield, MA	213	A	1	4/17/97	69.40%	136,000	94,384
Anderson, SC	227	A	1	4/17/97	80.00%	150,000	120,000
Vineland-Millville-Bridgeton, NJ	228	B	1	4/17/97	100.00%	139,000	139,000
Petersburg-Colonial Heights-Hopewell, VA	235	B	1	4/17/97	5.00%	131,000	6,550
Burlington, VT	248	B	1	4/17/97	100.00%	142,000	142,000
Glens Falls, NY	266	B	1	4/17/97	100.00%	123,000	123,000
Lewiston-Auburn, ME	279	B	1	4/17/97	33.00%	103,000	33,990
Las Cruces, NM	285	A	1	4/17/97	73.60%	156,000	114,816
Arizona 5 - Gila	322	A	1	4/17/97	100.00%	170,000	170,000
Connecticut 2 - Windham	358	A	1	4/17/97	100.00%	104,000	104,000
Delaware 1 - Kent	359	B	1	4/17/97	100.00%	244,000	244,000
Maryland 2 - Kent	468	B	1	4/17/97	100.00%	429,000	429,000
Maryland 3 - Frederick	469	B	1	4/17/97	100.00%	167,000	167,000
Massachusetts 2 - Barnstable	471	B	1	4/17/97	65.00%	211,000	137,150
New Hampshire 2 - Carroll	549	B	1	4/17/97	100.00%	208,000	208,000
New Jersey 1 - Hunterdon	550	B	1	4/17/97	100.00%	116,000	116,000
New Jersey 2 - Ocean	551	B	1	4/17/97	100.00%	444,000	444,000
New Jersey 3 - Sussex	552	B	1	4/17/97	100.00%	138,000	138,000
New York 1 - Jefferson	559	B	1	4/17/97	20.00%	260,000	52,000
New York 2 - Franklin	560	B	1	4/17/97	21.50%	233,000	50,095
New York 3 - Chautauqua	561	B	1	4/17/97	22.50%	448,000	100,800
New York 4 - Yates	562	B	1	4/17/97	27.00%	359,000	96,930
New York 6 - Columbia	564	B	1	4/17/97	33.30%	111,000	36,963
North Carolina 1 - Cherokee	565	A	1	4/17/97	100.00%	176,000	176,000
North Carolina 5 - Anson	569	A	1	4/17/97	100.00%	127,000	127,000
Pennsylvania 2 - McKean	613	B	1	4/17/97	100.00%	89,000	89,000
Pennsylvania 6 - Lawrence	617	B	2	4/17/97	51.10%	159,000	81,249
Pennsylvania 7 - Jefferson	618	B	1	4/17/97	100.00%	217,000	217,000
Pennsylvania 9 - Greene	620	B	1	4/17/97	100.00%	187,000	187,000
Pennsylvania 11 - Huntingdon	622	B	2	4/17/97	100.00%	91,000	91,000
Rhode Island 1 - Newport	624	B	1	4/17/97	100.00%	86,000	86,000
South Carolina 1 - Oconee	625	A	1	4/17/97	100.00%	60,000	60,000
South Carolina 2 - Laurens	626	A	1	4/17/97	100.00%	223,000	223,000
South Carolina 3 - Cherokee	627	A	1	4/17/97	100.00%	132,000	132,000
South Carolina 9 - Lancaster	633	A	1	4/17/97	100.00%	197,000	197,000
Vermont 1 - Franklin	679	B	1	4/17/97	83.30%	207,000	172,431
Vermont 2 - Addison	680	B	1	4/17/97	83.30%	124,000	103,292
Virginia 1 - Lee	681	A	1	4/17/97	100.00%	147,000	147,000
Virginia 2 - Tazewell	682	B	1	4/17/97	5.00%	136,000	6,800
Virginia 8 - Amelia	688	B	1	4/17/97	5.00%	83,000	4,150
Virginia 9 - Greensville	689	B	1	4/17/97	5.00%	88,000	4,400
Virginia 10 - Frederick	690	B	1	4/17/97	64.70%	51,000	32,997
Virginia 11 - Madison	691	B	1	4/17/97	5.00%	119,000	5,950

Virginia 11 - Madison	691	B	3	4/17/97	64.70%	70,000	45,290
Virginia 12 - Caroline	692	B	1	4/17/97	5.00%	101,000	5,050
Virginia 12 - Caroline	692	B	2	4/17/97	64.70%	70,000	45,290
West Virginia 1 - Mason	701	B	1	4/17/97	100.00%	74,000	74,000
West Virginia 2 - Wetzel	702	B	1	4/17/97	100.00%	79,000	79,000
Total						63,972,000	53,304,158

BellSouth Corp.

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Los Angeles-Long Beach/Anaheim-Santa Ana-Garden Grove/Riverside-San Bernardino-Ontario, CA	2	A	1	12/31/96	60.03%	14,766,508	8,864,335
Houston, TX	10	A	1	12/31/96	43.75%	3,919,171	1,714,637
Miami-Fort Lauderdale-Hollywood, FL	12	B	1	12/31/96	100.00%	3,451,832	3,451,832
Pittsburgh, PA	13	B	1	12/31/96	1.67%	2,093,893	34,968
Atlanta, GA	17	B	1	12/31/96	100.00%	3,111,400	3,111,400
Indianapolis, IN	28	A	1	12/31/96	100.00%	1,347,064	1,347,064
New Orleans, LA	29	B	1	12/31/96	100.00%	1,180,852	1,180,852
Memphis, TN-AR-MS	36	B	1	12/31/96	75.00%	1,040,653	780,490
Louisville, KY-IN	37	B	1	12/31/96	100.00%	933,817	933,817
Birmingham, AL	41	B	1	12/31/96	100.00%	908,231	908,231
Nashville-Davidson, TN	46	B	1	11/3/97	100.00%	1,090,914	1,090,914
Honolulu, HI	50	A	1	12/31/96	100.00%	879,935	879,935
Jacksonville, FL	51	B	1	12/31/96	85.76%	1,013,136	868,865
Gary-Hammond-East Chicago, IN	54	A	1	12/31/96	33.33%	624,435	208,124
Richmond, VA	59	A	1	12/31/96	72.73%	800,217	581,998
Orlando, FL	60	B	1	12/31/96	85.00%	1,213,893	1,031,809
West Palm Beach-Boca Raton, FL	72	B	1	12/31/96	100.00%	973,453	973,453
Baton Rouge, LA	80	B	1	11/3/97	100.00%	565,377	565,377
Mobile, AL	83	A	1	12/31/96	98.68%	520,267	513,399
Chattanooga, TN-GA	88	B	1	12/31/96	69.73%	452,330	315,410
Columbia, SC	95	B	1	12/31/96	46.42%	490,535	227,706
Bakersfield, CA	97	A	1	12/31/96	100.00%	616,649	616,649
Shreveport, Louisiana	100	B	1	12/31/96	9.00%	379,525	34,157
Jackson, MS	106	B	1	12/31/96	73.26%	416,072	304,814
Lexington-Fayette, KY	116	B	1	12/31/96	100.00%	373,639	373,639
Evansville, IN/KY	119	A	1	11/3/97	100.00%	320,894	320,894
Huntsville, AL	120	B	1	11/3/97	62.25%	399,661	248,789
Melbourne-Titusville-Palm Bay, FL	137	B	1	12/31/96	85.00%	454,028	385,924
Macon-Warner Robins, GA	138	B	1	12/31/96	100.00%	311,666	311,666
Daytona Beach, FL	146	B	1	12/31/96	85.00%	409,706	348,250
Galveston-Texas City, TX	170	A	1	12/31/96	36.17%	238,669	86,327
Biloxi-Gulfport, MS	173	B	1	11/3/97	49.00%	229,730	112,568
Lafayette, LA	174	B	1	12/31/96	51.00%	225,660	115,087
Terre Haute, IN	185	A	1	12/31/96	92.85%	169,996	157,841
Racine, WI	189	A	1	12/31/97	89.64%	186,000	166,730
Clarksville-Hopkinsville, TN/KY	209	B	1	11/3/97	100.00%	191,450	191,450
Anderson, IN	217	A	1	12/31/96	100.00%	133,357	133,357
Monroe, LA	219	B	1	12/31/96	9.00%	147,395	13,266
Tuscaloosa, AL	222	B	1	12/31/96	100.00%	158,936	158,936
Florence, AL	226	B	1	Jan	(1)	(1)	(1)
Athens, GA	234	B	1	12/31/96	100.00%	168,719	168,719
Muncie, IN	236	A	1	12/31/96	93.10%	119,906	111,632
Lafayette, IN	246	A	1	12/31/96	100.00%	136,256	136,256
Anniston, AL	249	B	1	12/31/96	100.00%	117,434	117,434
Pascagoula, MS	252	B	1	11/3/97	49.00%	126,963	62,212
Florence, SC	264	B	1	12/31/96	46.42%	122,979	57,087
Kokomo, IN	271	A	1	12/31/96	9.04%	99,933	9,034
Gadsden, AL	272	B	1	12/31/96	100.00%	100,691	100,691
Bloomington, IN	282	A	1	12/31/96	94.18%	115,207	108,502
Owensboro, KY	293	A	1	11/3/97	100.00%	90,844	90,844
Alabama 1 - Franklin	307	B	1	12/31/96	100.00%	55,130	55,130
Alabama 1 - Franklin	307	B	2	12/31/96	80.00%	53,152	42,522
Alabama 1 - Franklin	307	B	4	Jan	(1)	(1)	(1)
Alabama 2 - Jackson	308	B	1	12/31/96	100.00%	25,249	25,249
Alabama 3 - Lamar	309	B	1	12/31/96	100.00%	97,841	97,841
Alabama 5 - Cleburne	311	B	1	12/31/96	100.00%	123,370	123,370
Alabama 6 - Washington	312	A	1	12/31/96	100.00%	120,839	120,839
Florida 1 - Collier	360	B	2	12/31/96	100.00%	30,503	30,503
Florida 2 - Glades	361	B	2	12/31/96	71.50%	128,685	92,010
Florida 2 - Glades	361	B	3	12/31/96	100.00%	8,152	8,152

Florida 4 - Citrus	363	B	2	12/31/96	85.00%	177,430	150,816
Florida 5 - Putnam	364	B	1	12/31/96	85.00%	33,734	28,674
Florida 11 - Monroe	370	B	1	12/31/96	100.00%	83,152	83,152
Georgia 1 - Whitfield	371	B	1	11/3/97	66.28%	211,600	140,248
Georgia 2 - Dawson	372	B	1	11/3/97	70.92%	148,871	105,579
Georgia 2 - Dawson	372	B	2	12/31/96	35.00%	100,370	35,130
Georgia 2 - Dawson	372	B	3	12/31/96	100.00%	33,337	33,337
Georgia 3 - Chattooga	373	B	1	12/31/96	75.00%	204,631	153,473
Georgia 4 - Jasper	374	B	1	12/31/96	100.00%	60,717	60,717
Georgia 4 - Jasper	374	B	2	12/31/96	35.00%	41,161	14,406
Georgia 5 - Haralson	375	B	1	12/31/96	100.00%	106,045	106,045
Georgia 6 - Spalding	376	B	4	12/31/96	100.00%	13,910	13,910
Georgia 6 - Spalding	376	B	5	12/31/96	100.00%	77,383	77,383
Georgia 7 - Hancock	377	B	1	12/31/96	100.00%	51,030	51,030
Indiana 5 - Warren	407	A	1	12/31/97	100.00%	121,577	121,577
Indiana 7 - Owen	409	A	1	11/3/97	100.00%	222,367	222,367
Indiana 9 - Decatur	411	A	1	12/31/97	100.00%	145,042	145,042
Kentucky 1 - Fulton	443	A	1	11/3/97	100.00%	187,931	187,931
Kentucky 2 - Union	444	A	1	11/3/97	100.00%	127,471	127,471
Kentucky 3 - Meade	445	A	1	11/3/97	100.00%	311,448	311,448
Kentucky 6 - Madison	448	B	2	12/31/96	100.00%	139,956	139,956
Kentucky 7 - Trimble	449	B	1	12/31/96	100.00%	57,693	57,693
Kentucky 8 - Mason	450	B	1	12/31/96	100.00%	118,733	118,733
Kentucky 9 - Elliott	451	A	1	11/3/97	100.00%	203,596	203,596
Kentucky 10 - Powell	452	A	1	11/3/97	100.00%	153,020	153,020
Kentucky 11 - Clay	453	A	1	11/3/97	100.00%	170,660	170,660
Louisiana 1 - Claiborne	454	B	1	12/31/96	9.00%	114,680	10,321
Louisiana 2 - Morehouse	455	B	1	12/31/96	9.00%	116,255	10,463
Louisiana 3 - De Soto	456	B	2	12/31/96	9.00%	90,417	8,138
Louisiana 5 - Beauregard	458	B	2	12/31/96	35.00%	273,836	95,843
Louisiana 6 - Iberville	459	B	1	12/31/96	35.00%	151,018	52,856
Louisiana 6 - Iberville	459	B	2	12/31/96	51.00%	31,441	16,035
Louisiana 7 - West Feliciana	460	B	1	12/31/96	66.70%	179,528	119,745
Mississippi 1 - Tunica	493	B	1	12/31/96	75.00%	62,176	46,632
Mississippi 2 - Benton	494	B	1	12/31/96	100.00%	242,751	242,751
Mississippi 3 - Bolivar	495	B	2	12/31/96	73.26%	30,704	22,494
Mississippi 4 - Yalobusha	496	B	1	12/31/96	100.00%	71,079	71,079
Mississippi 4 - Yalobusha	496	B	2	12/31/96	73.26%	34,314	25,138
Mississippi 5 - Washington	497	B	2	12/31/96	73.26%	47,590	34,864
Mississippi 6 - Montgomery	498	B	1	12/31/96	73.26%	31,342	22,961
Mississippi 7 - Leake	499	B	1	12/31/96	73.26%	178,303	130,625
Mississippi 8 - Claiborne	500	B	2	12/31/96	73.26%	11,467	8,401
Mississippi 9 - Copiah	501	B	1	12/31/96	73.26%	79,574	58,296
Mississippi 10 - Smith	502	B	2	12/31/96	73.26%	50,097	36,701
Tennessee 1 - Lake	643	B	1	11/3/97	75.00%	63,914	47,936
Tennessee 1 - Lake	643	B	4	11/3/97	100.00%	78,701	78,701
Tennessee 5 - Fayette	647	B	1	11/3/97	75.00%	163,408	122,556
Tennessee 5 - Fayette	647	B	2	12/31/96	100.00%	86,499	86,499
Tennessee 5 - Fayette	647	B	3	11/3/97	100.00%	89,386	89,386
Tennessee 6 - Giles	648	B	1	11/3/97	100.00%	n/a	n/a
Tennessee 7 - Bledsoe	649	B	1	12/31/96	100.00%	97,137	97,137
Tennessee 7 - Bledsoe	649	B	2	12/31/96	100.00%	10,447	10,447
Tennessee 9 - Maury	651	B	1	11/3/97	100.00%	66,205	66,205
Total						54,201,677	39,712,335

(1) BellSouth acquired these two licenses in January 1997 and is yet to report these figures.

