

Before the  
 Federal Communications Commission  
 Washington, D.C. 20554

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

**SEVENTH REPORT**

**Adopted: June 13, 2002**

**Released: July 3, 2002**

By the Commission: Commissioner Copps issuing a statement.

**Table of Contents**

	<u>Page</u>
I. INTRODUCTION .....	3
A. Overview.....	3
B. Status of Competition .....	4
C. Industry Development.....	5
II. THE CMRS INDUSTRY .....	9
A. Mobile Telephony.....	9
1. Mobile Telephone Overview and Analysis.....	9
a. Market Structure .....	9
b. Market Performance .....	19
c. Digital Deployment .....	25
d. Pricing Data and Trends .....	28
e. Wireless/Wireline Competition .....	32
f. Geographical Comparisons: Urban vs. Rural .....	36
2. Other Competitors: Resellers and Satellite Operators .....	41
a. Resellers.....	41
b. Satellite Operators.....	42
3. International Developments.....	44
a. International Investments.....	44
b. International Comparisons.....	48
B. Mobile Data .....	55

---

1.	Introduction.....	55
a.	Domestic Developments .....	55
b.	International Developments .....	58
2.	Industry Structure and Performance .....	59
a.	Mobile Telephone Sector.....	59
b.	Handheld Devices.....	61
c.	Paging Sector.....	66
3.	Mobile Data Services.....	68
a.	Paging .....	68
b.	SMS and Instant Messaging .....	68
c.	Web Content .....	70
d.	E-mail and Corporate Server Access .....	73
e.	Location-Based Services.....	75
f.	Short Range Data Transmissions.....	78
4.	Telemetry and Telematics.....	81
III.	CONCLUSION.....	83
IV.	ADMINISTRATIVE MATTERS.....	85

APPENDIX A: Fixed Wireless Voice and Data Services

APPENDIX B: Spectrum Auctions Tables

APPENDIX C: Mobile Telephony Tables

APPENDIX D: Mobile Data Tables

APPENDIX E: Maps

## I. INTRODUCTION

### A. Overview

In 1993, Congress created the statutory classification of Commercial Mobile Services<sup>1</sup> to promote the consistent regulation of mobile radio services that are similar in nature.<sup>2</sup> At the same time, Congress established the promotion of competition as a fundamental goal for CMRS policy formation and regulation. To measure progress toward this goal, Congress required the Federal Communications Commission (“FCC” or “Commission”) to submit annual reports that analyze competitive conditions in the industry.<sup>3</sup> This report is the seventh of the Commission’s annual reports<sup>4</sup> on the state of CMRS competition.<sup>5</sup>

CMRS includes a large number of terrestrial services and some mobile satellite services.<sup>6</sup> As in the past, this report bases its analysis on a consumer-oriented view of wireless services by focusing on specific product categories, regardless of their regulatory classification. In some cases, this includes an analysis of offerings outside the umbrella of “services” specifically designated by the Commission as CMRS.<sup>7</sup> However, because licensees of these other spectrum-based services often compete with CMRS providers, as well as with other providers of telecommunications services, the Commission believes that it is important to consider them in the analysis.

Since the release of the *Sixth Report*, the Commission has expanded its efforts to improve the quality and granularity of the data used to examine competition in the CMRS marketplace. For example, this report utilizes data submitted directly to the FCC, in addition to non-governmental surveys, for information on

---

<sup>1</sup> Commercial Mobile Services came to be known by the Commission as the Commercial Mobile Radio Services, or “CMRS.”

<sup>2</sup> The Omnibus Budget Reconciliation Act of 1993, Pub. L. No. 103-66, Title VI, § 6002(b), amending the Communications Act of 1934 and codified at 47 U.S.C. § 332(c).

<sup>3</sup> *Id.* codified at 47 U.S.C. § 332(c)(1)(C).

<sup>4</sup> *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, *Fourth Report*, 14 FCC Rcd 10145 (1999) (“*Fourth 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, *Fifth Report*, 15 FCC Rcd 17660 (2000) (“*Fifth 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, *Sixth Report*, 16 FCC Rcd 13350 (2001) (“*Sixth Report*”).

<sup>5</sup> This report, like the others before it, discusses CMRS as a whole because Congress called on the Commission to report on “competitive market conditions with respect to commercial mobile services.” 47 U.S.C. § 332 (c)(1)(C). Any individual proceeding in which the Commission defines relevant product and geographic markets, such as an application for approval of a license transfer, may present facts pointing to narrower or broader product markets than any used, suggested, or implied in this report.

<sup>6</sup> 47 C.F.R. § 20.9(10).

<sup>7</sup> *See, e.g.*, Section II.A.2.b, Satellite Operators, *infra*, which includes a discussion of satellite services that are regulated as commercial mobile radio services as well as satellite services that may compete with CMRS, even though they are not subject to the CMRS rules.

mobile telephony subscribership.<sup>8</sup> An analysis of this information allows the Commission to estimate wireless penetration rates on a regional basis in addition to a national basis.

As part of its ongoing effort to improve its annual CMRS report, the Commission also held a Public Forum in February 2002 to examine ways in which to better gather and analyze data for this report, in particular data regarding the development of rural and underserved wireless markets.<sup>9</sup> Participants included representatives from telecommunications companies, industry associations, consumer groups, academics, consulting firms, and federal government agencies. In response, the Commission has integrated into this report the data submitted at the forum, and adopted a number of suggestions made by Forum participants on how to obtain and analyze data more effectively. In addition, the Commission will be issuing a Notice of Inquiry (“NOI”) to help gather more information for next year’s report.

This report focuses on two categories of wireless services: mobile telephony<sup>10</sup> and mobile data.<sup>11</sup> We emphasize that these two service categories are not as clearly delineated in the marketplace. For example, many mobile telephony operators also offer mobile data services using the same spectrum, network facilities, and customer equipment. Therefore, while these service categories are used to provide structure for this CMRS competition report, the Commission’s view of the mobile services marketplace is not limited by the categories in which this report places them.

## B. Status of Competition

In the year 2001, the CMRS industry continued to experience increased competition, innovation, lower prices for consumers, and increased diversity of service offerings. The year saw a number of operators continue to fill in gaps in their national coverage through mergers, acquisitions, license swaps, and joint ventures.<sup>12</sup> In parallel with this process of footprint building,<sup>13</sup> mobile telephone operators continue to deploy their networks in an increasing number of markets, expand their digital networks, and develop innovative pricing plans.

---

<sup>8</sup> See Section II.A.1.b, Market Performance, *infra*, for a detailed discussion.

<sup>9</sup> See Wireless Telecommunications Bureau Announces Agenda and Speakers For Public Forum For The 7<sup>th</sup> Annual Commercial Mobile Radio Services Competition Report, *Public Notice*, DA 02-422 (rel. Feb. 25, 2002). See *Commercial Mobile Radio Services (CMRS) Competition Report Public Forum* <<http://wireless.fcc.gov/cmrs-crforum.html>> for access to participants’ presentations and forum transcript. The transcript of the forum can be found at *Public Hearing for 7th Annual CMRS Competition Report: Transcript of the Day’s Event* (visited Mar. 14, 2002) <<http://wireless.fcc.gov/services/cmrs/presentations/020228.pdf>> (“*Transcript*”).

<sup>10</sup> For purposes of this report, the Commission defines the mobile telephone segment to include the provision of mobile telephony services by cellular, broadband Personal Communications Services (“broadband PCS” or “PCS”), and digital Specialized Mobile Radio (“SMR”) operators. The Commission recognizes that other formulations have been used in specific adjudications and that the Commission may determine in the future that these definitions should be revised.

<sup>11</sup> Mobile data service is the delivery of non-voice information to a mobile device and includes everything from paging messages to web access on a mobile phone to e-mail delivery.

<sup>12</sup> See Section II.A.1.a(ii), Building Nationwide Networks, *infra*.

<sup>13</sup> Generally, “footprint” is an industry term of art referring to the total geographic area in which a wireless provider offers service or is licensed to offer service.

During the past year, the mobile data industry continued to grow and to evolve. Estimates of the number of mobile Internet users at the end of 2001 range from approximately 8 to 10 million,<sup>14</sup> up from 2 to 2.5 million at the end of 2000.<sup>15</sup> Since the writing of the *Sixth Report*, several mobile data operators have begun upgrading their networks to allow for faster data access speeds and more advanced services.<sup>16</sup> As of March 2002, four nationwide mobile telephone operators were offering mobile Internet access at speeds generally ranging from 25-60 kilobits per second (“kbps”), with maximum bursting rates up to 144 kbps for at least one carrier, in some portion of U.S. counties covering approximately 181 million people.<sup>17</sup> In addition, most handheld personal digital assistant (“PDA”) devices<sup>18</sup> currently available offer users some method of connecting to the mobile Internet. Competition within the mobile data sector is developing successfully, as evidenced by the multitude of dynamic services, service packages, and pricing plans available to consumers from a variety of providers.

### C. Industry Development

*Mobile Telephony.* The mobile telephony sector of CMRS has experienced continued strong growth and competitive development.<sup>19</sup> In the 12 months ending December 2001, the mobile telephony sector generated over \$65 billion in revenues,<sup>20</sup> increased subscribership from 109.5 million to 128.5 million,<sup>21</sup> and produced a nationwide penetration rate of roughly 45 percent.<sup>22</sup> Broadband PCS carriers and digital SMR providers continue to deploy their networks.<sup>23</sup> To date, 268 million people, or 94 percent of the total U.S. population, live in counties with access to three or more different operators (cellular, broadband PCS, and/or digital SMR providers) offering mobile telephone service.<sup>24</sup> Over 229 million people, or 80 percent of the U.S. population, live in counties with five or more mobile telephone operators competing to

---

<sup>14</sup> See Section II.B.1.a, Mobile Data Domestic Developments, and note 367, *infra*.

<sup>15</sup> See Section II.B.1.a, Mobile Data Domestic Developments, *infra*.

<sup>16</sup> See Section II.B.2.a, Mobile Data Mobile Telephone Sector, *infra*.

<sup>17</sup> See Section II.B.1.a, Mobile Data Domestic Developments, *infra*.

<sup>18</sup> The terms “PDA,” “handheld,” “handheld PDA,” and “handheld device” are used interchangeably throughout this report.

<sup>19</sup> Most of the data in this report, except where noted, are taken from publicly-available sources. These sources include: trade associations, securities analysts, company releases and web sites, filings with the Securities and Exchange Commission (“SEC”), 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.

<sup>20</sup> See Appendix C, Table 1, at C-2.

<sup>21</sup> See Section II.A.1.b(i), Subscriber Growth, *infra*.

<sup>22</sup> *Id.*

<sup>23</sup> See Section II.A.1.b(vi), Market Entry, *infra*, for a detailed discussion.

<sup>24</sup> See Appendix C, Table 4, at C-5.

offer service.<sup>25</sup> And 151 million people, or 53 percent of the population, live in counties in which six different mobile telephone operators are providing service.<sup>26</sup>

Digital technology is now dominant in the mobile telephone sector.<sup>27</sup> At the end of 2001, digital customers made up almost 80 percent of the industry total, up from 72 percent at the end of 2000.<sup>28</sup> Finally, in part because of competitive pressures in the marketplace, the average price of mobile telephone service has declined during the year since the *Sixth Report*, continuing the trend of the last several years.<sup>29</sup> According to the U.S. Department of Labor's Bureau of Labor Statistics, the price of residential mobile telephone service declined by 5.5 percent during 2001.<sup>30</sup> Another survey indicates that the average revenue per minute of mobile telephone use fell 31 percent between 2000 and 2001.<sup>31</sup>

*Mobile Data.* This report describes mobile data providers and their corresponding devices in three general categories: (1) mobile telephone operators offering services primarily on mobile telephone handsets, (2) providers of mobile data access to handheld PDA devices and laptop computers, and (3) paging carriers offering services on pagers and two-way messaging devices. The report's mobile data section first discusses the key developments and events related to these three categories of carriers and devices that occurred during 2001 and early 2002. During the past year, the types of mobile data services available on mobile data devices have become increasingly similar. Therefore, this year's report provides details on the major mobile data services available to consumers – including paging, Short Messaging Service (“SMS”), web access, e-mail and corporate server access, location-based services, and short range data transmissions – in a separate section following the discussion of the three categories of mobile data providers and devices. During the past year, many mobile telephone carriers began deploying advanced wireless service network technologies such as cdma2000 1xRTT and General Packet Radio Service (“GPRS”).<sup>32</sup> These deployments contributed to the further convergence of mobile voice and mobile data

---

<sup>25</sup> *Id.*

<sup>26</sup> *Id.*

<sup>27</sup> The four main digital technologies used in the United States are: Code Division Multiple Access (“CDMA”), Global System Mobile Communications (“GSM”), integrated Digital Enhanced Network (“iDEN”), and Time Division Multiple Access (“TDMA”).

<sup>28</sup> See Section II.A.1.c, Digital Deployment, *infra*, for a detailed discussion.

<sup>29</sup> See Section II.A.1.d, Pricing Data and Trends, *infra*, for a detailed discussion of price competition.

<sup>30</sup> *Id.*

<sup>31</sup> *Id.*

<sup>32</sup> For purposes of this report, “advanced wireless services” is used to describe the next-generation mobile network technologies of GPRS and cdma2000 1xRTT (also referred to as “cdma2000 1X” or “1xRTT”). This term is used because there is debate in the industry as to which next-generation mobile network upgrades constitute “3G.” As explained in the *Sixth Report*, Third Generation, or “3G,” generally refers to high-speed advanced mobile data services and the next generation of technologies – beyond the 2G technologies of CDMA, TDMA, GSM, and iDEN – that will make such services possible. See *Sixth Report*, at 13356. 3G speeds are expected to reach 2 megabits per second (“Mbps”) from a fixed location, 384 kbps at pedestrian speeds, and 144 kbps at traveling speeds of 100 kilometers per hour. See *Fifth Report*, at 17695. In the United States, GSM/TDMA carriers are deploying GPRS as an interim technology, also often referred to as a “2.5G” technology because most currently plan to use GPRS in migrating from 2G to 3G. GPRS is a packet-based data-only network upgrade that allows for faster data rates by aggregating up to eight 14.4 kbps channels. See *Fifth Report*, at 17700. See also, note 399,

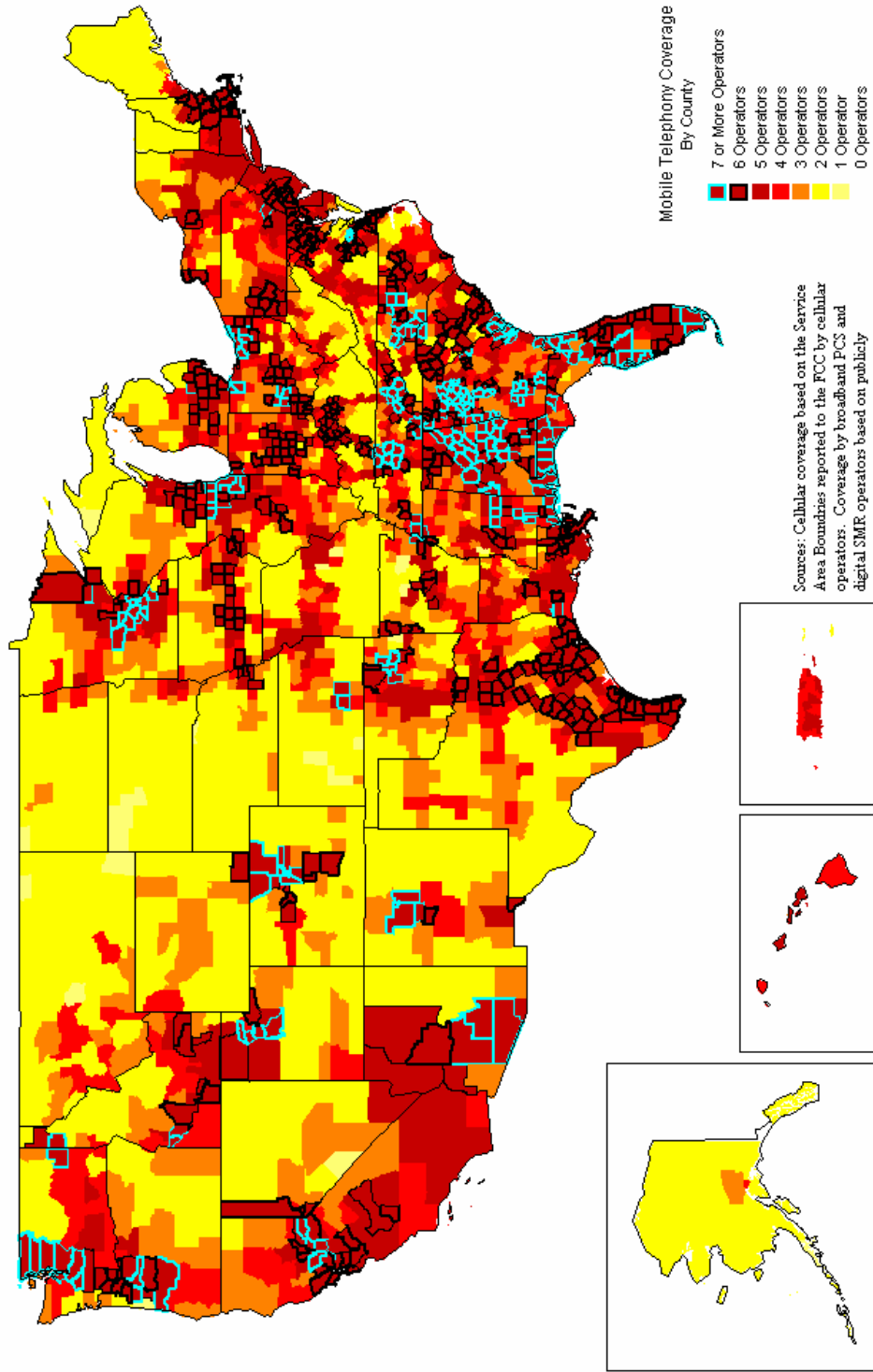
services, which was marked by the emergence of smartphone devices that combine the organization and data-centric features of PDAs with the voice capabilities of mobile telephones.<sup>33</sup>