Centennial Cellular Corp.

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
San Francisco-Oakland, CA	7	B	1	7/31/97	2.87%	3,686,600	105,805
San Jose, CA	27	B	1	7/31/97	2.87%	1,497,000	42,964
Sacramento, CA	35	B	1	7/31/97	23.47%	1,355,000	318,019
Fort Wayne, IN	96	A	1	7/31/97	100.00%	420,900	420,900
Beaumont-Port Arthur, TX	101	A	1	7/31/97	100.00%	361,200	361,200
Stockton, CA	107	B	1	7/31/97	23.47%	480,600	112,797
Vallejo-Fairfield-Napa, CA	111	B	1	7/31/97	2.87%	451,200	12,949
Santa Rosa-Petaluma, CA	123	B	1	7/31/97	2.87%	388,200	11,141
Salinas-Seaside-Monterey, CA	126	B	1	7/31/97	2.87%	355,700	10,209
South Bend-Mishawaka, IN	129	A	1	7/31/97	100.00%	289,200	289,200
Kalamazoo, MI	132	A	1	7/31/97	100.00%	293,500	293,500

Modesto, CA	142	B	1	7/31/97	23.47%	370,600	86,980
Reno, NV	171	B	1	7/31/97	23.47%	254,700	59,778
Lafayette, LA	174	A	1	7/31/97	94.30%	209,000	197,087
Santa Cruz, CA	175	B	1	7/31/97	2.87%	229,700	6,592
Battle Creek, MI	177	A	1	7/31/97	100.00%	186,000	186,000
Benton Harbor, MI	193	A	1	7/31/97	100.00%	161,400	161,400
Lake Charles, LA	197	A	1	7/31/97	25.10%	168,100	42,193
Alexandria, LA	205	A	1	7/31/97	92.80%	149,000	138,272
Jackson, MI	207	A	1	7/31/97	92.00%	149,800	137,816
Chico	215	B	1	7/31/97	23.47%	182,100	42,739
Elkhart-Goshen, IN	223	A	1	7/31/97	91.40%	156,200	142,767
Redding, CA	254	B	1	7/31/97	23.47%	147,000	34,501
Yuba City, CA	274	B	1	7/31/97	23.47%	122,600	28,774
Arizona 2 - Coconino	319	A	1	7/31/97	21.30%	204,300	43,516
Arizona 4 - Yuma	321	A	1	7/31/97	100.00%	120,700	120,700
California 1 - Del Norte	336	B	1	7/31/97	6.88%	199,200	13,705
California 2 - Modoc	337	B	1	7/31/97	25.00%	57,000	14,250
California 7 - Imperial	342	A	1	7/31/97	100.00%	109,300	109,300
California 8 - Tehama	343	B	1	7/31/97	23.47%	90,700	21,287
California 10 - Sierra	345	B	1	7/31/97	23.47%	81,800	19,198
Indiana 1 - Newton	403	A	1	7/31/97	100.00%	204,200	204,200
Indiana 2 - Kosciusko	404	A	1	7/31/97	100.00%	160,000	160,000
Indiana 3 - Huntington	405	A	1	7/31/97	100.00%	145,200	145,200
Indiana 4 - Miami	406	A	1	7/31/97	100.00%	179,000	179,000
Indiana 6 - Randolph	408	A	1	7/31/97	100.00%	217,900	217,900
Louisiana 2 - Morehouse	455	A	1	7/31/97	100.00%	92,200	92,200
Louisiana 3 - De Soto	456	A	1	7/31/97	100.00%	121,300	121,300
Louisiana 4 - Caldwell	457	A	1	7/31/97	100.00%	71,600	71,600
Louisiana 5 - Beauregard	458	A	1	7/31/97	100.00%	372,500	372,500
Louisiana 6 - Iberville	459	A	1	7/31/97	100.00%	131,000	131,000
Louisiana 7 - West Feliciana	460	A	1	7/31/97	100.00%	170,900	170,900
Michigan 6 - Roscommon	477	A	1	7/31/97	100.00%	130,400	130,400
Michigan 7 - Newaygo	478	A	1	7/31/97	100.00%	220,200	220,200
Michigan 9 - Cass	480	A	1	7/31/97	85.70%	288,000	246,816
Mississippi 8 - Claiborne	500	A	1	7/31/97	100.00%	153,900	153,900
Mississippi 9 - Copiah	501	A	1	7/31/97	100.00%	118,000	118,000
Nevada 3 - Storey	545	B	1	7/31/97	23.47%	90,600	21,264
Ohio 1 - Williams	585	A	1	7/31/97	100.00%	125,900	125,900
Pennsylvania 6 - Lawrence	617	B	1	7/31/97	14.29%	363,400	51,930
Total						16,284,500	6,519,749

Century Telephone Enterprises Inc.

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Detroit/Ann Arbor, MI	5	B	1	12/31/97	3.20%	4,618,871	147,804
Dallas-Forth Worth, TX	9	B	1	12/31/97	0.50%	4,548,203	22,741
Milwaukee, WI	21	B	1	12/31/97	17.96%	1,979,672	355,549
Grand Rapids, MI	64	B	1	12/31/97	97.00%	758,622	735,863
Flint, MI	68	B	1	12/31/97	3.20%	509,418	16,301
Austin, TX	75	B	1	12/31/97	35.00%	987,525	345,634
Lansing-East Lansing, MI	78	B	1	12/31/97	97.00%	509,507	494,222
Little Rock-North Little Rock, AR	92	B	1	12/31/97	36.00%	552,830	199,019
Saginaw-Bay City-Midland, MI	94	B	1	12/31/97	91.70%	403,413	369,930
Shreveport, Louisiana	100	B	1	12/31/97	87.00%	380,333	330,890
Jackson, MS	106	A	1	12/31/97	88.31%	424,152	374,569
Madison, WI	113	B	1	12/31/97	9.78%	700,610	68,520
Appleton-Oskosh-Neenah, WI	125	B	1	12/31/97	98.85%	498,367	492,636
McAllen-Edinburg-Mission, TX	128	A	1	12/31/97	69.50%	508,926	353,704
Kalamazoo, MI	132	B	1	12/31/97	97.00%	305,743	296,571
Brownsville-Harlingen, TX	162	A	1	12/31/97	78.74%	321,534	253,176
Biloxi-Gulfport, MS	173	A	1	12/31/97	96.45%	230,242	222,068
Lafayette, LA	174	B	1	12/31/97	49.00%	261,276	128,025
Battle Creek, MI	177	B	1	12/31/97	97.00%	193,965	188,146
Muskegon, MI	181	B	1	12/31/97	97.00%	190,153	184,448
Green Bay, WI	186	B	1	12/31/97	20.11%	215,185	43,274
Benton Harbor, MI	193	B	1	12/31/97	97.00%	161,421	156,578
Alexandria, LA	205	B	1	12/31/97	100.00%	144,523	144,523
Jackson, MI	207	B	1	12/31/97	97.00%	155,167	150,512
Monroe, LA	219	B	1	12/31/97	87.00%	147,753	128,545
Eau Claire, WI	232	B	1	12/31/97	55.50%	143,834	79,828
Texarkana, TX - Texarkana, AR	240	B	1	12/31/97	89.00%	137,665	122,522

Pascagoula, MS	252	A	1	12/31/97	89.05%	129,421	115,249
Wausau, WI	263	B	1	12/31/97	1.00%	122,436	1,224
Rochester, MN	288	B	1	12/31/97	2.93%	113,681	3,331
La Crosse, WI	290	B	1	12/31/97	95.00%	102,819	97,678
Pine Bluff, AK	291	B	1	12/31/97	100.00%	82,616	82,616
Sherman-Denison, TX	292	B	1	12/31/97	0.50%	101,516	508
Alaska 1 - Wade Hampton	315	A	1	12/31/97	100.00%	128,044	128,044
Alaska 3 - Haines	317	B	1	12/31/97	100.00%	74,427	74,427
Arizona 2 - Coconino	319	B	1	12/31/97	21.30%	257,751	54,901
Arkansas 2 - Marion	325	B	1	12/31/97	82.00%	86,426	70,869
Arkansas 3 - Sharp	326	B	1	12/31/97	82.00%	103,692	85,027
Arkansas 11 - Hempstead	334	B	1	12/31/97	89.00%	66,783	59,437
Arkansas 12 - Ouachita	335	B	1	12/31/97	80.00%	187,065	149,652
Louisiana 1 - Claiborne	454	B	1	12/31/97	87.00%	113,313	98,582
Louisiana 2 - Morehouse	455	B	1	12/31/97	87.00%	116,256	101,143
Louisiana 3 - De Soto	456	B	2	12/31/97	87.00%	95,283	82,896
Louisiana 4 - Caldwell	457	B	1	12/31/97	100.00%	72,909	72,909
Michigan 1 - Gogebic	472	B	1	12/31/97	100.00%	198,058	198,058
Michigan 2 - Alger	473	B	1	12/31/97	100.00%	112,864	112,864
Michigan 3 - Emmet	474	B	1	12/31/97	42.84%	161,448	69,164
Michigan 4 - Cheboygan	475	B	1	12/31/97	100.00%	133,783	133,783
Michigan 5 - Manistee	476	B	1	12/31/97	42.84%	159,061	68,142
Michigan 6 - Roscommon	477	B	1	12/31/97	98.00%	139,515	136,725
Michigan 7 - Newaygo	478	B	1	12/31/97	56.07%	240,993	135,125
Michigan 8 - Allegan	479	B	1	12/31/97	97.00%	100,094	97,091
Michigan 9 - Cass	480	B	1	12/31/97	43.38%	298,548	129,510
Michigan 10 - Tuscola	481	B	1	12/31/97	26.00%	136,216	35,416
Minnesota 7 - Chippewa	488	B	1	12/31/97	2.93%	171,922	5,037
Minnesota 8 - Lac qui Parle	489	B	1	12/31/97	2.93%	67,915	1,990
Minnesota 9 - Pipestone	490	B	1	12/31/97	2.93%	134,921	3,953
Minnesota 10 - Le Sueur	491	B	1	12/31/97	2.93%	230,358	6,749
Minnesota 11 - Goodhue	492	B	1	12/31/97	2.93%	206,149	6,040
Mississippi 2 - Benton	494	A	1	12/31/97	100.00%	247,820	247,820
Mississippi 6 - Montgomery	498	A	1	12/31/97	100.00%	183,383	183,383
Mississippi 7 - Leake	499	A	1	12/31/97	100.00%	181,267	181,267
New Mexico 4 - Santa Fe	556	B	2	12/31/97	35.71%	139,598	49,850
Oregon 2 - Hood River	607	B	1	12/31/97	22.00%	74,465	16,382
Oregon 3 - Umatilla	608	B	1	12/31/97	15.97%	151,017	24,117
Oregon 6 - Crook	611	B	1	12/31/97	37.50%	195,630	73,361
Texas 7 - Fanni	658	B	6	12/31/97	89.00%	57,934	51,561
Texas 16 - Burleson	667	B	1	12/31/97	9.60%	330,320	31,711
Washington 5 - Kittitas	697	B	1	12/31/97	8.47%	59,476	5,038
Washington 8 - Whitman	700	B	1	12/31/97	7.36%	136,337	10,034
Wisconsin 1 - Burnett	708	B	1	12/31/97	42.21%	111,767	47,177
Wisconsin 2 - Bayfield	709	B	1	12/31/97	99.00%	85,963	85,103
Wisconsin 3 - Vilas	710	B	1	12/31/97	42.86%	141,685	60,726
Wisconsin 4 - Marinette	711	B	1	12/31/97	30.03%	119,513	35,890
Wisconsin 6 - Trempealeau	713	B	1	12/31/97	57.14%	116,043	66,307
Wisconsin 7 - Wood	714	B	1	12/31/97	22.70%	290,190	65,873
Wisconsin 8 - Vernon	715	B	1	12/31/97	82.00%	236,128	193,625
Wisconsin 10 - Door	717	B	1	12/31/97	22.50%	129,653	29,172
Total						27,518,908	10,282,137

CFW Communications Inc.