---

*infra*. Most U.S. GSM/TDMA carriers plan to deploy Enhanced Data Rates for GSM Evolution (“EDGE”) and eventually Wideband CDMA (“WCDMA,” also known as Universal Mobile Telecommunications System, or “UMTS”). CDMA carriers are upgrading to cdma2000 1xRTT, a network technology that doubles voice capacity and allows maximum data throughput rates of up to 144 kbps. Many in the industry describe 1xRTT as a 2.5G technology, while some CDMA carriers and equipment manufacturers characterize it as the first step in 3G deployment. Beyond 1xRTT, the major CDMA carriers have plans to build out cdma2000 EV-DO and/or cdma2000 1X-EV, which will reportedly increase maximum data transfer speeds to 2.4 Mbps. *See* Section II.B.2.a, Mobile Data Mobile Telephone Sector, *infra*, for a more detailed discussion.

<sup>33</sup> *See* Section II.B.2.b.(i), Smartphones, *infra*.

# Mobile Telephone Operator Coverage Estimated by County





## II. THE CMRS INDUSTRY

### A. Mobile Telephony

This report defines the mobile telephone sector to include all operators that offer commercially available, interconnected mobile phone services. These operators provide access to the public switched telephone network (“PSTN”) via mobile communication devices employing radiowave technology to transmit calls. As discussed in previous reports,<sup>34</sup> providers using cellular radiotelephone, broadband PCS, and SMR licenses dominate this sector.<sup>35</sup> Resellers and operators using satellite systems also offer mobile telephone services. Because these providers offer mobile telephone services that are essentially interchangeable, or at least close substitutes, from the perspective of most consumers, they are discussed in this report as a cohesive industry sector.

The discussion below describes the mobile telephone market as a whole and includes sections on market structure, market performance, digital technologies, pricing, wireless-wireline competition, and urban-rural comparisons. This is followed by discussions of resellers and satellite providers as well as international developments.

#### 1. Mobile Telephone Overview and Analysis

##### a. Market Structure

###### (i) Spectrum Allocation

Currently, mobile telephony operators primarily use three types of spectrum licenses to provide service: cellular, broadband PCS, and SMR.<sup>36</sup>

Cellular – The Commission began licensing commercial cellular providers in 1982 and completed licensing the majority of operators by 1991. The Commission divided the United States and its possessions into 734 cellular market areas (“CMAs”), including 305 Metropolitan Statistical Areas (“MSAs”), 428 Rural Service Areas (“RSAs”), and a market for the Gulf of Mexico.<sup>37</sup> Two cellular

---

<sup>34</sup> See *Fourth Report*, at 10151-10152, and *Fifth Report*, at 17668.

<sup>35</sup> See 47 C.F.R. §§ 22.900, 24.200, 90.601.

<sup>36</sup> See Appendix E, Table 1 and Maps 11-14, at E-12 – E-16, for descriptions and maps of various geographical licensing schemes employed by the Commission.

<sup>37</sup> Under the original cellular licensing rules, one of the two cellular channel blocks in each market (the B block) was awarded to a local wireline carrier, while the other block (the A block) was awarded competitively to a carrier other than a local wireline incumbent. After awarding the first 30 MSA licenses pursuant to comparative hearing rules, the Commission adopted rules in 1984 and 1986 to award the remaining cellular MSA and RSA licenses through lotteries. By 1991, lotteries had been held for every MSA and RSA, and licenses were awarded to the lottery winners in most instances. In some RSA markets, however, the initial lottery winner was disqualified from receiving the license because of a successful petition to deny or other Commission action. Implementation of Competitive Bidding Rules to License Certain Rural Service Areas, *Report and Order*, 17 FCC Rcd 1960, 1961-1962 (2002). In 1997, the Commission auctioned cellular spectrum in areas unbuilt by the original cellular licensees. See FCC, *Auction 12: Cellular Unserviced* (visited Apr. 12, 2002) <<http://wireless.fcc.gov/auctions/12/>>.

systems were licensed in each market area. The Commission allocated 50 megahertz of spectrum in the 800 MHz frequency band for the two competing cellular systems in each market (25 megahertz for each system). Initially, cellular systems offered service using analog technology, but today most of the service offered using cellular spectrum is digital.<sup>38</sup>

Broadband PCS – Broadband PCS is similar to cellular service, except that broadband PCS systems operate in different spectrum bands and have been designed from the beginning to use a digital format. Broadband PCS licenses have been assigned through auction, beginning in 1995.<sup>39</sup> The most recent broadband PCS auction was completed in 2001.<sup>40</sup> The Commission has set aside the spectrum between 1850 MHz and 1990 MHz for broadband PCS. This spectrum includes 120 megahertz for mobile telephony, divided originally into three blocks of 30 megahertz each (blocks A, B, and C) and three blocks of 10 megahertz each (blocks D, E, and F).<sup>41</sup> Two of the 30 megahertz blocks (A and B blocks) are assigned on the basis of 51 Major Trading Areas (“MTAs”).<sup>42</sup> One of the 30 megahertz blocks (C block) and all three of the 10 megahertz blocks are assigned on the basis of 493 BTAs.<sup>43</sup>

---

In 2002, the Commission auctioned three RSA licenses where the initial lottery winner had been disqualified. *See* FCC, *Auction 45: Cellular RSA* (visited June 7, 2002) <<http://wireless.fcc.gov/auctions/45/>>.

<sup>38</sup> See Section II.A.1.c, Digital Deployment, *infra*.

<sup>39</sup> The first auction was for two license blocks of 30 megahertz each. *FCC Grants 99 Licenses For Broadband Personal Communications Services In Major Trading Areas*, News Release, Federal Communications Commission, June 23, 1995. The Commission has had five additional broadband PCS auctions. *See* Federal Communications Commission, *Completed Auctions* (visited Apr. 13, 2001) <<http://www.fcc.gov/wtb/auctions/serv8.html>>. Three licenses were also awarded as part of a pioneer preference program in 1994. *Three Pioneer Preference PCS Applications Granted*, News Release, FCC, Dec. 14, 1994.

<sup>40</sup> *See Sixth Report*, at 13368.

<sup>41</sup> The Commission’s broadband PCS allocation includes 20 megahertz of spectrum at 1910 MHz - 1930 MHz for unlicensed broadband PCS. Unlicensed broadband PCS is used for short-range communications such as wireless private branch exchanges. Such systems operate with very low power and have a limit on the duration of transmissions.

<sup>42</sup> Major Trading Areas are Material Copyright (c) 1992 Rand McNally & Company. Rights granted pursuant to a license from Rand McNally & Company through an arrangement with the Federal Communications Commission. Rand McNally’s MTA specification contains 47 geographic areas covering the 50 states and the District of Columbia. For its spectrum auctions, the Commission has added three MTA-like areas: Guam and the Northern Mariana Islands, Puerto Rico and the U.S. Virgin Islands, and American Samoa. In addition, Alaska was separated from the Seattle MTA into its own MTA-like area. MTAs are combinations of two or more Basic Trading Areas (“BTAs”). BTAs are Material Copyright (c) 1992 Rand McNally & Company. Rights granted pursuant to a license from Rand McNally & Company through an arrangement with the Federal Communications Commission. BTAs are geographic areas drawn based on the counties in which residents of a given BTA make the bulk of their shopping goods purchases. Rand McNally’s BTA specification contains 487 geographic areas covering the 50 states and the District of Columbia. For its spectrum auctions, the Commission added additional BTA-like areas for: American Samoa; Guam; Northern Mariana Islands; San Juan, Puerto Rico; Mayagüez/Aguadilla-Ponce, Puerto Rico; and the U.S. Virgin Islands.

<sup>43</sup> In June 1998, broadband PCS C block licensees were permitted to elect to disaggregate their licenses and return 15 megahertz of C block spectrum to the Commission. As a result, a number of licensees elected to disaggregate some or all of their licenses, creating some BTAs with seven broadband PCS spectrum licenses. *See* Amendment of the Commission’s Rules Regarding Installment Payment Financing for Personal Communications

SMR - The Commission first established SMR in 1979 to provide for land mobile communications on a commercial basis. The Commission initially licensed spectrum in the 800 and 900 MHz bands for this service, in non-contiguous bands, on a site-by-site basis.<sup>44</sup> The Commission has since licensed additional SMR spectrum through auctions.<sup>45</sup> In total, the Commission has licensed 19 megahertz of SMR spectrum, plus an additional 7.5 megahertz of spectrum that is available for SMR as well as other services.<sup>46</sup> While Commission policy permits flexible use of this spectrum, including the provision of paging, dispatch, mobile voice, mobile data, facsimile, or combinations of these services,<sup>47</sup> the primary use for SMR traditionally has been dispatch services.<sup>48</sup> Dispatch differs from mobile voice

---

Services (PCS) Licensees, *Second Report and Order and Further Notice of Proposed Rule Making*, 12 FCC Rcd 16436 (1997); Amendment of the Commission's Rules Regarding Installment Payment Financing for Personal Communications Services (PCS) Licensees, *Order on Reconsideration of the Second Report and Order*, 13 FCC Rcd 8345 (1998). In August 2000, the Commission decided to reconfigure each 30 megahertz C block license available for auction, beginning with Auction No. 35, into three 10 megahertz licenses. Amendment of the Commission's Rules Regarding Installment Payment Financing for Personal Communications Services (PCS) Licensees, *Sixth Report and Order and Order on Reconsideration*, 15 FCC Rcd 16266, 16267 (2000).

<sup>44</sup> The "900 MHz" SMR band refers to spectrum allocated in the 896-901 and 935-940 MHz bands; the "800 MHz" band refers to spectrum allocated in the 806-824 and 851-869 MHz bands. See 47 C.F.R. §90.603; see also 47 C.F.R. § 90.7 (defining "specialized mobile radio system").

<sup>45</sup> The Commission has held multiple auctions for SMR licenses. FCC, *FCC Auctions* (visited Mar. 7, 2002) <<http://wireless.fcc.gov/auctions/>>.

<sup>46</sup> There are five megahertz in the 900 MHz band (200 paired channels x 12.5 kHz/channel). See 47 C.F.R. §90.617, Table 4B. There are 21.5 megahertz in the 800 MHz band: 14 megahertz in the 800 SMR Service (280 paired channels x 25 kHz/channel) and 7.5 megahertz in the 800 MHz General Category (150 paired channels x 25 kHz/channel). See 47 C.F.R. § 90.615, Table 1 (SMR General Category) and 47 C.F.R. § 90.617, Table 4A (SMR Service). In 2000, the Commission amended its rules to allow Business and Industrial/Land Transportation licensees in the 800 MHz band to use their spectrum for CMRS operations under certain conditions. Implementation of Sections 309(j) and 337 of the Communications Act of 1934 as Amended Promotion of Spectrum Efficient Technologies on Certain Part 90 Frequencies; Establishment of Public Service Radio Pool in the Private Mobile Frequencies Below 800 MHz; Petition for Rule Making of The American Mobile Telecommunications Association, *Report and Order and Further Notice of Proposed Rule Making*, 15 FCC Rcd 22709, 22760-61 (2000). This could make up to five megahertz of additional spectrum available for digital SMR providers: 2.5 megahertz in the Industrial/Land Transportation Category (50 paired channels x 25 kHz/channel) and 2.5 megahertz in the Business Category (50 paired channels x 25 kHz/channel). See 47 C.F.R. § 90.617, Tables 2A and 3A.

<sup>47</sup> *Principles for Reallocation of Spectrum to Encourage the Development of Telecommunications Technologies for the New Millennium*, Policy Statement, 14 FCC Rcd 19868 (1999); see also Applications of Various Subsidiaries and Affiliates of Geotek Communications, Inc., Debtor-In-Possession, Assignors, and Wilmington Trust Company or Hughes Electric Corporation, Assignees, For Consent to Assignment of 900 MHz Specialized Mobile Radio Licenses, *Memorandum Opinion and Order*, 15 FCC Rcd 790, 802 (2000).

<sup>48</sup> Dispatch services allow two-way, real-time, voice communications between fixed units and mobile units (e.g., between a taxicab dispatch office and a taxi) or between two or more mobile units (e.g., between a car and a truck). See *Fifth Report*, at 17727-17728, for a detailed discussion. A number of providers continue to provide both commercial and private dispatch services at 800 MHz, 900 MHz, 220 MHz, 217-219 MHz, and 450-470 MHz. See Applications of Motorola, Inc.; Motorola SMR, Inc.; and Motorola Communications and Electronics, Inc. Assignors; and FCI 900, Inc., Assignee, For Consent to Assignment of 900 MHz Specialized Mobile Radio

communications offered by PCS and cellular carriers in that it allows both one-to-one and one-to-many communication (including real-time conferencing with groups), and it generally does not operate through interconnection with the public switched telephone network.<sup>49</sup> SMR systems have also had the ability to offer interconnected service, but until the development of digital technologies, analog SMR systems had very limited capacity to provide mobile telephony. In recent years, however, the nature of SMR service has evolved significantly. SMR providers such as Nextel Communications, Inc. (“Nextel”) and Southern LINC, a unit of energy concern Southern Company, have used digital technologies to increase spectral efficiency and to become more significant competitors in mobile telephony, while also providing dispatch functionality as a part of their service offerings.<sup>50</sup> At the same time, traditional dispatch services are being provided increasingly on non-SMR spectrum bands.<sup>51</sup> Furthermore, in apparent response to the dispatch functionality of SMR services, cellular and PCS carriers have recently begun to offer dispatch-like options (e.g., group calling and conferencing) as part of their service offerings, particularly for businesses.<sup>52</sup>

**Spectrum Cap** - In every geographical area of the country, the Commission initially authorized up to eight different mobile telephony licenses (two cellular and six broadband PCS), not including additional digital SMR licenses.<sup>53</sup> Moreover, under Commission rules, broadband PCS, cellular, and auctioned SMR licensees may, with Commission approval, disaggregate (divide the spectrum into smaller amounts of bandwidth) or partition (divide the license into smaller geographical areas) their licenses, or both, to other entities.<sup>54</sup> Many licensees hold more than one license in a particular market. Previously, under the Commission’s CMRS spectrum cap (which applies to 180 MHz of spectrum), no entity could control

---

Licenses, *Order*, 16 FCC Rcd 8451 (2001) (“*Motorola Order*”). Dispatch and SMR are often used interchangeably, although SMR refers to specific spectrum ranges.

<sup>49</sup> See The Strategis Group, *THE STATE OF THE SMR INDUSTRY: NEXTEL AND DISPATCH COMMUNICATIONS* (Sept. 2000), at 57; The Strategis Group, *U.S. DISPATCH MARKETS* (Jan. 2000), at 1. See also *Motorola Order*, at 8457.

<sup>50</sup> According to Nextel, “[We are] referred to as an ‘SMR provider’ . . . , although [our] services compete directly with and are regulated virtually identically to those of cellular and PCS providers.” Nextel, *Automatic and Manual Roaming Obligations Pertaining to Commercial Mobile Radio Services*, *Comments*, WT Docket No. 00-193, at note 4 (filed Jan. 5, 2001). However, in comparison with cellular and broadband PCS providers, digital SMR providers are more focused on the business than the individual consumer market. See, e.g., Nextel Communications, Inc., SEC Form 10-Q, Nov. 14, 2000, at 16.

<sup>51</sup> “Trunked” dispatch, which refers to dispatch offered on systems allowing automatic sharing of multiple radio channels, is available on spectrum allocated in the 217-219, 220-222, and 450-470 MHz frequency bands. See *Motorola Order*, at 8460-8462 for a detailed discussion.

<sup>52</sup> *Id.*, at 8462-8463.

<sup>53</sup> Some markets may have fewer than eight active licenses because certain auction winners have defaulted on payments to the Commission, because some licensees did not meet their buildout requirements, because some licensees returned their licenses, or because some licenses went unsold in auction.

<sup>54</sup> 47 C.F.R. § 24.714 (PCS); 47 C.F.R. § 22.948 (cellular); 47 C.F.R. §§ 22.948, 90.813, and 90.911 (auctioned SMR). As a result of partitioning and disaggregation, there often are more than eight cellular and broadband PCS licenses in a market.

more than 45 megahertz of cellular, broadband PCS, and SMR<sup>55</sup> spectrum in an MSA, or more than 55 megahertz in a RSA.<sup>56</sup> In November 2001, however, the Commission raised the spectrum cap to 55 megahertz in all markets, and decided to eliminate the restriction entirely effective January 1, 2003.<sup>57</sup> In addition, the Commission forbids an entity from having cross-interests in cellular licenses on both blocks within an RSA.<sup>58</sup>

## (ii) Building Nationwide Networks

In the United States, there are six mobile telephony operators that analyst typically describe as nationwide: AT&T Wireless Services, Inc. (“AT&T Wireless”), Sprint PCS,<sup>59</sup> Verizon Wireless, LLC (“Verizon Wireless”),<sup>60</sup> VoiceStream Wireless Corp. (“VoiceStream”),<sup>61</sup> Cingular Wireless, LLC (“Cingular Wireless” or “Cingular”),<sup>62</sup> and Nextel. When an operator is described as being “nationwide,” it does not necessarily mean that the operator’s license areas, service areas, or pricing plans cover the entire land area of the United States. The six mobile telephony carriers that analyst reports typically describe as nationwide all offer service in at least some portion of the western, midwestern, and eastern United States.<sup>63</sup> In addition to the nationwide operators, there are a number of large regional players, including ALLTEL Corp. (“ALLTEL”), Western Wireless Corp. (“Western Wireless”), United States Cellular Corp. (“US Cellular”), and Dobson Communications Corp. (“Dobson”).

The Commission has concluded previously that operators with larger footprints can achieve certain

---

<sup>55</sup> No more than 10 megahertz of SMR spectrum is attributable to an entity under the cap. 47 C.F.R. § 20.6(b).

<sup>56</sup> 47 C.F.R. § 20.6(a).

<sup>57</sup> 2000 Biennial Regulatory Review Spectrum Aggregation Limits For Commercial Mobile Radio Services, *Report and Order*, 16 FCC Rcd 22668 (2001), *petitions for reconsideration pending* (“*Spectrum Cap Order*”). The increase to 55 megahertz took effect February 13, 2002. *See* 67 Fed. Reg. 1626 (Jan. 14, 2002). All license transfers are still subject to review by the Commission to determine whether they are in the public interest. *Spectrum Cap Order*, at 22670-22671.

<sup>58</sup> *Spectrum Cap Order*, at 22669-22670.

<sup>59</sup> Sprint PCS is a division of Sprint Corp. (“Sprint”). *See* Sprint Corp., SEC Form 10-K, Mar. 4, 2002, at 3.

<sup>60</sup> Verizon Wireless is a joint venture of Verizon Communications, Inc. (“Verizon”) and Vodafone Group PLC (“Vodafone”). Verizon owns 55 percent of Verizon Wireless, and Vodafone owns 45 percent. *See* Verizon Communications, Inc., SEC Form 10-K, Mar. 20, 2002, at 10.

<sup>61</sup> VoiceStream is a wholly-owned subsidiary of Deutsche Telekom AG (“Deutsche Telekom”). *See Sixth Report*, at 13364. Deutsche Telekom is in the process of phasing out its VoiceStream brand in favor of its worldwide “T-Mobile” name, to be completed by the end of 2002. *T-Mobile replaces VoiceStream By Year’s End*, WIRELESSNOW, Feb. 15, 2002 (citing a report in THE SEATTLE TIMES).

<sup>62</sup> Cingular Wireless is a joint venture of SBC Communications, Inc. (“SBC”) and BellSouth Corporation (“BellSouth”). *See Sixth Report*, at 13363-64.

<sup>63</sup> In addition, based on FCC internal analysis, the six national operators, including affiliates and partnerships, have licenses covering between 230 and 285 million people, while the next largest provider of mobile telephone service has licenses covering less than 60 million people.

economies of scale and increased efficiencies compared to operators with smaller footprints.<sup>64</sup> Such benefits, along with advances such as digital technology, have permitted companies to introduce and expand innovative pricing plans such as digital-one-rate (“DOR”) type plans, reducing prices to consumers.<sup>65</sup>

Since the end of 1999, carriers have been building nationwide footprints through various forms of transactions.<sup>66</sup> One of the driving forces behind many of these transactions has been the desire of large regional carriers to enhance their ability to compete with existing nationwide operators that offer attractive nationwide pricing plans. More recently, national operators have sought to fill in gaps in their coverage areas.<sup>67</sup> Since the writing of the *Sixth Report*, a number of such transactions have been announced. The most significant are discussed below, along with a discussion of the spin-off of AT&T Wireless from its parent AT&T Corp. (“AT&T”).

### (a) Combinations

*AT&T Wireless/TeleCorp* – AT&T Wireless announced in February 2002 that it had completed its acquisition of former network affiliate TeleCorp PCS, Inc. (“TeleCorp”).<sup>68</sup> On October 8, 2001, AT&T Wireless announced plans to acquire TeleCorp in an all-stock transaction valued at \$4.7 billion.<sup>69</sup> AT&T Wireless acquired the 77 percent of TeleCorp it did not already own by issuing approximately 146 million additional AT&T Wireless Services common shares and assumed \$2.1 billion in net debt and approximately \$221 million in preferred securities.<sup>70</sup> With this transaction, AT&T Wireless acquired markets covering 32 million potential customers, or “POPs,”<sup>71</sup> in 14 states - primarily in the Southeast and Midwest, as well as the commonwealth of Puerto Rico.<sup>72</sup> TeleCorp was AT&T’s largest affiliate with approximately 800,000 subscribers at the time of its acquisition.<sup>73</sup>

---

<sup>64</sup> See *Fifth Report*, at 17669.

<sup>65</sup> For a discussion of DOR plans, see *Fifth Report*, at 17675-17676; *Fourth Report*, at 10155-10156. See also Section II.A.1.d(i), *Developments in Pricing Plans*, *infra*.

<sup>66</sup> The Commission must consent to the transfer of control or assignment of all spectrum licenses used to provide wireless telecommunications services. 47 C.F.R. § 1.948.

<sup>67</sup> For a more complete discussion of the motivations for this phenomenon, see *Fourth Report*, at 10159-10160.

<sup>68</sup> *AT&T Wireless Completes TeleCorp PCS Acquisition*, News Release, AT&T Wireless, Feb. 12, 2002. The Commission gave its consent to the transaction in February 2002. Wireless Telecommunications Bureau and International Bureau Grant Consent For Transfer Of Control Or Assignment Of Licenses From Telecorp PCS, Inc. to AT&T Wireless Services, Inc., *Public Notice*, DA 02-331 (rel. Feb. 12, 2002).

<sup>69</sup> *AT&T Wireless To Acquire TeleCorp PCS*, News Release, AT&T Wireless, Oct. 8, 2001.

<sup>70</sup> *Id.*

<sup>71</sup> POPs is an industry term referring to population, usually the number of people covered by a given wireless license or footprint. One “POP” equals one person.

<sup>72</sup> *AT&T Wireless To Acquire TeleCorp PCS*, News Release, AT&T Wireless, Oct. 8, 2001.

<sup>73</sup> AT&T Wireless, SEC Form 10-k405, Mar. 28, 2002, at 2.

*Verizon Wireless/Price Wireless* – On November 15, 2000, Verizon Wireless announced it had signed an agreement to acquire Price Communications Wireless (“Price Wireless”) for approximately \$2 billion.<sup>74</sup> This agreement was conditioned on the completion of Verizon Wireless’s planned initial public offering (“IPO”) by September 30, 2001. With that deadline unmet, in December 2001, Verizon Wireless and Price Wireless agreed to alter their original agreement.<sup>75</sup> Instead of an outright acquisition, the companies agreed to form a limited partnership consisting of Price Wireless’s wireless operations and certain Verizon Wireless assets. Verizon Wireless will control and manage the partnership. In exchange for its assets, Price Wireless will receive an interest in the partnership valued at \$1.15 billion, and Verizon Wireless will assume \$550 million of Price Wireless’s debt.

*Sprint PCS Affiliates* – A number of Sprint PCS network affiliates have acquired, or announced plans to acquire, other affiliates. On August 13, 2001, UbiquiTel, Inc. (“UbiquiTel”), which serves markets in several states in the western and midwestern United States, acquired privately held VIA Wireless (“VIA”), an affiliate serving the central valley of California.<sup>76</sup> The acquisition doubled UbiquiTel’s subscriber base to over 100,000 (at that time) and increased its service territory by 3.4 million POPs to 11.1 million.<sup>77</sup> On November 30, AirGate PCS, Inc. (“AirGate”) completed its acquisition of iPCS Inc. (“iPCS”).<sup>78</sup> The combined company, serving over 300,000 subscribers, has a service territory of more than 14.5 million POPs across seven states in the Southeast and Midwest.<sup>79</sup> Finally, in the spring of 2002,

---

<sup>74</sup> See *Sixth Report*, at 13364. The Commission granted consent for the transaction in March 2001. Wireless Telecommunications Bureau and International Bureau Grant Consent For Assignment or Transfer of Control of Wireless Licenses and Authorizations from Price Communications Corporation to Cellco Partnership d/b/a Verizon Wireless, *Public Notice*, DA 01-791 (rel. Mar. 30, 2001).

<sup>75</sup> *Verizon Wireless, Price Communications to Combine Certain Business Operation*, News Release, Verizon Wireless, Dec. 19, 2001.

<sup>76</sup> *UbiquiTel Becomes Second Largest Sprint PCS Network Partner with Completion of Acquisition of VIA Wireless*, News Release, UbiquiTel, Aug. 13, 2001. VIA also had spectrum licenses in Oklahoma and Pennsylvania. *UbiquiTel to Sell Spectrum*, News Release, UbiquiTel, Mar. 6, 2001. The Commission consented to this transaction in July 2001. Wireless Telecommunications Bureau Grants Consent to Transfer Control Of A, C, and F Block Broadband PCS Licenses and Common Carrier Fixed Point to Point Microwave Service, *Public Notice*, DA 01-1707 (rel. July 16, 2001).

<sup>77</sup> *UbiquiTel Becomes Second Largest Sprint PCS Network Partner with Completion of Acquisition of VIA Wireless*, News Release, UbiquiTel, Aug. 13, 2001. The acquisition cost Ubiquitel about \$150 million in stock and assumed debt. *Id.* Based on UbiquiTel’s \$8 closing price on August 13, 2001, the deal valued VIA at \$156.2 million. *UbiquiTel Buys VIA Wireless*, DOW JONES NEWS SERVICE, Aug. 13, 2001. In October 2001, UbiquiTel raised \$50 million by the sale of VIA’s California spectrum to VoiceStream. *UbiquiTel to Sell Spectrum*, News Release, UbiquiTel, Mar. 6, 2001; *UbiquiTel Completes Sale of Spectrum to VoiceStream for \$50 Million*, News Release, UbiquiTel, Oct. 22, 2001. The Commission consented to the transaction in August 2001. Wireless Telecommunications Bureau Grants Consent to Assign A, C and F Block Broadband PCS Licenses, *Public Notice*, DA 01-1212 (rel. Aug. 24, 2001). UbiquiTel is able to continue operations in California through its affiliation with Sprint PCS. See Section I.A.1.a(i)(d), *Affiliations, infra*.

<sup>78</sup> *AirGate PCS, Inc. Completes Merger With iPCS, Inc.*, News Release, AirGate, Nov. 30, 2001; *AirGate PCS to Combine With iPCS for \$900 Million to Create The Premier Sprint PCS Network Partner*, News Release, AirGate, Aug. 29, 2001.

<sup>79</sup> *AirGate PCS to Combine With iPCS for \$900 Million to Create The Premier Sprint PCS Network Partner*, News Release, AirGate, Aug. 29, 2001. The transaction, involving the swap of 13.5 million shares of AirGate stock

US Unwired Inc. (“US Unwired”) announced that it had completed the acquisitions of two other affiliates, Georgia PCS Management, LLC (“Georgia PCS”) and Independent Wireless One holdings, Inc. (“IWO”).<sup>80</sup> The two transactions, with a combined value of over \$550 million, added roughly 160,000 subscribers to US Unwired’s existing base of 236,000.<sup>81</sup> The combined companies’ service territory covers more than 17.6 million POPs in the southeast and northeastern regions of the county.<sup>82</sup>

*ALLTEL/CenturyTel* – On March 19, 2002, ALLTEL announced an agreement to purchase all the wireless properties owned by CenturyTel Inc. (“CenturyTel”) for \$1.65 billion in cash.<sup>83</sup> Through the acquisition, ALLTEL will add more than 700,000 wireless customers and expand its footprint into new markets across Arkansas, Louisiana, Michigan, Mississippi, Texas, and Wisconsin.<sup>84</sup> Combined with CenturyTel’s properties, ALLTEL will have 7.4 million wireless customers in 24 states. ALLTEL claims that the acquisition will allow the carrier to connect to areas where it has significant existing operations, and to increase the profitability of the CenturyTel properties through the introduction of regional and national rate plans as well as through cost reductions. The Commission granted consent to the license transfers on June 10, 2002.<sup>85</sup>

*US Cellular / PrimeCo Communications* – On May 10, 2002, US Cellular announced that it was acquiring PrimeCo Wireless Communications LLC’s (“PrimeCo”) Chicago-area mobile wireless business for approximately \$610 million.<sup>86</sup> US Cellular, which has networks adjacent to the Chicago market, is acquiring PrimeCo’s CDMA network and subscriber base of 350,000.<sup>87</sup> The transaction is subject to approval by the Commission and the Department of Justice.

*Nextel/Pacific Wireless Technologies* – On July 27, 2001, Pacific Wireless Technologies, Inc. (“Pacific”) and Nextel filed an application with the Commission seeking consent to transfer Pacific’s 800 MHz SMR

---

for iPCS stock and the assumption of \$97 million of iPCS debt, was valued at \$900 million when the deal was announced in August 2001. *Id.*

<sup>80</sup> *US Unwired Completes Acquisition of Georgia PCS*, News Release, US Unwired, Mar. 15, 2002; *US Unwired Completes Acquisition of IWO Holdings*, News Release, US Unwired, Apr. 2, 2002.

<sup>81</sup> Subscriber numbers for IWO (125,000) and US Unwired (236,000) are as of September 30, 2001 and December 31, 2001 for Georgia PCS (36,600). See *US Unwired to Acquire Georgia PCS*, News Release, US Unwired, Feb. 11, 2002; *US Unwired to Acquire IWO Holdings*, News Release, US Unwired, Dec. 20, 2001.

<sup>82</sup> *US Unwired to Acquire Georgia PCS*, News Release, US Unwired, Feb. 11, 2002.

<sup>83</sup> *ALLTEL to Purchase CenturyTel's Wireless Properties for \$1.65 billion*, News Release, ALLTEL, Mar. 19, 2002. In 2001, ALLTEL made an unsolicited \$6.1 billion bid for all of CenturyTel, but the offer was rejected. COMMUNICATIONS DAILY, Mar. 20, 2002.

<sup>84</sup> Also included in the transaction are minority partnership interests in cellular operations of 2 million POPs, and PCS licenses covering 1.3 million POPs in Wisconsin and Iowa.

<sup>85</sup> Wireless Telecommunications Bureau Grants Consent for the Transfer of Control of Licenses from Centurytel, Inc. to ALLTEL Communications, Inc., *Public Notice*, DA 02-1366 (rel. June 12, 2002).