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Virginia 5 - Bath	685	B	1	12/31/97	22.00%	(1)	(1)
Virginia 6 - Highland	686	B	1	12/31/97	84.00%	200,000	168,000
Total						200,000	168,000

(1) CFW did not report POPs for this license.

Cincinnati Bell Inc.

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Cincinnati, OH-KY-IN	23	B	1	12/31/97	45.00%	(1)	(1)
Columbus, OH	31	B	1	12/31/97	45.00%	(1)	(1)
Dayton, OH	40	B	1	12/31/97	45.00%	(1)	(1)
Hamilton-Middletown, OH	145	B	1	12/31/97	45.00%	(1)	(1)

Springfield, OH	180	B	1	12/31/97	45.00%	(1)	(1)
Kentucky 7 - Trimble	449	B	2	12/31/97	45.00%	(1)	(1)
Ohio 4 - Mercer	588	B	1	12/31/97	45.00%	(1)	(1)
Ohio 7 - Tuscarawas	591	B	1	12/31/97	45.00%	(1)	(1)
Ohio 8 - Clinton	592	B	1	12/31/97	45.00%	(1)	(1)
Ohio 10 - Perry	594	B	1	12/31/97	45.00%	(1)	(1)
Total							2,300,000

(1) Only reports net POPs for the entire partnership.

Comcast Corp.

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Philadelphia, PA	4	A	1	12/31/97	100.00%	4,898,500	4,898,500
New Brunswick-Perth Amboy-Sayreville, NJ	62	A	1	12/31/97	100.00%	709,700	709,700
Wilmington, DE-NJ-MD	69	A	1	12/31/97	100.00%	622,200	622,200
Long Branch-Asbury Park, NJ	70	A	1	12/31/97	100.00%	600,300	600,300
Trenton, NJ	121	A	1	12/31/97	85.70%	331,300	283,924
Atlantic City, NJ	134	A	1	12/31/97	97.40%	336,600	327,848
Vineland-Millville-Bridgeton, NJ	228	A	1	12/31/97	94.60%	134,100	126,859
Aurora-Elgin, IL	303	A	1	12/31/97	81.70%	49,100	40,115
Joliet, IL	304	A	1	12/31/97	84.00%	36,000	30,240
Delaware 1 - Kent	359	A	1	12/31/97	50.00%	261,400	130,700
New Jersey 2 - Ocean	551	A	1	12/31/97	100.00%	484,900	484,900
Total						8,464,100	8,255,286

CommNet Cellular Inc.

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Duluth, MN-WI	141	B	1	2/10/98	16.34%	240,234	39,254
Terre Haute, IN	185	B	1	2/10/98	16.67%	170,755	28,465
Pueblo, CO	241	B	1	2/10/98	73.99%	130,921	96,868
Sioux City, IA-NE	253	B	1	2/10/98	74.50%	120,902	90,072
Sioux Falls, SD	267	B	1	2/10/98	51.00%	137,742	70,248
Billings, MT	268	B	1	2/10/98	91.63%	126,711	116,105
Lewiston-Auburn, ME	279	B	1	2/10/98	11.11%	103,721	11,523
Rapid City, SD	289	B	1	2/10/98	100.00%	111,904	111,904
Great Falls, MT	297	B	1	2/10/98	91.63%	81,568	74,741
Bismarck, ND	298	B	1	2/10/98	51.00%	90,439	46,124
Colorado 1 - Moffat	348	A	1	2/10/98	10.00%	47,002	4,700
Colorado 2 - Logan	349	B	1	2/10/98	61.75%	62,939	38,865
Colorado 4 - Park	351	B	1	2/10/98	61.75%	74,044	45,722
Colorado 5 - Elbert	352	B	1	2/10/98	66.00%	30,019	19,813
Colorado 6 - San Miguel	353	B	1	2/10/98	100.00%	72,920	72,920
Colorado 7 - Saguache	354	B	1	2/10/98	69.40%	47,604	33,037
Colorado 8 - Kiowa	355	B	1	2/10/98	49.00%	45,762	22,423
Colorado 9 - Costilla	356	B	1	2/10/98	49.00%	25,426	12,459
Idaho 2 - Idaho	389	B	1	2/10/98	50.00%	71,284	35,642
Idaho 3 - Lemhi	390	B	1	2/10/98	33.33%	17,602	5,867
Idaho 5 - Butte	392	B	1	2/10/98	100.00%	141,031	141,031
Idaho 6 - Clark	393	B	1	2/10/98	91.64%	293,120	268,615
Iowa 4 - Muscatine	415	B	1	2/10/98	10.11%	155,178	15,688
Iowa 5 - Jackson	416	B	1	2/10/98	78.54%	109,023	85,627
Iowa 6 - Iowa	417	B	1	2/10/98	100.00%	109,023	109,023
Iowa 8 - Monona	419	B	1	2/10/98	44.92%	54,745	24,591
Iowa 9 - Ida	420	A	1	2/10/98	100.00%	63,302	63,302
Iowa 13 - Mitchell	424	B	1	2/10/98	50.00%	66,929	33,465
Iowa 14 - Kossuth	425	B	1	2/10/98	13.28%	107,809	14,317
Iowa 15 - Dickinson	426	B	1	2/10/98	49.14%	83,580	41,071
Iowa 16 - Lyon	427	B	1	2/10/98	49.17%	103,912	51,094
Kansas 1 - Cheyenne	428	B	1	2/10/98	3.07%	27,741	852
Kansas 2 - Norton	429	B	1	2/10/98	3.07%	30,523	937
Kansas 3 - Jewell	430	B	1	2/10/98	3.07%	53,026	1,628
Kansas 4 - Marshall	431	B	1	2/10/98	3.07%	137,928	4,234
Kansas 5 - Brown	432	B	1	2/10/98	3.07%	31,040	953
Kansas 6 - Wallace	433	B	1	2/10/98	3.07%	20,123	618
Kansas 7 - Trego	434	B	1	2/10/98	3.07%	80,524	2,472
Kansas 8 - Ellsworth	435	B	1	2/10/98	3.07%	131,254	4,029
Kansas 9 - Morris	436	B	1	2/10/98	3.07%	58,858	1,807

Kansas 10 - Franklin	437	B	1	2/10/98	3.07%	109,008	3,347
Kansas 11 - Hamilton	438	B	1	2/10/98	3.07%	84,143	2,583
Kansas 12 - Hodgeman	439	B	1	2/10/98	3.07%	43,831	1,346
Kansas 13 - Edwards	440	B	1	2/10/98	3.07%	29,677	911
Kansas 14 - Reno	441	B	1	2/10/98	3.07%	175,260	5,380
Kansas 15 - Elk	442	A	1	2/10/98	3.07%	155,007	4,759
Missouri 9 - Bates	512	B	1	2/10/98	14.70%	56,464	8,300
Montana 1 - Lincoln	523	B	1	2/10/98	91.63%	72,719	66,632
Montana 1 - Lincoln	523	B	2	2/10/98	91.63%	78,894	72,291
Montana 2 - Toole	524	B	1	2/10/98	91.63%	34,780	31,869
Montana 4 - Daniels	526	B	1	2/10/98	91.63%	21,753	19,932
Montana 5 - Mineral	527	B	1	2/10/98	91.63%	189,151	173,319
Montana 6 - Deer Lodge	528	B	1	2/10/98	91.63%	65,206	59,748
Montana 7 - Fergus	529	B	1	2/10/98	91.63%	30,030	27,516
Montana 8 - Beaverhead	530	B	1	2/10/98	91.63%	92,780	85,014
Montana 9 - Carbon	531	B	1	2/10/98	91.63%	33,426	30,628
Montana 10 - Prairie	532	B	1	2/10/98	91.63%	20,078	18,397
New Mexico 1 - San Juan	553	B	2	2/10/98	58.36%	113,473	66,223
New Mexico 3 - Catron	555	B	1	2/10/98	12.25%	89,939	11,018
New Mexico 5 - Grant	557	B	1	2/10/98	16.33%	59,835	9,771
North Dakota 1 - Divide	580	B	1	2/10/98	53.36%	103,812	55,394
North Dakota 2 - Bottineau	581	B	1	2/10/98	49.00%	60,895	29,839
North Dakota 3 - Barnes	582	B	1	2/10/98	41.45%	90,709	37,599
North Dakota 4 - McKenzie	583	B	1	2/10/98	49.00%	63,305	31,019
North Dakota 5 - Kidder	584	B	1	2/10/98	61.75%	48,606	30,014
South Dakota 1 - Harding	634	B	1	2/10/98	100.00%	37,096	37,096
South Dakota 2 - Corson	635	B	1	2/10/98	100.00%	23,000	23,000
South Dakota 3 - McPherson	636	B	1	2/10/98	100.00%	53,557	53,557
South Dakota 5 - Custer	638	B	1	2/10/98	100.00%	17,069	17,069
South Dakota 5 - Custer	638	B	2	2/10/98	100.00%	9,102	9,102
South Dakota 6 - Haakon	639	B	1	2/10/98	100.00%	36,886	36,886
South Dakota 6 - Haakon	639	B	2	2/10/98	100.00%	3,233	3,233
South Dakota 7 - Sully	640	B	1	2/10/98	64.49%	67,096	43,270
South Dakota 8 - Kingsbury	641	B	1	2/10/98	61.13%	73,887	45,167
South Dakota 9 - Hanson	642	B	1	2/10/98	49.00%	96,725	47,395
Utah 3 - Juab	675	B	1	2/10/98	100.00%	56,209	56,209
Utah 4 - Beaver	676	B	1	2/10/98	100.00%	107,882	107,882
Utah 5 - Carbon	677	B	3	2/10/98	100.00%	39,506	39,506
Utah 6 - Piute	678	B	1	2/10/98	80.00%	28,326	22,661
Wyoming 1 - Park	718	B	1	2/10/98	66.00%	50,273	33,180
Wyoming 2 - Sheridan	719	B	1	2/10/98	100.00%	76,440	76,440
Wyoming 3 - Lincoln	720	A	1	2/10/98	100.00%	147,595	147,595
Total						6,514,831	3,524,206

Conestoga Enterprises Inc.

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Reading, PA	118	B	1	12/31/97	27.30%	(1)	(1)
Total							

(1) Does not report POPs.

CoreComm Inc.

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
San Juan-Caguas, PR	91	A	1	12/31/97	100.00%	2,124,891	2,124,891
Ponce, PR	147	A	1	12/31/97	100.00%	261,585	261,585
Mayaguez, PR	169	A	1	12/31/97	100.00%	227,941	227,941
Arecibo, PR	202	A	1	12/31/97	100.00%	195,843	195,843
Aguadilla, PR	204	A	1	12/31/97	99.01%	180,687	178,898
Puerto Rico 1 - Rincon	723	A	1	12/31/97	100.00%	13,726	13,726
Puerto Rico 2 - Adjuntas	724	A	1	12/31/97	100.00%	276,517	276,517
Puerto Rico 3 - Ciales	725	A	1	12/31/97	100.00%	126,052	126,052
Puerto Rico 4 - Aibonito	726	A	1	1/1/98	100.00%	295,140	295,140
Puerto Rico 6 - Vieques	728	A	1	12/31/97	100.00%	8,975	8,975
Puerto Rico 7 - Culebra	729	A	1	12/31/97	100.00%	1,598	1,598
Virgin Islands 1 - St.Thomas Island	730	A	1	12/31/97	100.00%	51,670	51,670
Virgin Islands 2 - St. Croix Island	731	A	1	12/31/97	100.00%	50,139	50,139
Total						3,814,764	3,812,975

CT Communications Inc.

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
North Carolina 4 - Henderson	568	B	2	12/31/97	24.50%	(1)	(1)
North Carolina 5 - Anson	569	B	1	12/31/97	24.50%	(1)	(1)
North Carolina 15 - Cabarrus	579	B	2	12/31/97	50.00%	(1)	(1)
Total							

(1) Does not report POPs.

D&E Communications Inc.

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Reading, PA	118	B	1	12/31/97	5.85%	(1)	(1)
Total							

(1) Does not report POPs.

Dobson Communications Corp.

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Hagerstown, MD	257	A	1	12/31/97	100.00%	127,800	127,800
Cumberland, MD-WV	269	A	1	12/31/97	100.00%	68,000	68,000
Enid, OK	302	A	1	12/31/97	100.00%	57,600	57,600
Arizona 5 - Gila	322	B	1	12/31/97	75.00%	184,400	138,300
Kansas 5 - Brown	432	A	1	12/31/97	100.00%	118,200	118,200
Maryland 2 - Kent	468	A	1	12/31/97	100.00%	444,700	444,700
Maryland 3 - Frederick	469	A	1	12/31/97	100.00%	184,200	184,200
Missouri 1 - Atchison	504	A	1	12/31/97	100.00%	42,600	42,600
Missouri 4 - De Kalb	507	A	1	12/31/97	100.00%	68,800	68,800
Missouri 5 - Linn	508	A	2	12/31/97	100.00%	14,200	14,200
Oklahoma 2 - Harper	597	A	1	12/31/97	100.00%	48,800	48,800
Oklahoma 3 - Grant	598	B	1	12/31/97	5.00%	(1)	(1)
Oklahoma 5 - Roger Mills	600	B	1	12/31/97	64.40%	32,500	20,930
Oklahoma 7 - Beckham	602	B	1	12/31/97	64.40%	115,700	74,511
Pennsylvania 10 - Bedford	621	A	1	12/31/97	100.00%	49,500	49,500
Texas 2 - Hansford	653	B	1	12/31/97	61.00%	89,700	54,717
Texas 16 - Burleson	667	B	1	1/28/98	100.00%	326,300	326,300
Total						1,973,000	1,839,158

(1) Does not report POPs.

Ellerbe Telephone

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
North Carolina 4 - Henderson	568	B	2	12/31/96	24.50%	(1)	(1)
North Carolina 5 - Anson	569	B	1	12/31/96	24.50%	(1)	(1)
Total							

(1) Does not report POPs.

Emerging Communications Inc.

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Virgin Islands 1 - St.Thomas Island	730	B	1	12/31/97	100.00%	(1)	(1)
Virgin Islands 2 - St. Croix Island	731	B	1	12/31/97	100.00%	(1)	(1)
Total							

(1) Does not report POPs.

Frontier Corp.

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Buffalo, NY	25	B	1	12/31/95	50.00%	1,205,000	602,500
Rochester, NY	34	B	1	12/31/95	42.50%	1,033,000	439,025

Syracuse, NY	53	B	1	12/31/95	27.50%	687,000	188,925
Des Moines, IA	102	B	1	12/31/95	4.00%	413,000	16,520
Utica-Rome, NY	115	B	1	12/31/95	50.00%	323,000	161,500
Binghamton, NY	122	B	1	12/31/95	24.00%	309,000	74,160
Poughkeepsie, NY	151	B	1	12/31/96	15.00%	265,000	39,750
New York 1 - Jefferson	559	B	1	12/31/95	20.00%	259,000	51,800
New York 2 - Franklin	560	B	1	12/31/95	21.43%	237,000	50,789
New York 3 - Chautauqua	561	B	1	12/31/95	22.50%	492,000	110,700
New York 4 - Yates	562	B	1	12/31/95	27.00%	364,000	98,280
Total						5,587,000	1,833,949

GTE Corp.

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Los Angeles-Long Beach/Anaheim-Santa Ana-Garden Grove/Riverside-San Bernardino-Ontario, CA	2	B	1	9/8/97	(1)	(1)	(1)
San Francisco-Oakland, CA	7	B	1	12/31/97	97.10%	3,865,088	3,753,000
Dallas-Forth Worth, TX	9	B	1	9/8/97	(1)	(1)	(1)
Houston, TX	10	B	1	12/31/97	83.60%	3,971,292	3,320,000
Cleveland, OH	16	B	1	12/31/97	96.50%	1,842,487	1,778,000
San Diego, CA	18	A	1	12/31/97	100.00%	2,675,000	2,675,000
Seattle-Everett, WA	20	B	1	9/8/97	(1)	(1)	(1)
Tampa-St. Petersburg, FL	22	B	1	12/31/97	100.00%	2,077,000	2,077,000
San Jose, CA	27	B	1	12/31/97	97.10%	1,573,635	1,528,000
Indianapolis, IN	28	B	1	12/31/97	94.80%	1,362,869	1,292,000
San Antonio, TX	33	B	1	9/8/97	(1)	(1)	(1)
Memphis, TN-AR-MS	36	A	1	12/31/97	100.00%	1,054,000	1,054,000
Louisville, KY-IN	37	A	1	12/31/97	100.00%	938,000	938,000
Birmingham, AL	41	A	1	12/31/97	100.00%	917,000	917,000
Norfolk-Virginia Beach-Portsmouth, VA/NC	43	B	1	12/31/97	95.00%	1,055,789	1,003,000
Nashville-Davidson, TN	46	A	1	12/31/97	100.00%	1,115,000	1,115,000
Greensboro-Winston-Salem-High Point, NC	47	A	1	12/31/97	100.00%	991,000	991,000
Honolulu, HI	50	B	1	12/31/97	100.00%	882,000	882,000
Akron, OH	52	B	1	12/31/97	96.50%	686,010	662,000
Richmond, VA	59	B	1	9/8/97	(1)	(1)	(1)
Greenville-Spartanburg, SC	67	B	1	9/8/97	(1)	(1)	(1)
Raleigh-Durham, NC	71	A	1	12/31/97	100.00%	832,632	832,000
Fresno, CA	74	B	1	12/31/97	97.00%	747,423	725,000
Austin, TX	75	B	1	12/31/97	61.70%	952,998	588,000
Knoxville, TN	79	A	1	12/31/97	94.10%	554,729	522,000
El Paso, TX	81	B	1	12/31/97	100.00%	690,000	690,000
Tacoma, WA	82	B	1	9/8/97	(1)	(1)	(1)
Mobile, AL	83	B	1	12/31/97	100.00%	526,000	526,000
Johnson City-Kingsport-Bristol, TN-VA	85	A	1	12/31/97	100.00%	458,000	458,000
Canton, OH	87	B	1	12/31/97	96.50%	405,181	391,000
Chattanooga, TN-GA	88	A	1	12/31/97	100.00%	457,000	457,000
Charleston-North Charleston, SC	90	A	1	12/31/97	100.00%	524,000	524,000
Fort Wayne, IN	96	B	1	12/31/97	65.00%	436,923	284,000
Bakersfield, CA	97	B	1	12/31/97	97.00%	618,557	600,000
Davenport-Rock Island-Moline, IA/IL	98	B	1	12/31/97	100.00%	360,000	360,000
Beaumont-Port Arthur, TX	101	B	1	12/31/97	83.60%	374,402	313,000
Newport News-Hampton, VA	104	B	1	12/31/97	95.00%	480,000	456,000
Vallejo-Fairfield-Napa, CA	111	B	1	12/31/97	97.10%	491,246	477,000
Lakeland-Winter Haven, FL	114	B	1	12/31/97	100.00%	442,000	442,000
Lexington-Fayette, KY	116	A	1	12/31/97	100.00%	377,000	377,000
Evansville, IN/KY	119	B	1	12/31/97	100.00%	322,000	322,000
Huntsville, AL	120	A	1	12/31/97	100.00%	401,000	401,000
Santa Rosa-Petaluma, CA	123	B	1	12/31/97	97.10%	419,156	407,000
Santa Barbara-Santa Maria-Lompoc, CA	124	B	1	12/31/97	90.00%	382,222	344,000
Salinas-Seaside-Monterey, CA	126	B	1	12/31/97	97.10%	357,364	347,000
Pensacola, FL	127	B	1	12/31/97	100.00%	386,000	386,000
Erie, PA	130	B	1	12/31/97	96.50%	280,829	261,515
Rockford, IL	131	B	1	12/31/97	59.60%	303,691	181,000
Lorain-Elyria, OH	136	B	1	12/31/97	96.50%	281,865	272,000
Fayetteville, NC	149	A	1	12/31/97	99.50%	291,457	290,000
Visalia-Tulare-Porterville, CA	150	B	1	12/31/97	97.00%	353,608	343,000
Roanoke, VA	157	B	1	12/31/97	70.00%	235,000	164,500
Fort Myers, FL Counties - Lee	164	B	1	12/31/97	100.00%	382,000	382,000
Sarasota, FL	167	B	1	12/31/97	100.00%	299,000	299,000
Galveston-Texas City, TX	170	B	1	12/31/97	83.60%	241,627	202,000
Santa Cruz, CA	175	B	1	12/31/97	97.10%	236,869	230,000

Asheville, NC	183	A	1	12/31/97	100.00%	209,000	209,000
Terre Haute, IN	185	B	1	12/31/97	76.30%	170,380	130,000
Clarksville-Hopkinsville, TN/KY	209	A	1	12/31/97	100.00%	196,000	196,000
Bradenton, FL	211	B	1	12/31/97	100.00%	233,000	233,000
Bremerton, WA	212	B	1	9/8/97	(1)	(1)	(1)
Anderson, IN	217	B	1	12/31/97	94.80%	132,911	126,000
Wilmington, NC	218	A	1	9/8/97	(1)	(1)	(1)
Tuscaloosa, AL	222	A	1	12/31/97	93.50%	161,497	151,000
Florence, AL	226	A	1	12/31/97	93.10%	137,487	128,000
Anderson, SC	227	B	1	9/8/97	(1)	(1)	(1)
Petersburg-Colonial Heights-Hopewell, VA	235	B	1	12/31/97	95.00%	129,474	123,000
Muncie, IN	236	B	1	12/31/97	94.80%	119,198	113,000
Lafayette, IN	247	B	1	12/31/97	94.80%	138,186	131,000
Anniston, AL	249	A	1	12/31/97	100.00%	118,000	118,000
Jacksonville, NC	258	A	1	9/8/97	(1)	(1)	(1)
Danville, VA	262	A	1	12/31/97	95.80%	110,647	106,000
Florence, SC	264	A	1	12/31/97	100.00%	125,000	125,000
Kokomo, IN	271	B	1	12/31/97	94.80%	101,266	96,000
Gadsden, AL	272	A	1	12/31/97	90.00%	101,111	91,000
Burlington, NC	280	A	1	12/31/97	100.00%	116,000	116,000
Bloomington, IN	282	B	1	12/31/97	94.80%	116,034	110,000
Las Cruces, NM	285	B	1	12/31/97	100.00%	163,000	163,000
Bryan-College Station, TX	287	B	1	12/31/97	100.00%	132,000	132,000
Owensboro, KY	293	B	1	12/31/97	100.00%	91,000	91,000
Victoria, TX	300	B	1	12/31/97	100.00%	81,000	81,000
Alabama 1 - Franklin	307	A	1	9/8/97	(1)	(1)	(1)
Alabama 1 - Franklin	307	A	2	9/8/97	(1)	(1)	(1)
Alabama 1 - Franklin	307	A	3	9/8/97	(1)	(1)	(1)
Alabama 2 - Jackson	308	A	1	12/31/94	100.00%	128,000	128,000
Alabama 5 - Cleburne	311	A	1	9/8/97	(1)	(1)	(1)
Alabama 5 - Cleburne	311	A	2	9/8/97	(1)	(1)	(1)
Alaska 2 - Bethel	316	B	2	9/8/97	(1)	(1)	(1)
California 1 - Del Norte	336	B	1	9/8/97	(1)	(1)	(1)
California 3 - Alpine	338	B	1	9/8/97	(1)	(1)	(1)
California 4 - Madera	339	B	1	9/8/97	(1)	(1)	(1)
California 5 - San Luis Obispo	340	B	1	12/31/94	90.00%	217,778	196,000
California 6 - Mono	341	B	1	12/31/94	100.00%	28,000	28,000
California 9 - Mendocino	344	B	1	12/31/94	100.00%	141,000	141,000
California 12 - Kings	347	B	1	12/31/94	97.00%	110,309	107,000
Florida 1 - Collier	360	B	1	12/31/94	61.60%	191,558	118,000
Florida 2 - Glades	361	B	1	12/31/94	100.00%	83,000	83,000
Florida 3 - Hardee	362	B	1	12/31/94	100.00%	175,000	175,000
Florida 4 - Citrus	363	B	1	12/31/94	100.00%	228,000	228,000
Florida 11 - Monroe	370	B	2	12/31/94	100.00%	81,000	81,000
Hawaii 1 - Kauai	385	B	1	12/31/94	100.00%	58,000	58,000
Hawaii 2 - Maui	386	B	1	12/31/94	100.00%	115,000	115,000
Hawaii 3 - Hawaii	387	B	1	12/31/94	100.00%	140,000	140,000
Illinois 1 - Jo Daviess	394	B	1	12/31/94	91.50%	315,847	289,000
Illinois 2 - Bureau	395	B	1	9/8/97	(1)	(1)	(1)
Illinois 3 - Mercer	396	B	1	9/8/97	(1)	(1)	(1)
Illinois 8 - Washington	401	B	1	9/8/97	(1)	(1)	(1)
Illinois 9 - Clay	402	B	1	9/8/97	(1)	(1)	(1)
Indiana 1 - Newton	403	B	1	9/8/97	(1)	(1)	(1)
Iowa 4 - Muscatine	415	B	1	9/8/97	(1)	(1)	(1)
Iowa 5 - Jackson	416	B	1	9/8/97	(1)	(1)	(1)
Kentucky 1 - Fulton	443	B	1	9/8/97	(1)	(1)	(1)
Kentucky 2 - Union	444	B	1	12/31/94	100.00%	128,000	128,000
Kentucky 7 - Trimble	449	A	1	12/31/94	100.00%	166,000	166,000
New Mexico 3 - Catron	555	B	1	9/8/97	(1)	(1)	(1)
New Mexico 5 - Grant	557	B	1	9/8/97	(1)	(1)	(1)
New Mexico 6 - Lincoln	558	B	1	12/31/94	71.40%	61,625	44,000
New Mexico 6 - Lincoln	558	B	2	9/8/97	(1)	(1)	(1)
North Carolina 15 - Cabarrus	579	A	1	9/8/97	(1)	(1)	(1)
Ohio 2 - Sandusky	586	B	2	12/31/94	100.00%	24,000	24,000
Ohio 3 - Ashtabula	587	B	1	9/8/97	(1)	(1)	(1)
Oregon 1 - Clatsop	606	A	1	12/31/94	83.30%	171,669	143,000
South Carolina 6 - Clarendon	630	A	1	12/31/94	100.00%	194,000	194,000
South Carolina 7 - Calhoun	631	A	1	9/8/97	(1)	(1)	(1)
South Carolina 8 - Hampton	632	A	1	9/8/97	(1)	(1)	(1)
Tennessee 1 - Lake	643	A	1	12/31/94	100.00%	297,000	297,000
Tennessee 2 - Cannon	644	A	1	12/31/94	100.00%	159,000	159,000
Tennessee 3 - Macon	645	A	1	12/31/94	100.00%	330,000	330,000