<sup>86</sup> *U.S. Cellular Enters into Agreement to Purchase PrimeCo Wireless*, News Release, U.S. Cellular, May 10, 2002.

<sup>87</sup> *Id.*



licenses to Nextel.<sup>88</sup> The deal was closed in December 2001.<sup>89</sup> Pacific, one of only two other digital SMR providers besides Nextel, launched service in July 2000.<sup>90</sup> Its digital SMR network in the central valley of California covered approximately 13.5 million POPs.<sup>91</sup> Pacific offered consumers a package of digital wireless services, including digital dispatch and interconnected mobile voice services, using an iDEN technology similar to that deployed throughout Nextel's markets.<sup>92</sup> Pacific served approximately 7,500 subscribers.<sup>93</sup>

### (b) Joint Ventures

*Cingular Wireless/VoiceStream* – In October 2001, Cingular Wireless and VoiceStream announced an infrastructure sharing joint venture that the companies claim will allow them to share their GSM networks in California, Nevada, and New York.<sup>94</sup>

*Cingular Wireless/AT&T Wireless* – In January 2002, Cingular Wireless and AT&T Wireless announced the formation of an infrastructure joint venture to build out a GSM/GPRS network along 3,000 miles of interstate highways predominantly in western and midwestern states.<sup>95</sup>

### (c) Spin-Off

On July 9, 2001, AT&T Wireless was spun-off from its parent AT&T and became a separate, independently-traded company.<sup>96</sup> AT&T executed the spin-off in two steps. First, AT&T redeemed all of the outstanding shares of AT&T Wireless Group tracking stock in exchange for shares of the new AT&T Wireless common stock.<sup>97</sup> Second, AT&T distributed the remaining shares of AT&T Wireless common

---

<sup>88</sup> Application of Pacific Wireless, Inc. and Nextel of California, Inc. for Assignments of Authorization, *Application*, ULS file no. 0000523796 (filed July 27, 2001) (“*PWT Application*”). The Commission consented to the transaction in November 2001. Application of Pacific Wireless Technologies, Inc. and Nextel of California, Inc. for Consent to Assignment of Licenses, *Memorandum Opinion and Order*, 16 FCC Rcd 20341(2001).

<sup>89</sup> Application of Pacific Wireless, Inc. and Nextel of California, Inc. for Assignments of Authorization, *Consummation Notice*, ULS file no. 0000738671 (filed Jan 18, 2002).

<sup>90</sup> *PWT Application*, Attachment 2, Public Interest Statement, at 4.

<sup>91</sup> *Id.*

<sup>92</sup> *Id.*

<sup>93</sup> *Id.*

<sup>94</sup> *Cingular, VoiceStream to Share Wireless Networks in New York, California and Nevada*, News Release, Cingular, Oct. 15, 2001.

<sup>95</sup> *AT&T Wireless and Cingular Wireless Announce Major Expansion of GSM/GPRS Network Coverage Via New Joint Venture*, News Release, AT&T Wireless, Jan. 28, 2002.

<sup>96</sup> *AT&T Wireless Is Separate, Independently-Traded Company, Following Split-off From AT&T*, News Release, AT&T Wireless, July 9, 2001.

<sup>97</sup> During late April 2000, AT&T raised \$10.6 billion in its initial public offering of 360 million shares of AT&T Wireless Group tracking stock. *AT&T Closes Wireless Offering*, News Release, AT&T Wireless, May 2, 2000.

stock to holders of AT&T common stock, less approximately \$3 billion, or about 7.3 percent, that AT&T retained. By the end of 2001, AT&T had disposed of its remaining interest in AT&T Wireless.<sup>98</sup>

#### (d) Affiliations

Three national operators also have extended their coverage through contractual affiliations with smaller carriers. These affiliations create a “family” of operating companies with much closer relationships than those formed by traditional roaming agreements.<sup>99</sup> The affiliations were established to accelerate the build-out of the larger companies’ networks by granting smaller affiliates the exclusive right to offer mobile telephony for those companies, in some cases under the larger companies’ brand names, in selected mid-sized and smaller markets.<sup>100</sup>

*AT&T Wireless* – The AT&T Wireless family consists of AT&T Wireless, as well as the affiliation it has with two companies: Triton PCS Holdings, Inc. (“Triton PCS”) and Edge Wireless, LLC (“Edge”).<sup>101</sup> In the case of Triton PCS, AT&T Wireless sold portions of some of its broadband PCS licenses to the company in exchange for a minority ownership interest.<sup>102</sup> While Triton PCS is marketed under the brand name SunCom<sup>103</sup> and Edge is marketed under its own name, both companies provide service as a “Member of the AT&T Wireless Network.” These affiliates have been deploying TDMA technology throughout their networks.

---

<sup>98</sup> *AT&T Completes Disposition of Its Remaining Interest in AT&T Wireless*, News Release, Dec. 24, 2001.

<sup>99</sup> See Section II.A.1.d(ii), Roaming, *infra*.

<sup>100</sup> See, e.g., Nextel, Automatic and Manual Roaming Obligations Pertaining to Commercial Mobile Radio Services, *Comments*, WT Docket No. 00-193, at note 20 (filed Jan. 5, 2001) (“To facilitate rapid deployment of its network throughout suburban, tertiary and rural areas of the country and move towards more ubiquitous nationwide service, Nextel entered into an agreement with Nextel Partners . . . to construct iDEN coverage using Commission licensed frequencies disaggregated by Nextel to [Nextel Partners], and offering its services to the public under the Nextel brand according to strict service quality standards.”).

<sup>101</sup> In addition, AT&T Wireless has close relationships with a number of other operators. AT&T Wireless and Dobson own equal interests in a joint venture, ACC Acquisitions, LLC (“ACC”), which provides service primarily in rural and suburban areas of the Midwestern and eastern United States. Dobson, SEC Form 10-K, Apr. 1, 2002, at 72. Dobson operates the ACC markets under the brand name Cellular One. Dobson, SEC Form 10-K, Apr. 1, 2002, at 3 and 8. AT&T Wireless owns approximately 12 percent of Dobson. AT&T Wireless, SEC Form 10-K405, Mar. 28, 2002, at 62. Cincinnati Bell Wireless, LLC (“Cincinnati Bell Wireless”) is a joint venture of Broadwing, Inc. (“Broadwing”) and AT&T Wireless, in which AT&T Wireless owns 19.9 percent and Broadwing owns the remaining 80.1 percent. Broadwing, Inc., SEC Form 10-K, Mar. 16, 2001, at 4. Cincinnati Bell Wireless services are sold under the Cincinnati Bell Wireless brand name. AT&T Wireless also has interests in a number of other broadband PCS licensee holders, including Cascade Wireless, LLC (85 percent) and Lewis & Clark Communications, LLC (49.9 percent). AT&T Wireless, FCC Form 602 (filed Mar. 6, 2002).

<sup>102</sup> AT&T Wireless owns 15.7 percent of Triton PCS and 40 percent of Edge. AT&T Wireless, FCC Form 602 (filed Mar. 6, 2002).

<sup>103</sup> Suncom, *Suncom Fact Sheet* (visited Mar. 8, 2002) <[http://www.suncom.com/pr\\_news/index.html](http://www.suncom.com/pr_news/index.html)>.

*Sprint PCS* – The Sprint PCS family consists of Sprint PCS and 12 affiliates.<sup>104</sup> Each of the affiliates has an agreement with Sprint PCS to use the latter’s PCS licenses to deploy CDMA technology and Sprint PCS-branded service in specific areas of the country.<sup>105</sup> In addition, Sprint PCS performs back-office tasks at cost for most of its affiliates, giving them the benefits of economies of scale for billing and customer service.<sup>106</sup> In return, Sprint receives 8 percent of the affiliates’ local service revenue.<sup>107</sup> Sprint PCS affiliates now provide service to more than 2 million subscribers.<sup>108</sup>

*Nextel* – The Nextel family consists of Nextel and Nextel Partners, Inc. (“Nextel Partners”). In an arrangement similar to that of AT&T with its affiliates, Nextel sold some of its SMR licenses to Nextel Partners in exchange for a minority ownership interest in the company.<sup>109</sup> Nextel Partners is building out an iDEN network compatible with Nextel’s, and Nextel assists Nextel Partners in obtaining substantially the same terms Nextel receives from vendors for equipment and services.<sup>110</sup> Both Nextel and Nextel Partners market their services under the Nextel brand name.

### b. Market Performance

Some of the key metrics reported by mobile telephone operators, such as subscriber growth, average monthly usage per subscriber, and average revenue per subscriber, while not indicative of competition *per se*, demonstrate the increased demand for and reliance placed on mobile telephony services. In addition, continued downward price trends<sup>111</sup> and continued expansion of mobile networks into new and existing markets are related in different ways to the level of competition for mobile telephony customers. These metrics generally demonstrate a high level of competition for most consumers.

In an effort to improve the accuracy of its estimate of U.S. mobile telephone subscribership, the Commission has begun analyzing information filed directly with the FCC. This information, the Numbering Report Utilization / Forecast data (“NRUF”),<sup>112</sup> tracks phone number usage information for

---

<sup>104</sup> As of the end of 2001. See Section I.A.1.a(i)(a), Combinations, *supra*. For a list of Sprint PCS affiliates and their service territories, see Dan Myer, *US Unwired Adds Georgia PCS To Fold*, RCR WIRELESS NEWS, Feb. 18, 2002, at 14.

<sup>105</sup> See, e.g., US Unwired Inc., SEC Form 4249(B)(1), May 17, 2000, at 7.

<sup>106</sup> Ric Prentis, *Sprint PCS*, Equity Research, Raymond James, Feb. 19, 2002, at 4.

<sup>107</sup> *Id.*

<sup>108</sup> *Sprint Wireless Affiliate Program Exceeds Two Million Subscribers*, News Release, Sprint PCS, Jan. 7, 2002.

<sup>109</sup> Nextel Partners, SEC Form 10-K, Mar. 22, 2002, at 3. As of the end of 2001, Nextel owned 32.3 percent of the common stock of Nextel Partners. *Id.*, at 2.

<sup>110</sup> *Id.*, at 3.

<sup>111</sup> See Section II.A.1.d, Pricing Data and Trends, *infra*.

<sup>112</sup> Carriers began reporting NRUF data biannually beginning with the period ending June 2000. The Commission has another source of mobile wireless subscribership data in addition to the NRUF data. Since the Commission’s local competition and broadband data gathering program was adopted in March 2000, mobile wireless carriers with over 10,000 facility-based subscribers in a state have been required to report the number of their subscribers in those states twice a year to the Commission. In their June 30, 2001 filings, operators reported

the United States.<sup>113</sup> All mobile wireless carriers must report to the FCC which of their phone numbers have been assigned to end-users, thereby permitting the Commission to make more accurate estimates regarding subscribership.<sup>114</sup> In previous years, for purposes of this report, the Commission had relied on national subscribership data from a highly-respected survey conducted by the Cellular Telecommunications and Internet Association (“CTIA”). CTIA’s survey is voluntary; it does not receive information from all carriers and must therefore estimate the subscribership for carriers not reporting.<sup>115</sup> In addition, NRUF data, in comparison to CTIA’s survey, is collected on a small area basis and thus allows regional subscribership comparisons.<sup>116</sup> For these reasons, for purposes of this report the Commission uses NRUF data as the basis for its estimate of mobile telephony subscribership, although we report the CTIA data as well.

---

that they served 114 million subscribers. *See* Appendix C, Table 2, at C-3. However, the Commission recognizes that its reporting rules result in some level of undercount of total industry subscribers since it does not count subscribers served by mobile telephony providers in states where the provider has fewer than 10,000 customers. *See* Local Competition and Broadband Reporting, *Report and Order*, 15 FCC Rcd 7717, 7743 (2000).

<sup>113</sup> When the North American Numbering Plan (“NANP”) was established in 1947, only 86 area codes were assigned to carriers in the United States. Only 61 new codes were added during the next 50 years. But the rate of activation has increased dramatically since then. Between January 1, 1997 and December 31, 2000, 84 new codes were activated in the United States. Because the remaining supply of unassigned area codes is dwindling, and because a premature exhaust of area codes imposes significant costs on consumers, the Commission has taken a number of steps to ensure that the limited numbering resources are used efficiently. Among other things, the Commission requires carriers to submit data on numbering resource utilization and forecasts twice a year. Federal Communications Commission, *Numbering Resource Utilization in the United States as of June 30, 2001* (Nov. 2001), at 1, 2. This information is submitted to the FCC on Form 502. *Id.*

<sup>114</sup> Federal Communications Commission, *Numbering Resource Utilization in the United States as of June 30, 2001* (Nov. 2001), at 1, 2. An assigned number is one that is in use by an end-user customer. Federal Communications Commission, *Numbering Resource Utilization in the United States as of June 30, 2001* (Nov. 2001), at 3. Carriers also report other phone number categories, including: intermediate – numbers given to other companies; aging - numbers held out of circulation; administrative – numbers for internal uses; reserved - numbers reserved for later activation; and available – numbers available to be assigned. *Id.* Assigned numbers are not necessarily from facilities-based carriers. A reseller can assign a number to an end user. This does not double-count in the assigned total, since the facilities-based carrier only counts that number as an “intermediate” number given to the reseller.

<sup>115</sup> For example, in the survey for the period ending June 30, 2001, subscribers captured through survey response made up 109,674,358 out of a total subscriber estimate of 118,397,734, a difference of 8 percent (8,723,376). CTIA, *Wireless Industry Indices: Semi-Annual Data Survey Results* (results through June 2001) (“June 2001 CTIA Survey”), at 15.

<sup>116</sup> NRUF data is collected by the area code and prefix (NXX) level for each carrier, which enables the Commission to approximate the number of subscribers that each carrier has in each of the approximately 30,000 rate centers in the country. Rate center boundaries generally do not coincide with county boundaries. However, for purposes of geographical analysis, the rate center data can be associated with a geographic point, and all of those points that fall within a county boundary can be aggregated together and associated with much larger geographic areas based on counties, for which population and other data exists. Aggregation to larger geographic areas reduces the level of inaccuracy inherent in combining unlike areas such as rate center areas and counties.

**(i) Subscriber Growth**

In 2001, the mobile telephone sector experienced another year of impressive subscriber growth.<sup>117</sup> As of December 2001, the Commission estimates that the sector had 128.5 million subscribers,<sup>118</sup> which translates into a nationwide penetration rate of roughly 45 percent.<sup>119</sup> CTIA's estimate for year-end 2001 was 128.4 million subscribers, roughly the same as the FCC estimate, and a 17 percent increase over CTIA's estimate of 109.5 million subscribers for December 2000.<sup>120</sup> CTIA's absolute increase of 18.9 million subscribers represents the second largest 12-month jump in subscribership in the history of the sector, but 4.5 million less than 2000's record increase of 23.5 million additional subscribers.<sup>121</sup> We note that in 2001, for the first time since CTIA began tracking subscribership, the absolute number of new subscribers of mobile telephony service is lower than that of the previous year. Because this change has occurred for only one year, it is not clear whether this represents a more general leveling off of wireless growth. We also note that the growth rate for mobile phone subscribers have been declining for several years.

**(ii) Regional Penetration Rates**

As stated earlier, an additional advantage of NRUF data over the CTIA data is that it allows the Commission to compare the spread of mobile telephone subscribership across different areas within the United States. Economic Areas ("EAs"), which are defined by the Department of Commerce's Bureau of Economic Analysis, are particularly well-suited for comparing regional mobile telephony penetration rates for two reasons.<sup>122</sup> First, the defining aspect of mobile telephony is, of course, mobility. Each EA is made up of one or more economic nodes and the surrounding areas that are economically related to the node. The main factor used in determining the economic relationship between the two areas is commuting patterns, so that each EA includes, as far as possible, the place of work and the place of residence of its labor force.<sup>123</sup> Thus, an EA would seem to capture the market where the average person would use his or her mobile phone most of the time – around work, around home, and all of the places in

---

<sup>117</sup> Subscribers refer to the number of separate wireless accounts. A particular individual may have more than one wireless account.

<sup>118</sup> Federal Communications Commission, based on preliminary year-end 2001 filings for Numbering Resource Utilization in the United States.

<sup>119</sup> The nationwide penetration rate is calculated by dividing total mobile telephone subscribers by the total U.S. population. According to the Bureau of the Census, the combined population of the 50 states, the District of Columbia, and Puerto Rico as of July 1, 2001 was estimated to be 288.6 million. See U.S. Census Bureau, *Population Estimates* (visited Mar. 8, 2002) <<http://eire.census.gov/popest/estimates.php>>.