Tennessee 5 - Fayette	647	A	1	12/31/94	100.00%	336,000	336,000
Tennessee 6 - Giles	648	A	1	12/31/94	100.00%	157,000	157,000
Tennessee 7 - Bledsoe	649	A	1	12/31/94	100.00%	248,000	248,000
Tennessee 9 - Maury	651	A	1	12/31/94	100.00%	68,000	68,000
Texas 10 - Navarro	661	B	3	12/31/94	75.00%	29,333	22,000
Texas 11 - Cherokee	662	B	1	9/8/97	(1)	(1)	(1)
Texas 16 - Burleson	667	B	1	9/8/97	(1)	(1)	(1)
Texas 17 - Newton	668	B	1	9/8/97	(1)	(1)	(1)
Texas 21 - Chambers	672	B	1	12/31/94	75.00%	21,333	16,000
Virginia 3 - Giles	683	B	1	12/31/94	51.00%	182,353	93,000
Virginia 4 - Bedford	684	B	1	12/31/94	51.00%	66,667	34,000
Virginia 5 - Bath	685	B	1	12/31/94	77.00%	63,636	49,000
Virginia 6 - Highland	686	B	1	9/8/97	(1)	(1)	(1)
Virginia 7 - Buckingham	687	B	1	12/31/94	100.00%	39,000	39,000
Virginia 8 - Amelia	688	B	1	12/31/94	95.00%	84,211	80,000
Virginia 9 - Greensville	689	B	1	12/31/94	95.00%	87,368	83,000
Virginia 10 - Frederick	690	B	1	9/8/97	(1)	(1)	(1)
Virginia 11 - Madison	691	B	1	12/31/94	95.00%	111,579	106,000
Virginia 12 - Caroline	692	B	1	12/31/94	95.00%	33,684	32,000
Virginia 12 - Caroline	692	B	2	9/8/97	(1)	(1)	(1)
Washington 1 - Clallam	693	B	1	9/8/97	(1)	(1)	(1)
Total						47,913,756	45,428,515

(1) GTE's holds more than 5 percent interest in these licenses but does not report ownership or POPs.

Hector Communications Corp.

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Sioux Falls, SD	267	B	1	12/31/97	12.25%	120,000	14,700
Rochester, MN	288	B	1	12/31/97	9.78%	(1)	(1)
Minnesota 7 - Chippewa	488	B	1	12/31/97	9.78%	(1)	(1)
Minnesota 8 - Lac qui Parle	489	B	1	12/31/97	9.78%	(1)	(1)
Minnesota 9 - Pipestone	490	B	1	12/31/97	9.78%	(1)	(1)
Minnesota 10 - Le Sueur	491	B	1	12/31/97	9.78%	(1)	(1)
Minnesota 11 - Goodhue	492	B	1	12/31/97	9.78%	(1)	(1)
North Dakota 3 - Barnes	582	B	1	12/31/97	1.60%	92,000	1,472
Total						1,160,000	108,886

(1) The Minnesota licenses have 948,000 combined POPs and 92,714 net POPs which are included in the company totals.

New Ulm Telecomm Inc. (1)

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Rochester, MN	288	B	1	12/31/97	7.70%	(2)	(2)
Minnesota 7 - Chippewa	488	B	1	12/31/97	7.70%	(2)	(2)
Minnesota 8 - Lac qui Parle	489	B	1	12/31/97	7.70%	(2)	(2)
Minnesota 9 - Pipestone	490	B	1	12/31/97	7.70%	(2)	(2)
Minnesota 10 - Le Sueur	491	B	1	12/31/97	7.70%	(2)	(2)
Minnesota 11 - Goodhue	492	B	1	12/31/97	7.70%	(2)	(2)
Total							

(1) New Ulm also owns minority interests in two Iowa RSAs.
(2) Does not report POPs.

Powertel Inc.

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Alabama 5 - Cleburne	311	B	3	12/31/97	100.00%	(1)	(1)
Alabama 8 - Lee	314	B	2	12/31/97	100.00%	(1)	(1)
Georgia 5 - Haralson	375	B	2	12/31/97	100.00%	(1)	(1)
Georgia 6 - Spalding	376	B	1	12/31/97	100.00%	296,000	296,000
Total							

(1) Only reports the combined POPs.

Price Communications Inc.

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Augusta, GA/SC	108	A	1	12/31/97	100.00%	439,116	439,116
Macon-Warner Robins, GA	138	A	1	12/31/97	99.20%	313,686	311,177
Montgomery, AL	139	A	1	12/31/97	92.80%	318,371	295,448
Columbus, GA-AL	153	A	1	12/31/97	85.20%	254,150	216,536
Savannah, GA	155	A	1	12/31/97	98.50%	283,978	279,718
Dothan, AL	246	A	1	12/31/97	94.60%	136,160	128,807
Albany, GA	261	A	1	12/31/97	86.50%	118,527	102,526
Panama City, FL	283	A	1	12/31/97	78.40%	146,018	114,478
Alabama 8 - Lee	314	A	1	12/31/97	100.00%	173,993	173,993
Georgia 6 - Spalding	376	A	1	12/31/97	96.30%	199,516	192,134
Georgia 7 - Hancock	377	A	1	12/31/97	100.00%	134,376	134,376
Georgia 8 - Warren	378	A	1	12/31/97	100.00%	157,451	157,451
Georgia 9 - Marion	379	A	1	12/31/97	100.00%	119,410	119,410
Georgia 10 - Bleckley	380	A	1	12/31/97	100.00%	149,699	149,699
Georgia 12 - Liberty	382	A	1	12/31/97	100.00%	211,799	211,799
Georgia 13 - Early	383	A	1	12/31/97	86.50%	147,392	127,494
Total						3,303,642	3,154,162

PriCellular Corp.

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Duluth, MN-WI	141	A	1	1/15/98	100.00%	240,234	240,234
Orange County, NY	144	A	1	1/15/98	100.00%	327,053	327,053
Poughkeepsie, NY	151	A	1	1/15/98	95.60%	263,723	252,119
Eau Claire, WI	232	A	1	1/15/98	96.70%	143,701	138,959
Wausau, WI	263	A	1	1/15/98	95.10%	121,727	115,762
Laredo, TX	281	B	1	1/15/98	44.50%	176,162	78,392
Illinois 4 - Adams	397	A	1	1/15/98	44.50%	216,119	96,173
Illinois 6 - Montgomery	399	A	1	1/15/98	44.50%	201,234	89,549
Kentucky 4 - Spencer	446	A	1	1/15/98	100.00%	245,952	245,952
Kentucky 5 - Barren	447	A	1	1/15/98	100.00%	158,204	158,204
Kentucky 6 - Madison	448	A	1	1/15/98	100.00%	260,920	260,920
Kentucky 8 - Mason	450	A	1	1/15/98	100.00%	119,840	119,840
Michigan 1 - Gogebic	472	A	1	1/15/98	100.00%	203,391	203,391
Minnesota 2 - Lake of the Woods	483	A	A	1/15/98	100.00%	38,766	38,766
Minnesota 3 - Koochiching	484	A	1	1/15/98	100.00%	59,528	59,528
Minnesota 4 - Lake	485	A	1	1/15/98	100.00%	15,226	15,226
Minnesota 5 - Wilkin	486	A	1	1/15/98	100.00%	207,107	207,107
Minnesota 6 - Hubbard	487	A	1	1/15/98	100.00%	220,067	220,067
New York 5 - Otsego	563	A	1	1/15/98	100.00%	382,180	382,180
New York 6 - Columbia	564	A	1	1/15/98	100.00%	111,373	111,373
Ohio 7 - Tuscarawas	591	A	1	1/15/98	100.00%	257,290	257,290
Ohio 10 - Perry	594	A	A	1/15/98	100.00%	62,345	62,345
Pennsylvania 9 - Greene	620	A	1	1/15/98	100.00%	188,096	188,096
Tennessee 4 - Hamblen	646	A	1	1/15/98	100.00%	263,553	263,553
West Virginia 2 - Wetzel	702	A	1	1/15/98	100.00%	79,567	79,567
West Virginia 3 - Monongalia	703	A	1	1/15/98	100.00%	269,709	269,709
Wisconsin 1 - Burnett	708	A	1	1/15/98	100.00%	110,749	110,749
Wisconsin 2 - Bayfield	709	A	1	1/15/98	100.00%	85,645	85,645
Wisconsin 3 - Vilas	710	A	1	1/15/98	100.00%	140,697	140,697
Wisconsin 4 - Marinette	711	A	1	1/15/98	100.00%	118,993	118,993
Wisconsin 5 - Pierce	712	A	1	1/15/98	100.00%	81,194	81,194
Wisconsin 6 - Trempealeau	713	A	A	11/15/98	100.00%	32,939	32,939
Total (1)						5,403,284	5,051,573

(1) The company also owns other interests with combined net POPs of 45,842 which are not included in the total.

Roseville Communications Inc.

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Sacramento, CA	35	B	1	12/31/97	23.50%	(1)	(1)
Stockton, CA	107	B	1	12/31/97	23.50%	(1)	(1)
Modesto, CA	142	B	1	12/31/97	23.50%	(1)	(1)
Reno, NV	171	B	1	12/31/97	23.50%	(1)	(1)
Chico	215	B	1	12/31/97	23.50%	(1)	(1)
Yuba City, CA	274	B	1	12/31/97	23.50%	(1)	(1)

California 8 - Tehama	343	B	1	12/31/97	23.50%	(1)	(1)
California 10 - Sierra	345	B	1	12/31/97	23.50%	(1)	(1)
Nevada 3 - Storey	545	B	1	12/31/97	23.50%	(1)	(1)
Total							

(1) Does not report POPs.

Rural Cellular Corp. (1)

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Bangor, ME	224	B	1	12/31/97	100.00%	147,000	147,000
Maine 2 - Somerset	464	B	1	12/31/97	100.00%	156,000	156,000
Maine 3 - Kennebec	465	B	1	12/31/97	100.00%	215,000	215,000
Minnesota 1 - Kittson	482	B	1	12/31/97	100.00%	50,000	50,000
Minnesota 2 - Lake of the Woods	483	B	1	12/31/97	100.00%	60,000	60,000
Minnesota 3 - Koochiching	484	B	1	12/31/97	100.00%	57,000	57,000
Minnesota 5 - Wilkin	486	B	1	12/31/97	100.00%	200,000	200,000
Minnesota 6 - Hubbard	487	B	1	12/31/97	100.00%	231,000	231,000
Total						1,116,000	1,116,000

(1) Rural Cellular has announced that it plans to acquire Atlantic Cellular Corp.

SBC Communications Inc. (1)

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Chicago, IL	3	A	1	3/2/98	(2)	(2)	(2)
Boston-Lowell-Brockton-Lawrence-Haverhill, MA	6	A	1	3/2/98	(2)	(2)	(2)
Washington, DC-MD-VA	8	A	1	3/2/98	(2)	(2)	(2)
Dallas-Forth Worth, TX	9	B	1	3/2/98	(2)	(2)	(2)
St. Louis, MO-IL	11	B	1	3/2/98	(2)	(2)	(2)
Baltimore, MD	14	A	1	3/2/98	(2)	(2)	(2)
Kansas City, MO-KS	24	B	1	3/2/98	(2)	(2)	(2)
Buffalo, NY	25	A	1	3/2/98	(2)	(2)	(2)
San Antonio, TX	33	B	1	3/2/98	(2)	(2)	(2)
Rochester, NY	34	A	1	3/2/98	(2)	(2)	(2)
Albany-Schenectady-Troy, NY	44	A	1	3/2/98	(2)	(2)	(2)
Oklahoma City, OK	45	B	1	3/2/98	(2)	(2)	(2)
Syracuse, NY	53	A	1	3/2/98	(2)	(2)	(2)
Gary-Hammond-East Chicago, IN	54	A	1	3/2/98	(2)	(2)	(2)
Worchester-Fitchburg-Leominster, MA	55	A	1	3/2/98	(2)	(2)	(2)
Wichita, KS	89	B	1	3/2/98	(2)	(2)	(2)
Little Rock-North Little Rock, AR	92	A	1	3/2/98	(2)	(2)	(2)
Corpus Christi, TX	112	B	1	3/2/98	(2)	(2)	(2)
Utica-Rome, NY	115	A	1	3/2/98	(2)	(2)	(2)
McAllen-Edinburg-Mission, TX	128	B	1	3/2/98	(2)	(2)	(2)
Lubbock, TX Counties - Lubbock	161	B	1	3/2/98	(2)	(2)	(2)
Brownsville-Harlingen, TX	162	B	1	3/2/98	(2)	(2)	(2)
Fort Smith, AK-OK	165	A	1	3/2/98	(2)	(2)	(2)
Springfield, IL	176	A	1	3/2/98	(2)	(2)	(2)
Topeka, KS	179	B	1	3/2/98	(2)	(2)	(2)
Fayetteville-Springdale, AK	182	A	1	3/2/98	(2)	(2)	(2)
Amarillo, TX	188	B	1	3/2/98	(2)	(2)	(2)
Champaign-Urbana-Rantoul, IL	196	A	1	3/2/98	(2)	(2)	(2)
Abilene, TX	220	B	1	3/2/98	(2)	(2)	(2)
Decatur, IL	230	A	1	3/2/98	(2)	(2)	(2)
Bloomington-Normal, IL	250	A	1	3/2/98	(2)	(2)	(2)
Odessa, TX	255	B	1	3/2/98	(2)	(2)	(2)
Glens Falls, NY	266	A	1	3/2/98	(2)	(2)	(2)
St. Joseph, MO	275	B	1	3/2/98	(2)	(2)	(2)
Laredo, TX	281	B	1	3/2/98	(2)	(2)	(2)
Pine Bluff, AK	291	A	1	3/2/98	(2)	(2)	(2)
Sherman-Denison, TX	292	B	1	3/2/98	(2)	(2)	(2)
Midland, TX	295	B	1	3/2/98	(2)	(2)	(2)
Lawrence, KS	301	B	1	3/2/98	(2)	(2)	(2)
Arkansas 1 - Madison	324	A	1	3/2/98	(2)	(2)	(2)
Arkansas 2 - Marion	325	A	1	3/2/98	(2)	(2)	(2)
Arkansas 3 - Sharp	326	A	1	3/2/98	(2)	(2)	(2)
Arkansas 4 - Clay	327	A	1	3/2/98	(2)	(2)	(2)