<sup>120</sup> See Appendix C, Table 1, at C-2.

<sup>121</sup> *Id.*

<sup>122</sup> There are 172 EAs, each of which is an aggregation of counties. See Kenneth P. Johnson, *Redefinition of the BEA Economic Areas*, SURVEY OF CURRENT BUSINESS, Feb. 1995, at 75. For its spectrum auctions, the FCC has defined four additional EAs: Guam and the Northern Mariana Islands (173); Puerto Rico and the U.S. Virgin Islands (174); American Samoa (175); and Gulf of Mexico (176). See FCC, *FCC Auctions: Maps* (visited Mar. 25, 2002) <<http://wireless.fcc.gov/auctions/data/maps.html>>.

<sup>123</sup> Kenneth P. Johnson, *Redefinition of the BEA Economic Areas*, SURVEY OF CURRENT BUSINESS, Feb. 1995, at 75.

between. Second, wireless carriers have considerable discretion in how they assign telephone numbers across the rate centers in their operating areas. In other words, a mobile telephone subscriber can be assigned a phone number associated with a rate center that is a significant distance away from the subscriber's place of residence (but generally still in the same EA).

Regional penetration rates for the 172 EAs covering the 50 United States, sorted by EA population density, can be seen in Appendix C, Table 3.<sup>124</sup> The rates range from a high of 57 percent in the Atlanta, GA-AL-NC EA (EA 40) to a low of 19 percent in the Paducah, KY-IL EA (EA 72). The Anchorage, AK EA (EA 171), with the lowest population density, had a penetration rate of 41 percent, while the Tampa-St. Petersburg-Clearwater, FL EA (EA 34), with the highest density, had a penetration rate of 38 percent. As previously stated based on an analysis of NRUF data, the national penetration rate is 45 percent.

### (iii) Minutes-of-Use

Wireless subscribers continue to increase the amount of time they communicate using their wireless phones. Average minutes-of-use per subscriber per month ("MOUs") continued a rapid rise in 2001. Increasing MOUs most likely are a result of the decreasing prices and the wider acceptance of and reliance upon wireless service.

According to the CTIA mobile telephone survey, MOUs were 385 between July and December 2001, an increase of 51 percent from 255 MOUs during the same period in 2000, in addition to a 38 percent increase from 1999.<sup>125</sup> Other analysts also report higher MOUs in 2001. Paul Kagan and Associates estimated MOUs of 410 in mid-2001, an increase of 22 percent from 335 in mid-2000.<sup>126</sup> J.D. Powers & Associates estimated 422 MOUs, an increase of 32 percent from 320 a year earlier.<sup>127</sup>

### (iv) Average Revenue Per Unit

A widely-used economic metric for the CMRS industry is average monthly revenue per subscriber (often referred to as average revenue per unit, or "ARPU"). For the mobile telephone sector, ARPU,<sup>128</sup> until

---

<sup>124</sup> See, also, Appendix E, Map 4, at E-5.

<sup>125</sup> *June 2001 CTIA Survey* (minutes of use through 2000), at 169; Todd Rethemeier *et al.*, *Talk is Cheaper, Demand is Steeper*, Bear Sterns, Equity Research, May 21, 2002, at 1 (citing CTIA 2001 MOU results). CTIA aggregated all of the carriers' MOUs from July 1 through December 31, then divided by the average number of subscribers, and then divided by six.

<sup>126</sup> Paul Kagan Associates, Inc., *Wireless Customers Using 60% More Minutes than Two Years Ago – Not Always On Plan*, WIRELESS MARKET STATS, Sept. 11, 2001, at 4 (based on carriers' reported MOUs); Paul Kagan Associates, Inc., *Minutes Up By 28% in Quarter; Acquisition Costs Continue Decline*, WIRELESS MARKET STATS, Aug. 14, 2000, at 6.

<sup>127</sup> *Wireless Phone Penetration Among U.S. Households Climbs Above 50 Percent As More First-Time Subscribers Enter the Marketplace*, News Release, J.D. Power and Associates, Sept. 26, 2001 (based on survey responses from 14,492 households in 25 of the largest U.S. markets); *Wireless Usage Continues to Climb as Flat-Rate Pricing And Free Minutes Become More Prevalent in the Marketplace*, News Release, J.D. Power and Associates, Sept. 26, 2000.

<sup>128</sup> There are different ways of calculating ARPU. The measure used here, CTIA's "average local monthly bill," does not include toll or roaming revenues. *June 2001 CTIA Survey*, at 158. CTIA defines an alternative

recently, decreased almost continuously since CTIA began tracking it in 1987, going from a peak of \$98.02 in December 1988 to a low of \$39.43 in December 1998.<sup>129</sup> However, since 1999, ARPU has begun increasing, rising to \$47.37 in December 2001, a 20 percent increase over the last three years. This is true even though per-minute prices have been declining throughout this period.<sup>130</sup> The recent ARPU increases might be due to a variety of factors, including increased usage offsetting per-minute price declines, as well as the adoption by wireless consumers of higher-priced calling plans.<sup>131</sup>

#### (v) Churn

Churn refers to the number of customers an operator loses over a given period of time. Mobile telephone operators usually express churn in terms of an average percent churn per month. For example, an operator might report an average monthly churn of 2 percent in a given fiscal quarter. In other words, on average, the operator lost 2 percent of its customers in each of the quarter's three months. At this rate, the operator would lose 24 percent of its customers in a single year.<sup>132</sup> Most carriers report churn rates between 1.5 percent and 3 percent per month.<sup>133</sup> At current rates, more than 30 percent of subscribers change service providers each year.<sup>134</sup>

Consistent with findings in the *Sixth Report*, customers indicated network quality and cost as the main reasons for changing providers.<sup>135</sup> In a survey taken in the second quarter of 2001, roughly equal percentages of subscribers who switched carriers did so in search of better network quality (18.4 percent) or better monthly service price plans (17.4 percent).<sup>136</sup> Another 12 percent wanted to take advantage of a

---

measure of ARPU, which includes roaming revenues but not toll revenue. For a comparison between these two measures, see *June 2001 CTIA Survey*, at 159.

<sup>129</sup> See Appendix C, Table 1, at C-2.

<sup>130</sup> See Section II.A.1.d, Pricing Data and Trends, *infra*.

<sup>131</sup> Regardless of whether customers use the large bundles of minutes included with such plans, the higher monthly access fees increase operators' ARPUs.

<sup>132</sup> This assumes that each churned customer is a unique individual and that the same customers do not churn multiple times.

<sup>133</sup> See Linda J. Mutschler *et al.*, *The Next Generation VI: Wireless in the US*, United States Telecom Services-Wireless/Cellular, Merrill Lynch, Mar. 8, 2002 ("NextGen VI"), at 85 (Table 24: US Wireless Operating Matrix – Monthly Churn). Churn also varies by locality. According to one survey, in the second quarter of 2001, Chicago had churn of 4.5 percent; Los Angeles, 3.5 percent; New York, 3.1 percent; San Francisco, 2.8 percent; and Washington, 2.7 percent. Tim Race, *Drilling Down / Cell Phones*, NEW YORK TIMES, Sept. 3, 2001 (citing a survey by Telephia).

<sup>134</sup> Michael I. Rollins *et al.*, *Wireless Services*, Equity Research, Salomon Smith Barney, Jan. 11, 2002, at 9 ("SSB Wireless Services").

<sup>135</sup> See *Sixth Report*, at 13372-73.

<sup>136</sup> *Churn Analysis II: Main Reason For Switching Carriers*, Telephia, Oct. 10, 2001 (published in WIRELESSWEEK, available at <[http://www.wirelessweek.com/index.asp?layout=Research&doc\\_id=49067&ResearchParam=Research+Article&vertical=Telephia&verticalid=594](http://www.wirelessweek.com/index.asp?layout=Research&doc_id=49067&ResearchParam=Research+Article&vertical=Telephia&verticalid=594)>).

sale or promotion.<sup>137</sup>

**(vi) Market Entry**

To track the level of competition in the mobile telephony market, the Commission compiles a list of counties with some level of coverage by mobile telephone providers. This data is based on publicly available sources of information released by the operators such as news releases, filings with the SEC, coverage maps available on operators' Internet sites, and network buildout notifications filed with the Commission.<sup>138</sup>

There are several important caveats to note when considering these data. First, to be considered as "covering" a county, an operator need only be offering any service in a portion of that county. Second, multiple operators shown as covering the same county are not necessarily providing service to the same portion of that county. Consequently, some of the counties included in this analysis may have only a small amount of coverage from a particular provider. Third, the figures for POPs and land area in this analysis include all of the POPs and every square mile in a county considered to have coverage.<sup>139</sup> Therefore, this analysis overstates the total coverage in terms of both geographic areas and populations covered.

On the other hand, this county-by-county analysis reflects a significant improvement in accuracy. In past editions of this report, the Commission provided summaries of estimated coverage by BTAs. Starting with the *Fifth Report*, the Commission decided to re-estimate and enhance these coverage maps using county boundaries in an attempt to provide a more precise picture of network deployments. Moreover, while the newer broadband PCS and digital SMR entrants have less complete networks, the original cellular licenses have extensive networks that provide almost complete coverage of the entire land mass of the continental United States.<sup>140</sup> Cellular licensees were originally awarded a geographical area (CMA) as a license area, but they only retained that portion of the CMA where they had built out and expanded their wireless networks.<sup>141</sup>

---

<sup>137</sup> *Id.*

<sup>138</sup> The Commission has buildout rules for geographic area licenses, although they do not require operators to deploy networks such that the entire geographic area of a specific license receives coverage. For example, the construction requirements for 30 megahertz broadband PCS licenses state that an operator's network must serve an area containing at least one-third of the license area's population within five years of the license being granted and two-thirds of the population within 10 years. *See* 47 C.F.R. § 24.203(a). Similarly, the construction requirements for 10 and 15 megahertz broadband PCS licenses state that an operator must cover one-quarter of a license area's population, or provide "substantial service," within five years of being licensed. *See* 47 C.F.R. § 24.203(b). The details concerning exactly which geographic areas or portions of the population should be covered to meet these requirements are left to the operators. In addition, decisions about whether to increase coverage above these requirements are left to the operators. For information on the buildout requirements for cellular licenses, *see* 47 C.F.R. §§ 22.946, 22.947, 22.949, 22.951. For information on the buildout requirements for non-site based SMR licenses, *see* 47 C.F.R. §§ 90.665 and 90.685.

<sup>139</sup> All population figures are based on the Bureau of the Census's 2000 county population.

<sup>140</sup> *See* Appendix E, Maps 2-3, at E-3 - E-4.

<sup>141</sup> *See* Amendment of Part 22 of the Commission's Rules to Provide for the Filing and Processing of Applications for Unserved Areas in the Cellular Service and to Modify other Cellular Rules, *First Report and Order and Memorandum Opinion and Order on Reconsideration*, 6 FCC Rcd 6185, 6196-6200 (1991). Initial cellular systems operators were given a five-year period during which to expand their systems within CMA in which they were licensees. *Id.*



To date, 268 million people, or 94 percent of the total U.S. population, have three or more different operators (cellular, PCS, and/or digital SMR) offering mobile telephone service in the counties in which they live.<sup>142</sup> However, these counties make up only 50 percent of the total land area of the United States, reflecting the nation's uneven population distribution.<sup>143</sup> On the other hand, the land area of these counties, 1.7 million square miles, is roughly 40 percent larger than the combined land area of the 15 members of the European Union (1.2 million square miles). In addition, over 229 million people, or 80 percent of the U.S. population, live in counties with five or more mobile telephone operators competing to offer service.<sup>144</sup>

While growth in the percentage of the population covered by three or more providers has been small in the past year,<sup>145</sup> the percentage growth of the population covered by seven or more providers has been significant. Sixty million people, or about 21 percent of the population, can now choose from among seven or more different mobile telephone operators providing service somewhere in their counties, roughly double the percentage from 2000.<sup>146</sup>

### c. Digital Deployment

Cellular, PCS, and digital SMR networks use the same basic design. All use a series of low-power transmitters to serve relatively small areas ("cells"), and all employ frequency reuse to maximize spectrum efficiency.<sup>147</sup> In the past, cellular and SMR networks used an analog technology, while PCS networks were designed from the start to use a digital format. Digital technology provides better sound quality and increases spectral efficiency in comparison to analog technology. Increased capacity on digital networks has in turn permitted companies to offer calling plans with large buckets of relatively inexpensive minutes, free enhanced services such as voicemail and caller ID, and wireless data and mobile Internet offerings.<sup>148</sup> From a customer's perspective, digital service in the cellular band or SMR bands is virtually identical to digital service in the PCS band.

Digital technology is now dominant in the mobile telephone sector. Digital subscribers now make up

---

<sup>142</sup> See Appendix C, Table 4, at C-5.

<sup>143</sup> *Id.*

<sup>144</sup> *Id.*

<sup>145</sup> Only 3 percent, due to its previous high level of 90.8 percent. See *Sixth Report*, at 13465.

<sup>146</sup> *Id.*

<sup>147</sup> PCS, digital SMR, and cellular networks are all "cellular" systems, since all divide service regions into many small areas called "cells." Cells can be as small as an individual building or as big as 20 miles across, or any size in between. Each cell is equipped with its own radio transmitter/receiver antenna. Service regions are divided into cells so that individual radio frequencies may be used over and over again in different cells ("frequency reuse"), allowing for more calls in the system. When a person makes a call on a wireless phone, the message is transmitted to the nearest antenna, which connects with the local phone network. When a person is using a wireless phone and approaches the boundary of one cell, the wireless network senses that the signal is becoming weak and automatically hands off the call to the antenna in the next cell. See *Sixth Report*, at 13361, note 55.

<sup>148</sup> See *Sixth Report*, at 13361.

approximately 80 percent of all wireless subscribers, up from 72 percent last year.<sup>149</sup> During 2001, the number of customers subscribing to digital services climbed 30 percent, from approximately 79 million to 103 million.<sup>150</sup> Approximately 26 million mobile telephony subscribers are analog only.<sup>151</sup>

Over 85 percent of the subscribers of the six largest carriers are using digital service.<sup>152</sup> All of Sprint PCS's, VoiceStream's, and Nextel's subscribers are on digital plans, while 96 percent of AT&T Wireless's, 84 percent of Cingular Wireless's,<sup>153</sup> and almost 75 percent of Verizon Wireless's customers subscribe to digital calling plans.<sup>154</sup> Even among the smaller, regional carriers, digital subscribership is widespread.<sup>155</sup> Leap Wireless International Inc. ("Leap") and Qwest Corp. are 100 percent digital, while ALLTEL, Dobson, US Cellular, and Rural Cellular Corp. ("Rural Cellular") range from 62 to 74 percent.<sup>156</sup> Western Wireless and CenturyTel trail with an approximately 30 percent digital subscriber base each, although each has shown rapid conversion to digital over the past year.<sup>157</sup>

### (i) Coverage by Technology Type

Operators also continued to expand the footprints of their chosen digital technology in 2001. This drive has stemmed from operators with analog networks needing to improve capacity, increase their advanced service offerings, and provide compatibility for digital-based roaming partners, as well as from newer, all-digital network operators who need to expand their footprints to increase their competitiveness.<sup>158</sup>

The four main digital technologies used in the United States are: Code Division Multiple Access ("CDMA"), Global System Mobile Communications ("GSM"), integrated Digital Enhanced Network ("iDEN"), and Time Division Multiple Access ("TDMA").

TDMA is being phased out as its main advocates, AT&T Wireless and Cingular Wireless, have

---

<sup>149</sup> *NextGen VI*, at 69. In the *Sixth Report*, the Commission estimated year-end 2000 digital penetration to be 62 percent. See *Sixth Report*, at 13374.

<sup>150</sup> Based on *NextGen VI* digital penetration rates.

<sup>151</sup> Subscribers that can access both the digital and analog networks of carriers are considered to be digital subscribers.

<sup>152</sup> *NextGen VI*, at 69.

<sup>153</sup> Ninety-six percent of Cingular's minutes of use were digital at the end of 2001. Frank G. Louthan IV, *SBC Communications*, Equity Research, Raymond James, Feb. 11, 2002, at 19.

<sup>154</sup> *NextGen VI*, at 69.

<sup>155</sup> Operators serving rural areas are converting their networks to digital technology as well. Ken Johnson of Rural Telecommunications Group ("RTG") said, "For their part, rural carriers are shifting to digital roll out." *Transcript*, at 100.

<sup>156</sup> *NextGen VI*, at 69.

<sup>157</sup> *NextGen VI*, at 69. CenturyTel went from 19 percent to 32 percent, while Western Wireless went from 3 percent to 30 percent. *Id.*

<sup>158</sup> See *Fourth Report*, at 10170.

announced plans to overlay their existing TDMA networks with GSM/GPRS technology.<sup>159</sup> Furthermore, the trade group that had represented TDMA technology announced in December 2001 that it was dissolving, as it had “successfully served its mission.”<sup>160</sup>

AT&T Wireless still expects to use TDMA for many years, but as reported in the *Sixth Report*, the company announced plans to overlay GSM/GPRS on its TDMA network in order to improve its wireless data capabilities and enhance its migration to 3G technology.<sup>161</sup> By the end of 2001, AT&T Wireless had rolled out GSM/GPRS to 45 percent of the POPs covered by its network.<sup>162</sup> AT&T Wireless has also announced that it plans to deploy GSM/GPRS in the network that it recently acquired through the purchase of TeleCorp.<sup>163</sup>

Cingular Wireless, which currently has a mix of TDMA (covering 70 percent of its POPs) and GSM (covering 30 percent of its POPs) networks, announced in October 2001 that it would overbuild its entire TDMA and remaining analog networks with GSM/GPRS.<sup>164</sup> Cingular Wireless expects to have 50 percent of its POPs covered with GSM by the end of 2002 and the remainder covered by the end of 2003.<sup>165</sup> Cingular Wireless will continue to provide TDMA service to its current customers, but it expects that many will upgrade to its GSM technology over time.<sup>166</sup> Cingular Wireless said the national network upgrade will cost approximately \$3 billion.<sup>167</sup> And, as noted above, Cingular Wireless and AT&T Wireless have announced plans to build a GSM/GPRS network along 3,000 miles of interstate highways

---

<sup>159</sup> Cingular announced in January 2002 that it had begun field testing a new technology, known as GAIT (GSM/ANSI-136 Interoperability Team), that allows users to move with one handset between TDMA and GSM technologies on both broadband PCS and cellular spectrum bands. *Network Enhancements to Enable Cingular Customers to Access Both GSM and TDMA*, News Release, Cingular, Jan. 16, 2002.

<sup>160</sup> *Universal Wireless Communications Consortium Completes Organizational Objectives*, News Release, Universal Wireless Communications Consortium, Dec. 26, 2001. In March 2002, a number of wireless carriers and equipment manufactures, including AT&T Wireless and Cingular, formed a new trade association, called 3G Americas, to promote the GSM and TDMA family of technologies. *3G Americas to Represent Global Technologies in the Americas*, News Release, 3G Americas, Mar. 13, 2002.

<sup>161</sup> See *Sixth Report*, at 13398-99. AT&T Wireless has indicated that it does not plan to aggressively migrate users to its GSM network. Paul Wuh *et al.*, *AT&T Wireless Group*, Global Equity Research, Goldman Sachs, Feb. 8, 2002, at 4 (“*Goldman Sachs AT&T Wireless Group*”).

<sup>162</sup> *Goldman Sachs AT&T Wireless Group*, at 2.

<sup>163</sup> AT&T Wireless indicated that it would begin to deploy GSM/GPRS infrastructure in TeleCorp’s coverage area beginning in the second half of 2002. *Id.*, at 10.

<sup>164</sup> *Cingular Moves to the Edge*, News Release, Cingular, Oct. 30, 2001; *Cingular Announces Technology Path*, speech by Stephen Carter at the Righa Royal Hotel, New York, NY, Oct. 30, 2001 (available in [http://www.cingularwireless.com/about/speech\\_01\\_10\\_30](http://www.cingularwireless.com/about/speech_01_10_30)).

<sup>165</sup> Ric Prentiss, *Cingular Announced GSM Overbuild Plans*, Email Alert, Raymond James, Oct. 30, 2001.

<sup>166</sup> *Cingular Moves to the Edge*, News Release, Cingular, Oct. 30, 2001

<sup>167</sup> Ric Prentiss, *Cingular Clues Us In on '02 CapEx Plans*, Equity Research, Raymond James, Nov. 6, 2001

in a number of western and midwestern states.<sup>168</sup>

As a result of these industry developments, this report no longer distinguishes between TDMA and GSM networks in its analysis of digital coverage, but considers the two as one migration path towards more advanced digital capabilities. We recognize that TDMA as currently deployed will continue to be used by millions of subscribers for a number of years.

Of the other four nationwide mobile telephone operators, Sprint PCS and Verizon Wireless use CDMA as their digital technology, VoiceStream uses GSM, and Nextel uses iDEN.

To date, 276 million people, or 97 percent of the total U.S. population, live in counties where operators offer digital mobile telephone service, using CDMA, TDMA/GSM, or iDEN technologies, or some combination of the three.<sup>169</sup> These counties make up 70 percent of the total land area of the United States. To estimate the current levels of deployment of the three main digital mobile telephone technologies individually, the Commission has prepared maps of each technology which combine the network coverage of all of the relevant operators.<sup>170</sup>

CDMA has been launched in at least some portion of counties containing 256 million people, or roughly 90 percent of the U.S. population, while TDMA/GSM has been launched in at least some portion of counties containing 265 million people, or almost 93 percent of the U.S. population.<sup>171</sup> To date, digital SMR operators have launched iDEN-based service in at least some portion of counties containing over 245 million people, or approximately 86 percent of the U.S. population.<sup>172</sup>

#### d. Pricing Data and Trends

Equity analysts and other industry observers typically describe wireless price competition in the United States as “competitive,” “intense,” and “aggressive.”<sup>173</sup> While it is difficult to identify sources of

---

<sup>168</sup> See Section I.A.1.a(i)(b), Joint Ventures, *supra*. Dobson, whose two largest roaming partners are AT&T Wireless and Cingular, announced in January 2002 that it too planned to upgrade its TDMA network to GSM/GPRS. *Dobson To Upgrade Network to Wireless Standard*, REUTERS, Jan. 29, 2002.

<sup>169</sup> The broadband PCS-based and digital SMR-based coverage is estimated using counties, and the cellular-based coverage is estimated using CMAs. The same caveats mentioned in Section II.A.1.b(vi), Market Entry, *supra*, apply to this analysis as well.

<sup>170</sup> See Appendix E, Maps 5-8, at E-6 – E-9.

<sup>171</sup> See Appendix C, Table 7 at C-10. Upgrades by carriers to GPRS and 1xRTT technologies are discussed in Section II.B.2.a, Mobile Data Mobile Telephone Sector, *infra*.

<sup>172</sup> See Appendix C, Table 7 at C-10.

<sup>173</sup> *NextGen VI*, at 2 (“There is no question that wireless pricing remains incredibly competitive”); *NextGen VI*, at 3 (“in recent quarters, we estimate that the level of pricing competition has accelerated, and we currently see no end in sight”); Olga Kharif, *Why Sprint PCS Could Pick Up Speed*, BUSINESSWEEK ONLINE, Mar. 13, 2002 (“Price competition has grown intense”); Tish Williams, *Wireless Now Has Price War to Worry About*, THESTREET.COM, Mar. 3, 2002; Paul Wuh *et al.*, *Week In Wireless*, Global Equity Research, Goldman Sachs, Feb. 8, 2002, at 1 (“we believe that the national carriers are continuing to become more aggressive about pricing”).

information that track mobile telephone prices in a comprehensive manner,<sup>174</sup> these claims are supported by a number of reports and other available data indicating that the cost of mobile telephony service has fallen since the *Sixth Report*, continuing the trend of the last several years.

According to one economic research and consulting firm, mobile telephony prices in the 25 largest U.S. cities declined roughly 7.3 percent in 2001, following a 6.9 percent decline in 2000.<sup>175</sup> The average cost of monthly service<sup>176</sup> – which was calculated across four typical usage plans (30, 150, 300 and 600 minutes) – dropped from \$42.53 in December 1999 to \$39.60 in December 2000 to \$36.70 in December 2001.<sup>177</sup> Of the four typical usage levels, the greatest price decline was for 600 minutes of airtime, down 11.7 percent, while usage at 150 and 300 minutes saw more modest reductions.<sup>178</sup> In contrast, the monthly cost of 30 minutes of airtime increased 5.9 percent.<sup>179</sup>

Another source of price information is the cellular telephone services component of the Consumer Price Index (“Cellular CPI”) produced by the United States Department of Labor’s Bureau of Labor Statistics (“BLS”).<sup>180</sup> Cellular CPI data is published on a national basis only.<sup>181</sup> During 2001, the Cellular CPI

---

<sup>174</sup> See *Fourth Report*, at 10164-10165.

<sup>175</sup> *Econ One Survey Shows Average Cost of Cell Phone Service Dropped 7.3 % in 2001*, News Release, Econ One, Jan. 31, 2002. The survey is based on an analysis of pricing plan data collected from carriers’ websites. *Transcript*, at 78.

<sup>176</sup> This does not include any additional costs for roaming or long distance.

<sup>177</sup> The analysis assumes a 70 percent peak /30 percent off-peak split in the kind of minutes used. *Transcript*, at 78.

<sup>178</sup> *Econ One Survey Shows Average Cost of Cell Phone Service Dropped 7.3 % in 2001*, News Release, Econ One, Jan. 31, 2002.

<sup>179</sup> *Id.*

<sup>180</sup> See Appendix C, Table 8, at C-10. The Consumer Price Index (“CPI”) is a measure of the average change over time in the prices paid by urban consumers for a fixed market basket of consumer goods and services. The basket of goods includes over 200 categories including items such as food and beverages, housing, apparel, transportation, medical care, recreation, education, and communications. The CPI provides a way for consumers to compare what the market basket of goods and services costs this month with what the same market basket cost a month or a year ago. Starting in December of 1998, this basket of goods included a category for cellular telephone services. All CPI figures discussed in this paragraph were taken from BLS databases found on the BLS Internet site at <<http://www.bls.gov>>. The index used in this analysis, the CPI for All Urban Consumers (CPI-U), represents about 87 percent of the total U.S. population. Bureau of Labor Statistics, *Consumer Price Index: Frequently Asked Questions* (visited Mar. 18, 2002). <<http://www.bls.gov/cpi/cpifaq.htm>>. While the CPI-U is urban-oriented, it does include expenditure patterns of some of the rural population. *Transcript*, at 59. Information submitted by companies for the CPI is provided on a voluntary basis. *Transcript*, at 53.

<sup>181</sup> *Transcript*, at 50. The Cellular CPI includes charges from all telephone companies that supply “cellular telephone services,” which are defined as “domestic personal consumer phone services where the telephone instrument is portable and it sends/receives signals for calls by wireless transmission.” This measure does not include business calls, telephone equipment rentals, portable radios, and pagers. Bureau of Labor Statistics, *How BLS Measures Price Change for Cellular Telephone Service in the Consumer Price Index* (visited Mar. 18, 2002) <<http://www.bls.gov/cpi/cpifactc.htm>>.

decreased by 5.5 percent while the overall CPI increased by 1.6 percent. In comparison, during the same period, the local telephone services component increased by 4.5 percent and the long distance telephone services component decreased by 1.8 percent. The Cellular CPI has declined almost 33 percent since the end of 1997 when BLS began tracking it.

As a third pricing indicator, some analysts believe average revenue per minute is a good proxy for mobile pricing.<sup>182</sup> CTIA's survey indicates that the average revenue per minute of mobile telephone use fell 31 percent between 2000 and 2001. This is calculated by dividing the estimate of ARPU by the estimate of MOUs, yielding the revenue per minute that the carrier is receiving.<sup>183</sup> Since 1994, average revenue per minute has fallen from \$0.47 in December 1994 to \$0.12 in December 2001, a decline of 74 percent.<sup>184</sup>

### (i) Developments in Pricing Plans

The continued rollout of differentiated pricing plans indicates a competitive marketplace. In the mobile telephone sector, a single operator often tries a new and innovative pricing plan, and is later imitated by competitors if the plan proves to be successful. For example, many in the industry questioned AT&T Wireless's wisdom when it introduced the first Digital One Rate ("DOR") plan in May 1998.<sup>185</sup> Today all of the nationwide operators offer a similar type of DOR pricing plan that allows customers to purchase a bucket of MOUs on a nationwide or nearly nationwide network without incurring roaming or long distance charges.<sup>186</sup>

A more recent example of this was the extension by carriers of unlimited or virtually unlimited night or weekend minutes to their DOR plans. In January 2001, Cingular Wireless started the trend when it promoted the feature as part of its campaign, launched during the Super Bowl, to promote its new brand ("Cingular Wireless").<sup>187</sup> Virtually every other national carrier (and several of the regional carriers) followed suit over the course of the year.<sup>188</sup>

### (ii) Roaming

All mobile calling plans specify a calling area – such as a particular metropolitan area, the East Coast, the carrier's entire network, or the entire United States – within which the subscriber can make a call without additional charges. When a subscriber exits this area, or "roams," he or she incurs additional charges for each minute of use. Sometimes these roaming charges go directly to the subscriber's carrier, and

---

<sup>182</sup> Adam Quinton *et al*, *Wireless Matrix – 3Q01*, Global Equity Research, Merrill Lynch, Jan. 2002, at 4 (*"Wireless Matrix"*).

<sup>183</sup> Note that this version of ARPU is CTIA's "average monthly local bill" and does not include toll or roaming revenues where they are not priced into a calling plan. *See* note 128, *supra*.

<sup>184</sup> *See* Appendix C, Table 9, at C-11.

<sup>185</sup> *See AT&T Launches First National One-Rate Wireless Service Plan*, News Release, AT&T Corp., May 7, 1998.

<sup>186</sup> *See NextGen VI*, at 57-63.

<sup>187</sup> *Id.*, at 18.

<sup>188</sup> *Id.*

sometimes the charges are used to pay a carrier other than the subscriber's, on whose network the subscriber was roaming.<sup>189</sup> This source of revenue is particularly important to some rural and smaller carriers.<sup>190</sup>

CTIA reported a slight rise in roaming revenues for the mobile telephony industry in 2001, from \$3.88 billion at the end of 2000 to \$3.94 billion in 2001, reversing the slight decline reported from 1999 to 2000.<sup>191</sup> Roaming revenues as a percentage of total service revenue have been declining for years, from 11 percent reported in December 1997 survey to 5.6 percent in the June 2001 survey.<sup>192</sup> CTIA attributes this decline to the growth of DOR plans and the extended calling areas established by many of the larger carriers.<sup>193</sup>

### (iii) Prepaid Service

In the United States, most mobile telephony subscribers pay their phone bills after they have incurred charges (known as postpaid service). Prepaid service, in contrast, requires customers to pay for a fixed amount of minutes prior to making calls. Although prepaid plans are considered a good way to increase penetration rates,<sup>194</sup> certain carriers have reevaluated their business plans with respect to prepaid subscribers, given their typically lower ARPUs and higher churn rates in comparison to postpaid subscribers.<sup>195</sup> Analysts estimate that approximately 8 to 10 percent of U.S. wireless phone users subscribed to prepaid plans in 2001, roughly unchanged from what we found in the *Sixth Report*.<sup>196</sup>

---

<sup>189</sup> The fees that a carrier collects from non-subscribers using its network are called "outcollect" fees, and the fees that a carrier pays for its subscribers to roam on other networks are called "incollect" fees. Margo McCall, *Roaming Feeds Regional Carriers*, WIRELESS WEEK, Mar. 26, 2001, at 23.

<sup>190</sup> In the fourth quarter of 2001, roaming revenues accounted for 25 percent of total revenue for Rural Cellular Corp. and 20 percent for Western Wireless. Dan Meyer, *Rural Carriers Overlay to Keep Roaming \$\$*, RCR WIRELESS NEWS, Mar. 4, 2002, at 1. In fact, the price of Western Wireless stock fell 30 percent when AT&T Wireless and Cingular announced their infrastructure sharing agreement (see above). *Western Wireless Stock Off More Than 30 Percent*, REUTERS, Jan. 28, 2002. Investors feared that Western Wireless's roaming revenues were likely to decline as a result of the deal. *Id.*

<sup>191</sup> See Appendix C, Table 1, at C-2.

<sup>192</sup> *June 2001 CTIA Survey*, at 65.

<sup>193</sup> *Id.*

<sup>194</sup> See, e.g., Yukari Iwatani, *AT&T Wireless Sees Potential in Prepayments*, REUTERS, July 26, 2001. Prepaid programs are considered to have been the primary driver of the rapid penetration gains in Europe over the past couple of years. *NextGen VI*, at 16.