Arkansas 5 - Cross	328	A	1	3/2/98	(2)	(2)	(2)
Arkansas 6 - Cleburne	329	A	1	3/2/98	(2)	(2)	(2)
Arkansas 7 - Pope	330	A	1	3/2/98	(2)	(2)	(2)
Arkansas 8 - Franklin	331	A	1	3/2/98	(2)	(2)	(2)
Arkansas 10 - Garland	333	A	1	3/2/98	(2)	(2)	(2)
Arkansas 12 - Ouachita	335	A	1	3/2/98	(2)	(2)	(2)
Illinois 2 - Bureau	395	A	1	3/2/98	(2)	(2)	(2)
Illinois 4 - Adams	397	A	1	3/2/98	(2)	(2)	(2)
Illinois 5 - Mason	398	A	1	3/2/98	(2)	(2)	(2)
Illinois 6 - Montgomery	399	A	1	3/2/98	(2)	(2)	(2)
Kansas 5 - Brown	432	B	2	3/2/98	(2)	(2)	(2)
Maryland 2 - Kent	468	A	2	3/2/98	(2)	(2)	(2)
Massachusetts 2 - Barnstable	471	A	1	3/2/98	(2)	(2)	(2)
Missouri 8 - Callaway	511	B	1	3/2/98	(2)	(2)	(2)
Missouri 9 - Bates	512	B	1	3/2/98	(2)	(2)	(2)
Missouri 11 - Moniteau	514	B	1	3/2/98	(2)	(2)	(2)
Missouri 12 - Maries	515	B	1	3/2/98	(2)	(2)	(2)
Missouri 13 - Washington	516	B	1	3/2/98	(2)	(2)	(2)
Missouri 18 - Perry	521	B	1	3/2/98	(2)	(2)	(2)
Missouri 19 - Stoddard	522	B	1	3/2/98	(2)	(2)	(2)
New Hampshire 2 - Carroll	549	A	2	2/1/98	(2)	(2)	(2)
New York 1 - Jefferson	559	A	1	3/2/98	(2)	(2)	(2)
New York 4 - Yates	562	A	1	3/2/98	(2)	(2)	(2)
Oklahoma 3 - Grant	598	B	1	3/2/98	(2)	(2)	(2)
Oklahoma 9 - Garvin	604	B	1	3/2/98	(2)	(2)	(2)
Texas 6 - Jack	657	B	1	3/2/98	(2)	(2)	(2)
Texas 7 - Fanni	658	B	1	3/2/98	(2)	(2)	(2)
Texas 9 - Runnels	660	B	1	3/2/98	(2)	(2)	(2)
Texas 9 - Runnels	660	B	4	3/2/98	(2)	(2)	(2)
Texas 10 - Navarro	661	B	1	3/2/98	(2)	(2)	(2)
Texas 18 - Edwards	669	B	1	3/2/98	(2)	(2)	(2)
Texas 19 - Atascosa	670	B	1	3/2/98	(2)	(2)	(2)
Texas 20 - Wilson	671	B	1	3/2/98	(2)	(2)	(2)
Virginia 10 - Frederick	690	A	1	3/2/98	(2)	(2)	(2)
Virginia 11 - Madison	691	A	1	3/2/98	(2)	(2)	(2)
Virginia 12 - Caroline	692	A	1	3/2/98	(2)	(2)	(2)
West Virginia 4 - Grant	704	A	1	3/2/98	(2)	(2)	(2)
Total							

(1) SBC has announced that it plans to merge with Southern New England Telecommunications.
(2) All licenses are majority owned. The company did not report percentage ownership, POPs, or other minority holdings.

Shenandoah Telecommunications Co.

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Virginia 10 - Frederick	690	B	2	12/31/97		(1)	(1)
Total							

(1) Company did not report percentage ownership or POPs.

Southern New England Telecommunications Corp. (1)

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Hartford-New Britain-Bristol, CT	32	B	1	12/31/97	99.60%	(2)	(2)
Providence-Warwick-Pawtucket, RI	38	A	1	12/31/97	100.00%	(2)	(2)
Bridgeport-Stamford-Norwalk-Danbury, CT	42	B	1	12/31/97	99.60%	(2)	(2)
New Haven-West Haven-Waterbury-Meriden, CT	49	B	1	12/31/97	99.60%	(2)	(2)
Springfield-Chicopee-Holyoke, MA	63	B	1	12/31/97	99.60%	(2)	(2)
New Bedford-Fall River, MA	76	A	1	12/31/97	100.00%	(2)	(2)
New London-Norwich, CT	154	B	1	12/31/97	99.60%	(2)	(2)
Pittsfield, MA	213	B	1	12/31/97	100.00%	(2)	(2)
Connecticut 1 - Litchfield	357	B	1	12/31/97	99.60%	(2)	(2)
Connecticut 2 - Windham	358	B	1	12/31/97	99.60%	(2)	(2)
Massachusetts 1 - Franklin	470	B	1	12/31/97	99.60%	(2)	(2)
Rhode Island 1 - Newport	624	A	1	12/31/97	100.00%	(2)	(2)
Total						5,700,000	

(1) The company has announced plans to merge with SBC Communications.

(2) The company does not report POPs for individual licenses.

Sygnet Communications

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Youngstown-Warren, OH	66	A	1	12/31/97	100.00%	491,900	491,900
Erie, PA	130	A	1	12/31/97	100.00%	280,600	280,600
Sharon, PA	238	A	1	12/31/97	100.00%	122,100	122,100
New York 3 - Chautauqua	561	A	1	12/31/97	100.00%	485,200	485,200
Ohio 11 - Columbiana	595	A	1	12/31/97	100.00%	111,700	111,700
Pennsylvania 1 - Crawford	612	A	1	12/31/97	100.00%	197,200	197,200
Pennsylvania 2 - McKean	613	A	2	12/31/97	100.00%	89,400	89,400
Pennsylvania 6 - Lawrence	617	A	1	12/31/97	100.00%	376,400	376,400
Pennsylvania 7 - Jefferson	618	A	1	12/31/97	100.00%	217,100	217,100
Total						2,371,600	2,371,600

United States Cellular Corp.

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Los Angeles-Long Beach/Anaheim-Santa Ana-Garden Grove/Riverside-San Bernardino-Ontario, CA	2	B	1	12/31/97	5.50%	(1)	(1)
Milwaukee, WI	21	A	1	12/31/97	100.00%	1,460,000	1,460,000
Oklahoma City, OK	45	B	1	12/31/97	14.60%	1,003,000	146,438
Tulsa, OK	57	B	1	12/31/97	55.06%	798,000	439,379
Oxnard-Simi Valley-Ventura, CA	73	B	1	12/31/97	5.50%	(1)	(1)
Knoxville, TN	79	B	1	12/31/97	96.03%	556,000	533,927
Davenport-Rock Island-Moline, IA/IL	98	A	1	12/31/97	97.37%	358,000	348,585
Des Moines, IA	102	A	1	12/31/97	100.00%	431,000	431,000
Peoria, IL	103	A	1	12/31/97	100.00%	347,000	347,000
Corpus Christi, TX	112	A	1	12/31/97	100.00%	388,000	388,000
Madison, WI	113	A	1	12/31/97	92.50%	398,000	368,150
Appleton-Oskosh-Neenah, WI	125	A	1	12/31/97	100.00%	344,000	344,000
McAllen-Edinburg-Mission, TX	128	A	1	12/31/97	26.20%	509,000	133,358
Rockford, IL	131	A	1	12/31/97	100.00%	304,000	304,000
Manchester-Nashua, NH	133	A	1	12/31/97	92.49%	357,000	330,189
Portland, ME	152	B	1	12/31/97	49.00%	288,000	141,120
Portsmouth-Dover-Rochester, NH-ME	156	B	1	12/31/97	40.00%	280,000	112,000
Roanoke, VA	157	A	1	12/31/97	100.00%	234,000	234,000
Tallahassee, FL	168	A	1	12/31/97	100.00%	280,000	280,000
Asheville, NC	183	B	1	12/31/97	100.00%	212,000	212,000
Green Bay, WI	186	A	1	12/31/97	99.01%	215,000	212,872
Yakima, WA	191	B	1	12/31/97	54.55%	219,000	119,465
Gainesville, FL	192	A	1	12/31/97	100.00%	222,000	222,000
Cedar Rapids, IA	195	A	1	12/31/97	96.00%	181,000	173,760
Waterloo-Cedar Falls, IA	201	A	1	12/31/97	93.03%	146,000	135,824
Lynchburg, VA	203	A	1	12/31/97	100.00%	160,000	160,000
Fort Pierce, FL	208	B	1	12/31/97	49.00%	291,000	142,590
Richland-Kennewick-Pasco, WA	214	B	1	12/31/97	100.00%	183,000	183,000
Janesville-Beloit, WI	216	A	1	12/31/97	80.54%	152,000	122,421
Bangor, ME	224	A	1	12/31/97	91.47%	145,000	132,632
Medford, OR	229	B	1	12/31/97	100.00%	171,000	171,000
Wichita Falls, TX	233	B	1	12/31/97	51.56%	140,000	72,184
Joplin, MO	239	B	1	12/31/97	100.00%	147,000	147,000
Kenosha, WI	244	A	1	12/31/97	99.01%	143,000	141,584
Charlottesville, VA	256	A	1	12/31/97	94.44%	146,000	137,882
Hagerstown, MD	257	B	1	12/31/97	100.00%	128,000	128,000
Lawton, OK	260	B	1	12/31/97	51.56%	111,000	57,232
Wausau, WI	263	B	1	12/31/97	71.76%	122,000	87,547
Cumberland, MD-WV	269	B	1	12/31/97	100.00%	100,000	100,000
Sheboygan, WI	277	A	1	12/31/97	86.66%	110,000	95,326
Columbia, MO	278	B	1	12/31/97	100.00%	127,000	127,000
Lewiston-Auburn, ME	279	A	1	12/31/97	82.67%	101,000	83,497
Laredo, TX	281	A	1	12/31/97	93.74.%	182,000	170,607
Dubuque, IA	286	A	1	12/31/97	95.90%	88,000	84,392
La Crosse, WI	290	A	1	12/31/97	95.11%	103,000	97,963
Iowa City, IA	296	A	1	12/31/97	100.00%	102,000	102,000
Victoria, TX	300	A	1	12/31/97	100.00%	82,000	82,000
Alton-Granite City, IL	305	A	1	12/31/97	100.00%	21,000	21,000
California 1 - Del Norte	336	A	1	12/31/97	100.00%	209,000	209,000
California 2 - Modoc	337	A	1	12/31/97	100.00%	63,000	63,000