<sup>195</sup> See *SSB Wireless Services*, at 5; *NextGen VI*, at 16. In its July analyst conference, for example, AT&T Wireless "took great pains" to emphasize that prepaid programs will not be a dominant part of its subscriber base, so that "subscriber quality" will remain high. Frank Marsala and Dae B. Rao, *AT&T Wireless*, Equity Research, Robertson Stephens, Sept. 7, 2001, at 1.

<sup>196</sup> Paul Wuh *et al.*, *Telecom Services: Wireless Communications*, Global Equity Research, Goldman Sachs, Dec. 12, 2001, at 1 (8 percent); *New Telephia/Harris Interactive Analysis Gives Wireless Carriers National Perspective on Customer Acquisition and Retention, News Release*, Telephia, Aug. 27, 2001 (10 percent). The Telephia survey also found that 16 percent of new subscribers were prepaid. *Id.* For 2000 percentage, see *Sixth Report*, at 13380.

At the end of the third quarter of 2001, Verizon Wireless's subscriber base was approximately 6 percent prepaid, AT&T Wireless's and Cingular Wireless's somewhat less than 10 percent, and VoiceStream's was much higher, at 27 percent.<sup>197</sup>

In place of a traditional prepaid offering, Sprint PCS has its Automatic Spending Limit ("ASL") program (now called "Clear Pay").<sup>198</sup> Sprint PCS introduced ASL in late 1999 in an attempt to target an under-penetrated segment of the population, the sub-prime credit category.<sup>199</sup> Depending on a potential customer's credit profile, he or she is offered either an account with no spending limit and no deposit, or is designated an ASL customer.<sup>200</sup> ASL customers have the same choice of phones, contracts, and promotions as non-ASL customers, but they are subject to spending limits or a deposit, or both.<sup>201</sup> Analysts claim that ASL is more attractive than prepaid to the credit-challenged, since postpaid plan rates are lower, the phone selection is greater, and the promotions are better than those available to prepaid subscribers.<sup>202</sup> Approximately 29 percent of Sprint PCS's subscribers are now ASL, and about 50 percent of Sprint PCS's gross subscriber additions<sup>203</sup> in the fourth quarter of 2001 were ASL.<sup>204</sup>

#### e. Wireless/Wireline Competition

Once solely a business tool, wireless phones are now a mass-market consumer device.<sup>205</sup> The overall wireless penetration rate (defined as the number of wireless subscribers divided by the total U.S. population) in the United States is now at 45 percent. In addition, one study found that 64.3 million households, or 61 percent of all U.S. households, had at least one wireless phone.<sup>206</sup> Another study found

---

<sup>197</sup> Ric Prentiss and Tanya Nelson, *Wireless Holiday Songs*, Industry Report, Raymond James & Associates, Dec. 20, 2001, at 5. Nextel does not offer prepaid plans. Nextel, *Compare Rate Plans* (visited Mar. 20, 2002) <[http://www.nextel.com/phone\\_services/rates/rateplancomparison.shtml](http://www.nextel.com/phone_services/rates/rateplancomparison.shtml)>.

<sup>198</sup> Paul Wuh and Seung Hoon Han, *Sprint PCS Group*, Global Equity Research, Goldman Sachs, Nov. 7, 2001, at 2 ("*Goldman Sachs Sprint PCS Report*"). Sprint PCS's slogan for the program is "Clear Pay – The Clear Alternative to Prepaid." *SSB Wireless Services*, at 14.

<sup>199</sup> *NextGen VI*, at 19. Approximately one-third of the U.S. consumer market has sub-prime credit. *SSB Wireless Services*, at 28.

<sup>200</sup> Paul Wuh *et al.*, *Analysis of Prepaid Business Model*, Global Equity Research, Goldman Sachs, June 14, 2001, at 13.

<sup>201</sup> *Goldman Sachs Sprint PCS Report*, at 2. Sprint PCS eliminated the deposit requirement in June 2001, but reinstated it in February 2002 due to high churn and default rates associated with ASL customers. Paul Kagan Associates, Inc., *No-Deposit Plans Still Driving Up Sprint Churn*, WIRELESS MARKET STATS, Mar. 26, at 6.

<sup>202</sup> *See, e.g., Goldman Sachs Sprint PCS Report*, at 2.

<sup>203</sup> Gross additions includes sales to both new and existing subscribers.

<sup>204</sup> Paul Wuh *et al.*, *Week in Wireless*, Global Equity Research, Goldman Sachs, Feb. 6, 2002, at 2.

<sup>205</sup> *See Sixth Report*, at 13381.

<sup>206</sup> Margaret Schoener, *U.S. Residential Wireless Voice Access Lines Head South, Revenue Heads North*, Gartner, Inc., Aug. 31, 2001, at 1. Another study found that 52 percent of households in the 25 largest U.S. markets



that 58 percent of Americans 12 and older now own a mobile phone.<sup>207</sup>

(i) **Wireless Substitution**

While firm data is difficult to come by, analysts estimate that 3 to 5 percent of wireless customers use their wireless phones as their only phone.<sup>208</sup> Though these estimates indicate that relatively few wireless customers have “cut the cord” in the sense of canceling their subscription to wireline telephone service, there is growing evidence that consumers are substituting wireless service for traditional wireline communications. One analyst claimed that 20 percent of residential customers had replaced “some” wireline phone usage with wireless, and that 11 percent had replaced a “significant percentage.”<sup>209</sup> According to a USA Today/CNN/Gallop poll, almost one in five mobile telephony users regard their wireless phone as their primary phone.<sup>210</sup>

Several local carriers have attributed declining access line growth rates in part to substitution by wireless.<sup>211</sup> The number of residential access lines served by BellSouth, SBC, and Verizon dropped by almost 3 percent during 2001, more than 2.5 million lines.<sup>212</sup> A top executive at Verizon attributed the decline in the number of access lines served by his company, the first in the company’s history, in part to the shift to wireless phones.<sup>213</sup> One study estimated that, by the end of 2001, wireless had displaced 10 million access lines, primarily by consumers choosing wireless over installing additional access lines.<sup>214</sup>

---

use wireless phone service. *Wireless Phone Penetration Among U.S. Household Climbs above 50 Percent As More First-Time Subscribers Enter the Marketplace*, News Release, J.D. Power and Associates, Sept. 26, 2001.

<sup>207</sup> GenWireless.Com, *Mobile Penetration by Age* (visited Jun 12, 2002) <<http://www.genwireless.com/stats.html>> (describing a November 2001 survey commissioned by Upoc, a “a mobile marketing and community developer”). The breakdown by age: 12-17, 51 percent; 18-24, 61 percent; 25-29, 60 percent; 30-34, 69 percent; 35-54, 62 percent; 55 and older, 50 percent. *Id.*

<sup>208</sup> *Carriers Said to Need New Tactics to Combat LD Substitution*, COMMUNICATIONS DAILY, Mar. 15, 2002 (citing Yankee Group analyst Knox Bricken’s estimate of 3 percent). According to CTIA, about 2.2 percent of people in the United States have abandoned their wireline phones in favor of wireless phones or other wireless devices, which translates into roughly 5 percent of all wireless subscribers. Yuki Noguchi, *More Cell-Phone Users Cut Ties to Traditional Service*, WASHTECH.COM, Dec. 27, 2001 (citing CTIA).

<sup>209</sup> *Carriers Said to Need New Tactics to Combat LD Substitution*, COMMUNICATIONS DAILY, Mar. 15, 2002 (citing Yankee Group analyst Knox Bricken).

<sup>210</sup> Michelle Kessler, *18% See Cellphones as Their Main Phone*, USA TODAY, Feb. 1, 2002.

<sup>211</sup> *NextGen VI*, at 33.

<sup>212</sup> *Id.*, at 34.

<sup>213</sup> Yuki Noguchi, *Verizon Connections Decline*, WASHINGTON POST, Sept. 11, 2001 (available in 2001 WL 22754735) (citing Verizon President and Co-Chief Executive Officer Ivan Seidenberg). In the same vein, Duane Ackerman, Chairman and Chief Executive Officer of BellSouth said: “Wireless substitution is now a fact.” Shawn Young, *More Callers Cut Off Second Phone Lines for Cellphones, Cable Modems*, WALL STREET JOURNAL, Nov. 15, 2001, at B1. He added, “That’s okay. We tend to own both.” *Id.*

<sup>214</sup> *It’s a Wireless Boom as More People Cut the Cord*, News Release, International Data Corp. (“IDC”), Jan. 8, 2002. Another study estimates that 2 million households replaced an access line with a wireless phone in the first six months of 2001. Margaret Schoener, *U.S. Residential Wireless Voice Access Lines Head South, Revenue Heads North*, Gartner, Inc., Aug. 31, 2001, at 1.

A number of payphone providers claim wireless use is significantly decreasing payphone profits.<sup>215</sup> In January 2002, Verizon began a trial program, which is still running, in which payphone users would pay a cheaper, per-minute rate for local calls, instead of a higher rate for a call of unlimited length.<sup>216</sup> Verizon introduced the program as a competitive market response to the “wireless challenge.” In February 2001, BellSouth announced that it was exiting the payphone business in part due to business lost to wireless phones.<sup>217</sup>

Wireless plans are substituting for traditional wireline long distance as well.<sup>218</sup> Many of the calling plans offered by the nationwide wireless carriers include free nationwide long distance.<sup>219</sup> One analyst claims that 20 percent of AT&T’s customers, or 5 million people, have replaced some wireline long distance usage with wireless.<sup>220</sup> AT&T itself attributed the decline in its long distance calling volumes and revenues in part to wireless substitution.<sup>221</sup> Cingular Wireless advertises its nationwide calling plans with the slogan, “Never Pay Long Distance Again.”<sup>222</sup>

## (ii) Wireless Alternatives

An increasing number of mobile wireless carriers offer service plans designed to compete directly with wireline local telephone service. For example, Leap, through its Cricket subsidiary, now offers its “Around Town Phone” mobile telephone service in 40 markets in 20 states.<sup>223</sup> At the end of 2001, Leap had more than 1.1 million customers, having added more than 900,000 during 2001.<sup>224</sup> Leap’s service allows subscribers to make unlimited local calls and receive calls from anywhere in the world for one flat rate of \$30 per month.<sup>225</sup> Roaming outside the local area is not available,<sup>226</sup> and customers pay extra for

---

<sup>215</sup> *SBC Adjusts Prices to Maintain Payphone Base*, News Release, SBC, July 6, 2001; *Verizon Raises Price of Local Payphone Call; Announces Return of the 10-Cent Call in Some Markets*, News Release, Verizon, Sept. 7, 2001.

<sup>216</sup> *Verizon Tests Lower Prices for Local Payphone Calls*, News Release, Verizon, Jan. 29, 2002.

<sup>217</sup> *Sixth Report*, at 13381.

<sup>218</sup> *NextGen VI*, at 33.

<sup>219</sup> *Id.*, at 57-63.

<sup>220</sup> *Carriers Said to Need New Tactics to Combat LD Substitution*, COMMUNICATIONS DAILY, Mar. 15, 2002 (citing Yankee Group analyst Knox Bricken).

<sup>221</sup> *AT&T Announces 1Q 2002 Earnings*, News Release, AT&T Corp., Apr. 24, 2002.

<sup>222</sup> See Cingular, *Cingular Wireless* (visited Mar. 21, 2002) <<http://www.cingular.com/>>.

<sup>223</sup> Leap, *Welcome to Cricket Communications* (visited Mar. 20, 2002) <<http://www.cricketcommunications.com/>>.

<sup>224</sup> *Leap Reports Results for Fourth Quarter and Fiscal Year 2001*, News Release, Leap, Feb. 11, 2002.

<sup>225</sup> The monthly fee, paid in advance, varies slightly by service area. The service is offered without a term contract and requires no credit check. Leap Wireless International Inc., SEC Form 10-Q, Nov. 13, 2001, at 21. Leap emphasizes that its Cricket service is not a prepaid program, but rather, “pay-in-advance,” like cable TV. The pay-in-advance model has the recurring revenue of customers paying every month, as opposed to the random refill

long distance calls. Leap states that, on average, its customers use 1,150 minutes a month, a figure which the company claims is comparable to typical landline usage.<sup>227</sup> According to the company, about 32 percent of their customers use their Cricket phones as their only phone,<sup>228</sup> and more than 80 percent use their Cricket phones at home.<sup>229</sup>

Other companies offering unlimited local calling plans include: US Cellular in Tennessee;<sup>230</sup> ALLTEL in Arizona, New Mexico, North Carolina, Nebraska, and Arkansas;<sup>231</sup> MetroPCS in California, Florida, and Georgia;<sup>232</sup> NorthCoast PCS in Ohio;<sup>233</sup> First Cellular of Southern Illinois (“First Cellular”) in Illinois,<sup>234</sup> Rural Cellular in Vermont, New Hampshire, New York, Kansas, Minnesota, Maine, North Dakota, South Dakota, and Wisconsin;<sup>235</sup> Midwest Wireless in Minnesota;<sup>236</sup> and Ntelos Inc. (“Ntelos”) in Virginia.<sup>237</sup>

For around \$50, many carriers offer regional or national calling plans with 500 or more “anytime”

---

patterns of someone using prepaid service. Pay-in-advance is considered more desirable than prepaid, since customers who receive a monthly bill are more likely to pay it, resulting in less churn and higher ARPU, and thus greater profitability per customer. Frank Marsala and Dave B. Rao, *Leap Wireless*, Telecom Services Research, Robertson Stephens, Oct. 25, 2001, at 3.

<sup>226</sup> Todd J. Rethemeier *et al.*, *Leap Wireless International Inc.*, Equity Research, Bear Stearns, Feb 1, 2002, at 13.

<sup>227</sup> Leap Wireless International, Inc. Request for Waiver and Extension of the Broadband PCS Construction Requirements of Commission Rule 24.203(a) and (b), FCC File No. 0000436815 (filed Apr. 26, 2001), at 2; *Leap Reports Results for Fourth Quarter and Fiscal Year 2001*, News Release, Leap, Feb. 11, 2002 (average usage in its one-year or older markets).

<sup>228</sup> Frank Marsala and Dae B. Rao, *Leap Wireless*, Equity Research, Robertson Stephens, Mar. 25, 2002, at 2.

<sup>229</sup> Todd J. Rethemeier *et al.*, *Leap Wireless International Inc.*, Equity Research, Bear Stearns, Feb 1, 2002, at 17 (citing Leap’s market research).

<sup>230</sup> Dan Meyer, *Carriers Eat Up All-You-Can-Talk Local Buffets*, RCR WIRELESS NEWS, July 16, 2001 (available in 2001 WL 8870069).

<sup>231</sup> *Id.*

<sup>232</sup> See MetroPCS, *Welcome* (visited Mar. 20, 2002) <<http://www.metropcs.com/>>.

<sup>233</sup> See NorthCoast PCS, *Service Plans* (visited Mar. 20, 2002) <<http://www.northcoastpcs.com/NewFiles/Callingfeatures.html>>.

<sup>234</sup> See *Transcript*, at 108; First Cellular, *Southern Illinois Unlimited* (visited Mar. 20, 2002) <[http://www.firstcellular.com/wireless\\_clear\\_connect\\_d.htm](http://www.firstcellular.com/wireless_clear_connect_d.htm)>.

<sup>235</sup> See Rural Cellular, *Welcome To Rural Cellular Corporation* (visited Mar. 20, 2002) <<http://www.ruralcellular.com/>>.

<sup>236</sup> Midwest Wireless, *Realm - Basic Service Plan* (visited Mar. 20, 2002) <[http://www.midwestwireless.com/mwc\\_plans/mwc\\_plans\\_Realm\\_BP.asp](http://www.midwestwireless.com/mwc_plans/mwc_plans_Realm_BP.asp)>.

<sup>237</sup> Ntelos, *Products & Services* (visited Mar. 20, 2002) <[http://www.ntelos.com/ProdSvcs/digpcs\\_rateplanW.html#nntown](http://www.ntelos.com/ProdSvcs/digpcs_rateplanW.html#nntown)>.

minutes and over 3000 night and weekends minutes.<sup>238</sup> In November 2001, VoiceStream began offering for a limited time virtually unlimited regional calling plans, its “Neighborhood” rate plans.<sup>239</sup> For \$50 to \$60 per month, subscribers get a calling plan that includes 3,000 minutes (usable anytime) and the ability to roam across several states on VoiceStream’s network without extra fees. Long distance from VoiceStream’s network to anywhere within those states is included as well. Subscribers on VoiceStream’s Northeast Neighborhood plan, for example, can call anywhere on VoiceStream’s East Coast network from southern Maine to northern Virginia without incurring roaming charges.<sup>240</sup>

#### **f. Geographical Comparisons: Urban vs. Rural**

Since the release of the *Sixth Report*, the Commission has attempted to obtain a better understanding of the state of competition below the national level, in particular in rural areas. The primary difficulty for the Commission in this task is the lack of data specific to rural markets. At its Public Forum held in February 2002, the Wireless Telecommunications Bureau asked participants, among other questions, to address this issue.<sup>241</sup> Several participants offered their opinions on these questions, which are discussed in more detail below.