California 9 - Mendocino	344	A	1	12/31/97	100.00%	139,000	139,000
Florida 5 - Putnam	364	A	1	12/31/97	100.00%	70,000	70,000
Florida 6 - Dixie	365	A	1	12/31/97	100.00%	57,000	57,000
Florida 8 - Jefferson	367	A	1	12/31/97	100.00%	49,000	49,000
Florida 9 - Calhoun	368	A	1	12/31/97	100.00%	43,000	43,000
Florida 10 - Walton	369	A	1	12/31/97	100.00%	119,000	119,000
Georgia 11 - Toombs	381	A	1	12/31/97	100.00%	155,000	155,000
Georgia 14 - Worth	384	A	1	12/31/97	100.00%	253,000	253,000
Hawaii 3 - Hawaii	387	A	1	12/31/97	100.00%	140,000	140,000
Idaho 5 - Butte	392	A	1	12/31/97	100.00%	160,000	160,000
Idaho 6 - Clark	393	A	1	12/31/97	100.00%	294,000	294,000
Illinois 1 - Jo Daviess	394	A	1	12/31/97	100.00%	318,000	318,000
Illinois 3 - Mercer	396	A	1	12/31/97	100.00%	202,000	202,000
Illinois 4 - Adams	397	B	2	12/31/97	100.00%	214,000	214,000
Indiana 4 - Miami	406	B	1	12/31/97	28.57%	179,000	51,140
Indiana 5 - Warren	407	B	1	12/31/97	33.33%	123,000	40,996
Iowa 1 - Mills	412	A	1	12/31/97	100.00%	62,000	62,000
Iowa 2 - Union	413	A	1	12/31/97	100.00%	50,000	50,000
Iowa 3 - Monroe	414	A	1	12/31/97	49.00%	91,000	44,590
Iowa 4 - Muscatine	415	A	1	12/31/97	100.00%	155,000	155,000
Iowa 5 - Jackson	416	A	1	12/31/97	100.00%	109,000	109,000
Iowa 6 - Iowa	417	A	1	12/31/97	100.00%	156,000	156,000
Iowa 7 - Audubon	418	A	1	12/31/97	100.00%	55,000	55,000
Iowa 9 - Ida	420	B	1	12/31/97	16.67%	63,000	10,502
Iowa 10 - Humbolt	421	A	1	12/31/97	100.00%	180,000	180,000
Iowa 11 - Hardin	422	A	1	12/31/97	100.00%	113,000	113,000
Iowa 12 - Winneshiek	423	A	1	12/31/97	24.50%	116,000	28,420
Iowa 13 - Mitchell	424	A	1	12/31/97	100.00%	67,000	67,000
Iowa 14 - Kossuth	425	A	1	12/31/97	100.00%	107,000	107,000
Iowa 16 - Lyon	427	A	1	12/31/97	100.00%	103,000	103,000
Kansas 15 - Elk	442	B	1	12/31/97	75.00%	154,000	115,500
Maine 1 - Oxford	463	A	1	12/31/97	100.00%	83,000	83,000
Maine 2 - Somerset	464	A	1	12/31/97	100.00%	148,000	148,000
Maine 3 - Kennebec	465	A	1	12/31/97	100.00%	221,000	221,000
Maine 4 - Washington	466	B	1	12/31/97	100.00%	86,000	86,000
Maryland 1 - Garrett	467	B	1	12/31/97	100.00%	30,000	30,000
Missouri 3 - Schuyler	506	A	1	12/31/97	100.00%	56,000	56,000
Missouri 5 - Linn	508	A	1	12/31/97	100.00%	55,000	55,000
Missouri 6 - Marion	509	B	1	12/31/97	100.00%	85,000	85,000
Missouri 13 - Washington	516	A	1	12/31/97	100.00%	94,000	94,000
Missouri 15 - Stone	518	A	1	12/31/97	100.00%	118,000	118,000
Missouri 16 - Laclede	519	A	1	12/31/97	100.00%	100,000	100,000
Missouri 17 - Shannon	520	A	1	12/31/97	100.00%	56,000	56,000
New Hampshire 1 - Coos	548	B	1	12/31/97	100.00%	224,000	224,000
New Hampshire 2 - Carroll	549	A	1	12/31/97	100.00%	216,000	216,000
North Carolina 2 - Yancey	566	B	3	12/31/97	100.00%	31,000	31,000
North Carolina 3 - Ashe	567	A	1	12/31/97	100.00%	162,000	162,000
North Carolina 4 - Henderson	568	B	1	12/31/97	100.00%	194,000	194,000
North Carolina 6 - Chatham	570	A	1	12/31/97	61.16%	162,000	99,079
North Carolina 7 - Rockingham	571	A	1	12/31/97	100.00%	291,000	291,000
North Carolina 8 - Northampton	572	A	1	12/31/97	100.00%	292,000	292,000
North Carolina 9 - Camden	573	A	1	12/31/97	100.00%	119,000	119,000
North Carolina 10 - Harnett	574	A	1	12/31/97	100.00%	294,000	294,000
North Carolina 11 - Hoke	575	A	1	12/31/97	100.00%	226,000	226,000
North Carolina 12 - Sampson	576	A	1	12/31/97	100.00%	132,000	132,000
North Carolina 13 - Greene	577	A	1	12/31/97	100.00%	246,000	246,000
North Carolina 14 - Pitt	578	A	1	12/31/97	100.00%	242,000	242,000
Ohio 9 - Ross	593	B	1	12/31/97	48.00%	249,000	119,520
Oklahoma 4 - Nowata	599	B	2	12/31/97	55.06%	102,000	56,161
Oklahoma 6 - Seminole	601	A	1	12/31/97	55.06%	219,000	120,581
Oklahoma 7 - Beckham	602	B	2	12/31/97	51.65%	10,000	5,165
Oklahoma 8 - Jackson	603	B	1	12/31/97	51.65%	97,000	50,101
Oklahoma 9 - Garvin	604	A	1	12/31/97	100.00%	203,000	203,000
Oklahoma 10 - Haskell	605	A	1	12/31/97	100.00%	83,000	83,000
Oregon 2 - Hood River	607	B	1	12/31/97	45.10%	74,000	33,374
Oregon 3 - Umatilla	608	B	1	12/31/97	60.42%	151,000	91,234
Oregon 5 - Coos	610	A	1	12/31/97	100.00%	260,000	260,000
Oregon 6 - Crook	611	B	1	12/31/97	62.50%	196,000	122,500
Pennsylvania 10 - Bedford	621	B	2	12/31/97	100.00%	49,000	49,000
South Carolina 4 - Chesterfield	628	A	1	12/31/97	100.00%	213,000	213,000
Tennessee 3 - Macon	645	B	1	12/31/97	16.67%	344,000	57,345
Tennessee 4 - Hamblen	646	B	2	12/31/97	100.00%	135,000	135,000

Tennessee 7 - Bledsoe	649	B	3	12/31/97	96.03%	151,000	145,005
Texas 4 - Briscoe	655	B	2	12/31/97	51.56%	13,000	6,703
Texas 5 - Hardeman	656	B	1	12/31/97	51.56%	38,000	19,593
Texas 18 - Edwards	669	A	1	12/31/97	100.00%	223,000	223,000
Texas 19 - Atascosa	670	A	1	12/31/97	100.00%	231,000	231,000
Texas 20 - Wilson	671	A	1	12/31/97	100.00%	148,000	148,000
Vermont 2 - Addison	680	B	2	12/31/97	100.00%	107,000	107,000
Virginia 2 - Tazewell	682	A	1	12/31/97	100.00%	83,000	83,000
Virginia 3 - Giles	683	A	1	12/31/97	100.00%	201,000	201,000
Virginia 4 - Bedford	684	A	1	12/31/97	100.00%	176,000	176,000
Virginia 5 - Bath	685	A	1	12/31/97	100.00%	61,000	61,000
Virginia 7 - Buckingham	687	A	1	12/31/97	100.00%	91,000	91,000
Washington 4 - Grays Harbor	696	A	1	12/31/97	100.00%	118,000	118,000
Washington 5 - Kittitas	697	B	1	12/31/97	83.50%	71,000	59,285
Washington 6 - Pacific	698	B	1	12/31/97	100.00%	184,000	184,000
Washington 7 - Skamania	699	B	1	12/31/97	45.10%	28,000	12,628
West Virginia 3 - Monongalia	703	B	1	12/31/97	100.00%	269,000	269,000
West Virginia 4 - Grant	704	B	1	12/31/97	100.00%	174,000	174,000
West Virginia 5 - Tucker	705	B	1	12/31/97	100.00%	132,000	132,000
West Virginia 7 - Raleigh	707	B	1	12/31/97	100.00%	256,000	256,000
Wisconsin 5 - Pierce	712	A	1	12/31/97	100.00%	14,000	14,000
Wisconsin 6 - Trempealeau	713	A	1	12/31/97	100.00%	83,000	83,000
Wisconsin 7 - Wood	714	A	1	12/31/97	100.00%	290,000	290,000
Wisconsin 8 - Vernon	715	A	1	12/31/97	100.00%	236,000	236,000
Wisconsin 9 - Columbia	716	A	1	12/31/97	100.00%	386,000	386,000
Wisconsin 10 - Door	717	A	1	12/31/97	100.00%	130,000	130,000
Total						40,946,000	25,133,350

(1) The company does not report POPs for these markets individually. They are included in the company totals.

US Unwired

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Lake Charles, LA	197	B	1	1/17/97	100.00%	174,000	174,000
Alabama 3 - Lamar	309	A	1	1/17/97	100.00%	136,000	136,000
Alabama 4 - Bibb	310	A	1	1/17/97	100.00%	138,000	138,000
Kansas 1 - Cheyenne	428	A	1	1/17/97	100.00%	27,000	27,000
Kansas 2 - Norton	429	A	1	1/17/97	100.00%	30,000	30,000
Kansas 6 - Wallace	433	A	1	1/17/97	100.00%	20,000	20,000
Kansas 7 - Trego	434	A	1	1/17/97	100.00%	78,000	78,000
Kansas 11 - Hamilton	438	A	1	1/17/97	100.00%	85,000	85,000
Kansas 12 - Hodgeman	439	A	1	1/17/97	100.00%	42,000	42,000
Kansas 13 - Edwards	440	A	1	1/17/97	100.00%	28,000	28,000
Louisiana 3 - De Soto	456	B	1	1/17/97	100.00%	59,000	59,000
Louisiana 5 - Beauregard	458	B	1	1/17/97	100.00%	142,000	142,000
Mississippi 1 - Tunica	493	A	1	1/17/97	100.00%	170,000	170,000
Mississippi 3 - Bolivar	495	A	1	1/17/97	51.00%	156,000	79,560
Mississippi 4 - Yalobusha	496	A	1	1/17/97	51.00%	127,000	64,770
Texas 21 - Chambers	672	B	1	1/17/97	25.00%	21,000	5,250
Total						1,433,000	1,278,580

US West Media Group (1)

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Minneapolis-St. Paul, MN-WI	15	B	1	12/31/95	100.00%	2,609,100	2,609,100
Denver-Boulder, CO	19	B	1	12/31/95	100.00%	2,093,900	2,093,900
Seattle-Everett, WA	20	B	1	12/31/95	83.83%	2,141,200	1,794,968
Phoenix, AZ	26	B	1	12/31/95	100.00%	2,391,300	2,391,300
Portland, OR-WA	30	B	1	12/31/95	100.00%	1,597,800	1,597,800
Salt Lake City-Ogden, UT	39	B	1	12/31/95	100.00%	1,233,300	1,233,300
Omaha, NE-IA	65	A	1	12/31/95	93.75%	627,700	588,469
Tuscon, AZ	77	B	1	12/31/95	70.64%	744,600	525,985
Tacoma, WA	82	B	1	12/31/95	83.83%	651,400	546,069
Albuquerque, NM	86	B	1	12/31/95	100.00%	602,300	602,300
Des Moines, IA	102	B	1	12/31/95	76.00%	421,600	320,416
Spokane, WA	109	B	1	12/31/95	100.00%	404,500	404,500
Colorado Springs, CO	117	B	1	12/31/95	100.00%	482,400	482,400
Eugene-Springfield, OR	135	B	1	12/31/95	100.00%	302,800	302,800
Duluth, MN-WI	141	B	1	12/31/95	63.37%	241,400	152,975

Salem, OR	148	B	1	12/31/95	100.00%	313,100	313,100
Provo-Orem, UT	159	B	1	12/31/95	100.00%	296,800	296,800
Springfield, IL	176	B	1	12/31/95	12.65%	197,200	24,946
Boise City, ID	190	B	1	12/31/95	100.00%	252,200	252,200
Champaign-Urbana-Rantoul, IL	196	B	1	12/31/95	12.65%	168,400	21,303
Fort Collins-Loveland, CO	210	B	1	12/31/95	100.00%	218,700	218,700
Bremerton, WA	212	B	1	12/31/95	83.83%	226,600	189,959
Fargo-Moorehead, ND-MN	221	B	1	12/31/95	100.00%	163,600	163,600
Decatur, IL	230	B	1	12/31/95	12.65%	116,400	14,725
Olympia, WA	242	B	1	12/31/95	61.08%	193,500	118,190
Greeley, CO	243	B	1	12/31/95	100.00%	146,900	146,900
Bloomington-Normal, IL	250	B	1	12/31/95	12.65%	139,600	17,659
Bellingham, WA	270	B	1	12/31/95	100.00%	149,600	149,600
Grand Forks, ND-MN	276	B	1	12/31/95	100.00%	104,000	104,000
Casper, WY	299	B	1	12/31/95	100.00%	64,500	64,500
Arizona 1 - Mohave	318	B	1	12/31/95	33.33%	121,700	40,563
Arizona 2 - Coconino	319	B	1	12/31/95	36.11%	243,500	87,928
Arizona 3 - Navajo	320	B	1	12/31/95	100.00%	154,500	154,500
Arizona 4 - Yuma	321	B	1	12/31/95	49.67%	146,100	72,568
Arizona 5 - Gila	322	B	1	12/31/95	13.55%	174,700	23,672
Arizona 6 - Graham	323	B	2	12/31/95	100.00%	36,100	36,100
Colorado 3 - Garfield	350	B	1	12/31/95	63.50%	274,800	174,498
Idaho 1 - Boundary	388	B	1	12/31/95	50.00%	240,200	120,100
Idaho 2 - Idaho	389	B	1	12/31/95	50.00%	69,600	34,800
Idaho 3 - Lemhi	390	B	1	12/31/95	66.67%	16,300	10,867
Idaho 4 - Elmore	391	B	1	12/31/95	100.00%	139,900	139,900
Idaho 5 - Butte	392	B	2	12/31/95	100.00%	17,400	17,400
Illinois 2 - Bureau	395	B	3	12/31/95	2.53%	56,400	1,427
Illinois 4 - Adams	397	B	1	12/31/95	0.13%	216,000	281
Illinois 5 - Mason	398	B	2	12/31/95	12.65%	95,100	12,030
Illinois 6 - Montgomery	399	B	1	12/31/95	7.72%	199,500	15,401
Illinois 7 - Vermilion	400	B	1	12/31/95	7.72%	237,400	18,327
Iowa 1 - Mills	412	B	1	12/31/95	7.69%	62,500	4,806
Iowa 2 - Union	413	B	1	12/31/95	50.00%	49,900	24,950
Iowa 7 - Audubon	418	B	1	12/31/95	14.29%	55,000	7,860
Iowa 10 - Humbolt	421	B	1	12/31/95	27.46%	180,900	49,675
Iowa 11 - Hardin	422	B	1	12/31/95	7.14%	111,200	7,940
Minnesota 4 - Lake	485	B	1	12/31/95	100.00%	15,100	15,100
New Mexico 1 - San Juan	553	B	1	12/31/95	100.00%	135,000	135,000
New Mexico 4 - Santa Fe	556	B	2	12/31/95	64.29%	133,700	85,956
North Dakota 3 - Barnes	582	B	1	12/31/95	15.41%	90,800	13,992
Oregon 1 - Clatsop	606	B	1	12/31/95	100.00%	175,800	175,800
Oregon 4 - Lincoln	609	B	1	12/31/95	100.00%	220,000	220,000
Utah 1 - Box Elder	673	B	1	12/31/95	100.00%	116,300	116,300
Utah 2 - Morgan	674	B	1	12/31/95	66.67%	41,500	27,668
Washington 1 - Clallam	693	B	1	12/31/95	83.83%	264,300	221,563
Washington 2 - Okanogan	694	B	1	12/31/95	100.00%	124,400	124,400
Washington 3 - Ferry	695	B	1	12/31/95	100.00%	55,800	55,800
Washington 4 - Grays Harbor	696	B	1	12/31/95	37.50%	115,000	43,125
Wyoming 4 - Niobrara	721	B	1	12/31/95	100.00%	134,000	134,000
Wyoming 5 - Converse	722	B	1	12/31/95	100.00%	11,900	11,900
Total						23,828,700	20,178,659

(1) On April 8, 1998 Airtouch completed its acquisition of US West Media Group's wireless properties.

Vanguard Cellular

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Northeast Pennsylvania, PA	56	A	1	12/31/97	100.00%	653,817	653,817
Allentown-Bethlehem-Easton, PA-NJ	58	A	1	12/31/97	100.00%	713,438	713,438
Harrisburg, PA	84	A	1	12/31/97	100.00%	499,402	499,402
York, PA	99	A	1	12/31/97	100.00%	456,861	456,861
Lancaster, PA	105	A	1	12/31/97	100.00%	453,348	453,348
Huntington-Ashland, WV/KY/OH	110	A	1	12/31/97	100.00%	316,929	316,929
Reading, PA	118	A	1	12/31/97	100.00%	353,650	353,650
Binghamton, NY	122	A	1	12/31/97	100.00%	293,703	293,703
Pensacola, FL	127	A	1	12/31/97	100.00%	390,989	390,989
Charleston, WV	140	A	1	12/31/97	100.00%	254,889	254,889
Portland, ME	152	A	1	12/31/97	100.00%	288,136	288,136
Columbus, GA-AL	153	A	1	12/31/97	13.69%	250,931	34,352

Portsmouth-Dover-Rochester, NH-ME	156	A	1	12/31/97	100.00%	280,193	280,193
Parkersburg-Marietta, OH-WV	200	A	1	12/31/97	100.00%	157,364	157,364
Wilmington, NC	218	A	1	12/31/97	47.97%	211,278	101,350
Bangor, ME	224	A	1	12/31/97	5.31%	144,777	7,688
Altoona, PA	225	A	1	12/31/97	100.00%	131,287	131,287
Petersburg-Colonial Heights-Hopewell, VA	235	A	1	12/31/97	12.44%	129,786	16,145
Williamsport, PA	251	A	1	12/31/97	100.00%	118,681	118,681
Pascagoula, MS	252	A	1	12/31/97	3.99%	129,421	5,164
Jacksonville, NC	258	A	1	12/31/97	47.79%	144,614	69,111
State College, PA	259	A	1	12/31/97	100.00%	131,962	131,962
Albany, GA	261	A	1	12/31/97	10.29%	117,662	12,107
Fort Walton Beach, FL	265	A	1	12/31/97	100.00%	168,283	168,283
Panama City, FL	283	A	1	12/31/97	18.28%	146,713	26,819
Elmira, NY	284	A	1	12/31/97	100.00%	92,820	92,820
Maine 4 - Washington	466	A	1	12/31/97	100.00%	86,052	86,052
Ohio 9 - Ross	593	A	1	12/31/97	100.00%	248,993	248,993
Ohio 10 - Perry	594	A	2	12/31/97	100.00%	112,256	112,256
Pennsylvania 5 - Wayne	616	A	1	12/31/97	100.00%	84,292	84,292
Pennsylvania 8 - Union	619	A	1	12/31/97	100.00%	408,709	408,709
Pennsylvania 10 - Bedford	621	A	2	12/31/97	100.00%	141,875	141,875
Pennsylvania 11 - Huntingdon	622	A	1	12/31/97	100.00%	113,933	113,933
Pennsylvania 12 - Lebanon	623	A	1	12/31/97	100.00%	117,361	117,361
South Carolina 5 - Georgetown	629	A	1	12/31/97	100.00%	253,351	253,351
West Virginia 1 - Mason	701	A	1	12/31/97	100.00%	77,008	77,008
West Virginia 6 - Lincoln	706	A	1	12/31/97	100.00%	182,128	182,128
Total (1)						8,856,892	7,854,447

(1) The Vanguard also has other minority interests with a combined 38,664 net POPs which are not included in the company totals.

Warwick Valley Telephone

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Orange County, NY	144	B	1	12/31/97	7.50%	(1)	(1)
Total							

(1) The company does not report POPs.

Western Wireless

MSA/RSA Name	MSA/RSA Number	Freq. Block	Sub Market	As of Date	% Owned	POPs	Net POPs
Lubbock, TX Counties - Lubbock	161	A	1	12/31/97	100.00%	237,000	237,000
Lincoln, NE	172	A	1	12/31/97	100.00%	237,000	237,000
Abilene, TX	220	A	1	12/31/97	100.00%	157,000	157,000
Fargo-Moorehead, ND-MN	221	A	1	12/31/97	100.00%	171,000	171,000
Pueblo, CO	241	A	1	12/31/97	100.00%	134,000	134,000
Sioux City, IA-NE	253	A	1	12/31/97	100.00%	123,000	123,000
Odessa, TX	255	A	1	12/31/97	96.00%	125,000	120,000
Sioux Falls, SD	267	A	1	12/31/97	99.00%	142,000	140,580
Billings, MT	268	A	1	12/31/97	98.00%	131,000	128,380
Grand Forks, ND-MN	276	A	1	12/31/97	100.00%	106,000	106,000
Rapid City, SD	289	A	1	12/31/97	100.00%	114,000	114,000
San Angelo, TX	294	A	1	12/31/97	100.00%	103,000	103,000
Midland, TX	295	A	1	12/31/97	96.00%	121,000	116,160
Great Falls, MT	297	A	1	12/31/97	100.00%	82,000	82,000
Bismarck, ND	298	A	1	12/31/97	100.00%	95,000	95,000
Casper, WY	299	A	1	12/31/97	100.00%	66,000	66,000
California 6 - Mono	341	A	1	12/31/97	100.00%	29,000	29,000
Colorado 5 - Elbert	352	A	1	12/31/97	100.00%	34,000	34,000
Colorado 7 - Saguache	354	A	1	12/31/97	100.00%	50,000	50,000
Colorado 8 - Kiowa	355	A	1	12/31/97	100.00%	48,000	48,000
Colorado 9 - Costilla	356	A	1	12/31/97	100.00%	30,000	30,000
Idaho 2 - Idaho	389	A	1	12/31/97	100.00%	80,000	80,000
Iowa 8 - Monona	419	A	1	12/31/97	100.00%	55,000	55,000
Kansas 3 - Jewell	430	A	1	12/31/97	100.00%	54,000	54,000
Kansas 4 - Marshall	431	A	1	12/31/97	100.00%	137,000	137,000
Kansas 8 - Ellsworth	435	A	1	12/31/97	100.00%	131,000	131,000
Kansas 9 - Morris	436	A	1	12/31/97	100.00%	59,000	59,000

Kansas 10 - Franklin	437	A	1	12/31/97	100.00%	110,000	110,000
Kansas 14 - Reno	441	A	1	12/31/97	100.00%	177,000	177,000
Minnesota 1 - Kittson	482	A	1	12/31/97	100.00%	49,000	49,000
Minnesota 2 - Lake of the Woods	483	A	1	12/31/97	100.00%	26,000	26,000
Minnesota 7 - Chippewa	488	A	1	12/31/97	100.00%	172,000	172,000
Minnesota 8 - Lac qui Parle	489	A	1	12/31/97	100.00%	68,000	68,000
Minnesota 9 - Pipestone	490	A	1	12/31/97	100.00%	133,000	133,000
Missouri 9 - Bates	512	A	1	12/31/97	100.00%	81,000	81,000
Montana 1 - Lincoln	523	A	1	12/31/97	100.00%	158,000	158,000
Montana 2 - Toole	524	A	1	12/31/97	100.00%	37,000	37,000
Montana 3 - Phillips	525	A	1	12/31/97	100.00%	16,000	16,000
Montana 4 - Daniels	526	A	1	12/31/97	100.00%	41,000	41,000
Montana 5 - Mineral	527	A	1	12/31/97	100.00%	194,000	194,000
Montana 6 - Deer Lodge	528	A	1	12/31/97	100.00%	66,000	66,000
Montana 7 - Fergus	529	A	1	12/31/97	100.00%	31,000	31,000
Montana 8 - Beaverhead	530	A	1	12/31/97	100.00%	96,000	96,000
Montana 9 - Carbon	531	A	1	12/31/97	100.00%	34,000	34,000
Montana 10 - Prairie	532	A	1	12/31/97	100.00%	20,000	20,000
Nebraska 2 - Cherry	534	A	1	12/31/97	100.00%	31,000	31,000
Nebraska 3 - Knox	535	A	1	12/31/97	100.00%	120,000	120,000
Nebraska 4 - Grant	536	A	1	12/31/97	100.00%	36,000	36,000
Nebraska 5 - Boone	537	A	1	12/31/97	100.00%	149,000	149,000
Nebraska 6 - Keith	538	A	1	12/31/97	100.00%	110,000	110,000
Nebraska 7 - Hall	539	A	1	12/31/97	100.00%	94,000	94,000
Nebraska 8 - Chase	540	A	1	12/31/97	100.00%	58,000	58,000
Nebraska 9 - Adams	541	A	1	12/31/97	100.00%	82,000	82,000
Nebraska 10 - Cass	542	A	1	12/31/97	100.00%	88,000	88,000
Nevada 1 - Humboldt	543	A	1	12/31/97	100.00%	44,000	44,000
Nevada 2 - Lander	544	A	1	12/31/97	100.00%	50,000	50,000
Nevada 4 - Mineral	546	A	1	12/31/97	100.00%	38,000	38,000
Nevada 5 - White Pine	547	A	1	12/31/97	100.00%	14,000	14,000
New Mexico 6 - Lincoln	558	A	1	12/31/97	100.00%	255,000	255,000
North Dakota 1 - Divide	580	A	1	12/31/97	100.00%	106,000	106,000
North Dakota 2 - Bottineau	581	A	1	12/31/97	100.00%	62,000	62,000
North Dakota 4 - McKenzie	583	A	1	12/31/97	100.00%	63,000	63,000
North Dakota 5 - Kidder	584	A	1	12/31/97	100.00%	48,000	48,000
Oklahoma 7 - Beckham	602	A	1	12/31/97	100.00%	133,000	133,000
Oklahoma 8 - Jackson	603	A	1	12/31/97	100.00%	99,000	99,000
South Dakota 1 - Harding	634	A	1	12/31/97	100.00%	38,000	38,000
South Dakota 2 - Corson	635	A	1	12/31/97	100.00%	23,000	23,000
South Dakota 3 - McPherson	636	A	1	12/31/97	100.00%	54,000	54,000
South Dakota 4 - Marshall	637	A	1	12/31/97	100.00%	71,000	71,000
South Dakota 5 - Custer	638	A	1	12/31/97	100.00%	27,000	27,000
South Dakota 6 - Haakon	639	A	1	12/31/97	100.00%	41,000	41,000
South Dakota 7 - Sully	640	A	1	12/31/97	100.00%	67,000	67,000
South Dakota 8 - Kingsbury	641	A	1	12/31/97	100.00%	74,000	74,000
South Dakota 9 - Hanson	642	A	1	12/31/97	100.00%	100,000	100,000
Texas 1 - Dallam	652	A	1	12/31/97	100.00%	56,000	56,000
Texas 2 - Hansford	653	A	1	12/31/97	100.00%	89,000	89,000
Texas 3 - Parmer	654	A	1	12/31/97	100.00%	139,000	139,000
Texas 4 - Briscoe	655	A	1	12/31/97	100.00%	40,000	40,000
Texas 5 - Hardeman	656	A	1	12/31/97	100.00%	77,000	77,000
Texas 8 - Gaines	659	A	1	12/31/97	100.00%	136,000	136,000
Texas 12 - Hudspeth	663	A	1	12/31/97	100.00%	27,000	27,000
Texas 13 - Reeves	664	A	1	12/31/97	100.00%	33,000	33,000
Texas 14 - Loving	665	A	1	12/31/97	100.00%	45,000	45,000
Utah 3 - Juab	675	A	1	12/31/97	100.00%	58,000	58,000
Utah 4 - Beaver	676	A	1	12/31/97	100.00%	119,000	119,000
Utah 6 - Piute	678	A	1	12/31/97	100.00%	30,000	30,000
Wyoming 2 - Sheridan	719	A	1	12/31/97	100.00%	80,000	80,000
Wyoming 5 - Converse	722	A	1	12/31/97	49.00%	13,000	6,370
Total						7,477,000	7,456,490