##### **(i) Rural-Specific Data**

Many of the analysts at the forum agreed that there was a lack of rural-specific data, as well as data on sub-national trends generally, and some suggested that the Commission should consider collecting data on local markets.<sup>242</sup> Other participants, while recognizing the value of such data, expressed concerns about the costs and burdens of imposing new reporting requirements on carriers to obtain such information.<sup>243</sup>

##### **(ii) Definition of Rural**

As the Department of Education stated in 1994, “few issues bedevil analysts and planners . . . more than

---

<sup>238</sup> See *NextGen VI*, at 57-63.

<sup>239</sup> *Id.*, at 19.

<sup>240</sup> VoiceStream, *Rate Plans: Northeast Neighborhood (Boston)* (visited Mar. 20, 2002) <[http://www.voicestream.com/products/services/rateplans/nen3\\_reg.asp](http://www.voicestream.com/products/services/rateplans/nen3_reg.asp)>. This plan costs \$59.99. *Id.*

<sup>241</sup> See *Commercial Mobile Radio Services (CMRS) Competition Report Public Forum* <<http://wireless.fcc.gov/cmrs-crforum.html>> for access to participants’ presentations and forum transcript. The transcript of the forum can be found at *Public Hearing for 7th Annual CMRS Competition Report: Transcript of the Day’s Event* (visited Mar. 14, 2002) <<http://wireless.fcc.gov/services/cmrs/presentations/020228.pdf>> (*Transcript*).

<sup>242</sup> See, e.g., *Transcript*, at 83 (Economist Charles Mahla: “We would love to have more data. Some of this data is difficult to get.”). Chris Murray of the Consumers Union argued that “[the Commission] should gather data independently as much as possible.” *Id.*, at 29. See, also, *Id.*, at 32 (comments of Economist Greg Rosston).

<sup>243</sup> Economist Greg Rosston, after describing the benefits of collecting data, said, “There are costs to collecting data as well, and that’s an important thing for the FCC to consider.” *Id.*, at 37. Terry Addington, President of the Rural Cellular Association (“RCA”) and CEO of First Cellular, concurred: “Mandates are very, very difficult for a small carrier to manage because we’re resource challenged.” *Id.*, at 106. Rosston also raised concerns about confidentiality and whether or not collected data would be or could be used anti-competitively. *Transcript*, at 37. See, also, *Id.*, at 105 (comments by Addington).

the question of what actually constitutes ‘rural.’”<sup>244</sup> The difficulties that this question brings are evidenced by the fact that within the federal government, the term rural has been defined in many different ways. The variety of definitions reflects the numerous purposes for which the definitions are used throughout the federal government.<sup>245</sup> The Commission has used RSAs as a proxy for rural areas for certain purposes, such as its CMRS spectrum cap proceeding, stating that “other market designations used by the Commission for CMRS, such as [EAs], combine urbanized and rural areas, while MSAs and RSAs

---

<sup>244</sup> Joyce D. Stern, *The Condition of Education in Rural Schools*, U.S. Department of Education (Jun 1994) [cited in National Center for Education Statistics, *Urban/Rural Classification Systems* (visited Apr. 4, 2002) <<http://nces.ed.gov/surveys/ruraled/definitions.asp>>].

<sup>245</sup> For Census 2000, the Census Bureau classifies “urban” as all territory, population, and housing units located within an urbanized area (“UA”) or an urban cluster (“UC”). It delineates UA and UC boundaries to encompass densely settled territory, which consists of: 1) core census block groups or blocks that have a population density of at least 1,000 people per square mile, and 2) surrounding census blocks that have an overall density of at least 500 people per square mile. In addition, under certain conditions, less densely settled territory may be part of each UA or UC. “Rural” consists of all territory, population, and housing units located outside of UAs and UCs. U.S. Census Bureau, *Urban and Rural Classification: Urban and Rural Criteria* (visited Apr. 15, 2002) <[http://www.census.gov/geo/www/ua/ua\\_2k.html](http://www.census.gov/geo/www/ua/ua_2k.html)>. The Office of Management and Budget (“OMB”) defines Metropolitan Areas (“MA”) for purposes of collecting, tabulating, and publishing federal data. OMB defines MAs as those areas within the United States that include: 1) one city with 50,000 or more inhabitants, or 2) a Census-Bureau defined urbanized area of at least 50,000 inhabitants and a total metropolitan population of at least 100,000 inhabitants (75,000 in New England). Currently defined MAs are based on application of 1990 standards (which appeared in the Federal Register on March 30, 1990) to 1990 decennial census data and to subsequent Census Bureau population estimates and special census data. Current MA definitions were announced by OMB effective June 30, 1999. U.S. Census Bureau, *About Metropolitan Areas* (visited Apr. 15, 2002) <<http://www.census.gov/population/www/estimates/aboutmetro.html>>. For the administration of several types of business loans, the Small Business Administration (“SBA”) has defined rural area as a political subdivision or unincorporated area in a non-metropolitan county (as defined by the Department of Agriculture), or, if in a metropolitan county, any such subdivision or area with a resident population under 20,000 which is designated by SBA as rural. 13 C.F.R. § 120.10. The Rural Housing and Economic Development (RHED) program, administered by the U.S. Department of the Housing and Urban Development, supports housing and economic development activities in rural areas, which are defined by any one of five criteria: 1) A place having fewer than 2,500 inhabitants (within or outside a metropolitan area); 2) a county with no urban population of 20,000 inhabitants or more; 3) Territory, persons, and housing units in rural portions of “extended cities” (using data from the U.S. Census Bureau); 4) “Open country” which is not part of or associated with an urban area (as defined by the Department of Agriculture); 5) Any place with a population not in excess of 20,000 and not located in a Metropolitan Statistical Area. 66 Fed. Reg. 12190 (2001). In the early 1970s, the Economic Research Service (ERS) of the U.S. Department of Agriculture, found a need for a classification of counties into various degrees of urbanization. The resultant system, officially known as the ERS Rural-Urban Continuum Codes, is most often referred to as the Beale codes, after its creator, Dr. Calvin Beale. The Beale codes form a classification scheme that distinguishes metropolitan counties by size, and nonmetropolitan counties by degree of urbanization and proximity to metro areas. Counties are subdivided into 4 metro and 6 nonmetro categories, resulting in a 10-part county codification scheme. A number of agencies, including the Department of Education, have used the Beale codes. National Center for Education Statistics, *Urban/Rural Classification Systems* (visited Apr. 25, 2002) <<http://nces.ed.gov/surveys/ruraled/definitions.asp>>. The Employment and Training Administration (“ETA”) in the Department of Labor administered the Welfare-to-Work grant program. In the third round of that grant program, a rural area was defined as: 1) any county that does not contain an urban center of more than 50,000 people, and where at least 50 percent of the geographical area of the county has a population density of less than 100 persons per square mile; or 2) in counties where there is an urban center, a rural area within the county that constitutes, or is part of, a distinct rural labor market. 64 Fed. Reg. 4018 (1999).

are defined expressly to distinguish between rural and urban areas.”<sup>246</sup> Some participants in the forum questioned whether the urban / rural distinction is currently meaningful in the context of mobile telephony.<sup>247</sup>

While the Commission does not have a statutory definition of what constitutes a rural area, in an attempt to gain some insight into the competitive differences within the different geographic areas of the United States, this report analyzes market entry data using a variety of criteria, including EA nodal versus EA non-nodal counties,<sup>248</sup> CMAs, and population density. This section of the report also discusses data presented at the forum on the cost of mobile telephony service in rural areas.

## Rural Rollout

### *EA Nodal vs. Non-Nodal Counties*

Each EA consists of one or more counties that are “Economic Nodes” and the surrounding counties that are economically related to it.<sup>249</sup> An EA may have more than one economic node. The counties that are economic nodes are metropolitan areas or similar areas that serve as the EA’s center(s) of economic activity.<sup>250</sup> As a proxy for urban and rural geographic areas, we have looked at counties which make up economic nodes, i.e. nodal counties, versus those counties that do not make up economic nodes, i.e. non-nodal counties. In comparing those two sets of counties, we find the non-nodal counties have an average of 3.1 mobile competitors, while the nodal counties have an average of 5.5 competitors.

### *MSAs vs. RSAs*

In considering what constitutes a rural area, Ken Johnson, the Director of Legislative and Regulatory at

---

<sup>246</sup> See Biennial Regulatory Review, Spectrum Aggregation Limits for Wireless Telecommunications Carriers, *Report and Order*, 15 FCC Rcd 9219, 9256 at note 203 (1999). Consistent with this approach, the Commission recently applied this distinction between rural and urban markets in its review of the cellular cross-interest rule, deciding to maintain this rule in RSAs while eliminating it in MSAs. See *Spectrum Cap Order*, at 22708. Based on data in its records, the Commission found that RSAs typically have fewer competitors offering two-way mobile service, and fewer nationwide service providers, than do MSAs. *Id.*, at 22705.

<sup>247</sup> Mark Rubin, Director of Federal Government Affairs for Western Wireless stated that “broad generalities, based upon [M]SA and RSA distinctions, don’t necessarily reflect the marketplace realities.” *Transcript*, at 122. Doug Stephens, interim Chief Operating Officer and Vice President for the central region of Dobson, said, “It is no longer useful for the Commission to engage in urban/rural distinction[s].” *Transcript*, at 114. Rubin of Western Wireless agreed: “Any differences that do exist [in competition between rural and urban areas] may not [be] attributable to any rural or urban distinction. For example, there are some rural areas that have better service and more competition than urban areas.” *Transcript*, at 122.

<sup>248</sup> See discussion in Rural Rollout, *infra*.

<sup>249</sup> See Section II.A.1.b(ii), Regional Penetration Rates, *supra*.

<sup>250</sup> Of the 3,141 counties in the nation in 1995, 836 were counties that made up the 310 metropolitan areas as defined by the Office of Management and Budget in June 1993. The 310 metropolitan areas consisted of 240 metropolitan statistical areas, 59 primary metropolitan statistical areas (PMSAs), and 11 New England county metropolitan areas (NECMAs). In parts of the United States remote from metropolitan areas, 38 non-metropolitan counties were each identified as a node. Kenneth P. Johnson, *Redefinition of the BEA Economic Areas*, SURVEY OF CURRENT BUSINESS, Feb. 1995, at 75.

RTG, stated, with reservations, that “RSAs are a good place to start.”<sup>251</sup> In comparing competitive entry in counties that make up RSAs compared to counties that make up MSAs, we find that RSA counties have an average of 3.3 mobile competitors, while MSAs have an average of 5.7 competitors.

#### *Population Density*

Two forum participants, Johnson of RTG and Rubin of Western Wireless, indicated that population density is a significant element of defining rural.<sup>252</sup> Johnson suggested that 100 people per square mile might be a reasonable place to make an urban versus rural split.<sup>253</sup> In comparing competitive entry in counties with population densities of 100 persons per square mile or less to those with densities greater than 100, we find that the less densely populated counties have an average of 3.2 mobile competitors, while the more densely populated counties have an average of 5.5 competitors.

#### *Summary*

These three exercises of defining urban versus rural (EA Nodal vs. Non-Nodal Counties/MSAs vs. RSAs/Population Density) provide remarkably similar estimates of the average number of competitors in urban versus rural markets. On average, rural markets have slightly more than three providers, while urban markets have between five and six providers.

### **Rural Pricing**

Econ One conducted an analysis in October 2001 of mobile telephony pricing in rural versus urban markets.<sup>254</sup> Econ One reviewed the pricing plans of 25 markets it considered to be rural.<sup>255</sup> The average population of the rural markets was 95,000, compared to the average population of 4.4 million in the top 25 U.S. cities. Econ One found that there was virtually no difference in the average monthly charge for wireless service between the two groups.<sup>256</sup> The charge for the top 25 markets was \$37.39, while the charge for rural markets was slightly less at \$36.34, a difference of 2.9 percent. Further, Mahla noted that Econ One’s study showed one difference between rural and urban markets in that there was a much wider

---

<sup>251</sup> Although he added, “but I’m not sure if that works.” *Transcript*, at 101. Johnson earlier noted that “there are rural portions of MSAs.” *Id.*, at 101.

<sup>252</sup> Johnson said “[population density is] one of the many factors that would determine rural.” *Id.*, at 101. Rubin said, “as a rural cellular service provider, Western defines itself, in part, based upon the low population density of its service area.” *Id.*, at 122-123.

<sup>253</sup> *Id.*, at 102. Johnson cautions: “So does that make Albemarle County, Virginia [rural?]. Albemarle County [includes] the University of Virginia. They have 94.0 people per square mile. Does that make [the county] rural . . . ? I mean, if you’re right there at the University of Virginia, it’s not rural. If you drive five minutes away, where Thomas Jefferson was born, it’s extra rural.” *Id.*, at 102.

<sup>254</sup> Econ One normally analyzes pricing plan data every month for the top 25 most populous U.S. markets. *See* Section II.A.1.d, Pricing Data and Trends, *supra*. The rural market pricing plans were analyzed using the same methodology as Econ One’s large markets survey.

<sup>255</sup> Economist Charles Mahla of Econ One described the selection process: “We randomly selected from RSAs and then simply chose cities within an RSA. The one, perhaps, selection bias is that we chose cities that were not adjacent to or very close to larger urban areas. So we randomly selected the RSAs we used and then, selected cities within those RSAs to conduct those studies.” He added, “I don’t believe the definition of rural markets would comport with some of the government agencies definition of rural markets.” *Transcript*, at 84-85.

<sup>256</sup> The survey results are reproduced in Appendix C, Table 10, at C-11.

spread in pricing among rural markets as compared to urban markets use. Specifically, the difference between the least and the most expensive pricing plans was 8.3 percent in the top 25 U.S. cities versus 59 percent in the cities in the randomly-sampled RSAs used in the Econ One analysis.<sup>257</sup> Although these results are interesting, Mahla cautioned about drawing “a tremendous number of conclusions about [the study] because we’ve only done one data point.”<sup>258</sup>

Addington of RCA also presented some pricing data specific to the rural wireless company he manages in Illinois. First Cellular offers a number of plans, including an unlimited local calling plan.<sup>259</sup> Addington claims that the average price per minute of First Cellular has declined from \$0.79 in 1995 to \$0.10 in 2001, dropping 70 percent from 1999 to 2001 alone.<sup>260</sup> First Cellular’s most popular plan for 2002 will average \$0.04 per minute.<sup>261</sup>

There appear to be differences in the number of market participants between our proxies for rural and urban wireless markets. Specifically, the proxies showed that there are, on the average, at least two more competitors in urban markets than in rural markets. However, at the public forum, Dobson’s and RCA’s representatives contended that it is not clear those differences are meaningful in terms of competition. According to Stephens of Dobson, “competition exists very heavily throughout small market America.”<sup>262</sup> Addington of RCA agreed: “Competition is real and . . . it’s out there.”<sup>263</sup> Some of the participants claimed that that reason for this may be the competitive pressures created by the very existence of nationwide operators. As explained by Stephens of Dobson:

In most respects, small market carriers like Dobson are subject to the same competitive pressures as the large market carriers. Because of national advertising and the Internet, consumers all over the country are educated about nationwide rate plans and services enabled by digital technology and the prices of wireless handsets. No matter where they live, customers expect and demand the diversity of services at competitive rates.<sup>264</sup>

Addington of RCA experienced similar challenges in his role as CEO of First Cellular: “If you want to measure [competition], come with me on a sales call, sit with me at a customer’s location, I’ll offer my unlimited [rate plan]. AT&T will come in and offer their one rate [plan]. Sprint will come in and offer

---

<sup>257</sup> *Transcript* at 87.

<sup>258</sup> *Transcript* at 86.

<sup>259</sup> *Transcript*, at 108-109.

<sup>260</sup> *See* Appendix C, Table 11, at C-12.

<sup>261</sup> *See* Appendix C, Table 11, at C-12. Addington said that his company’s “margins have gone down 8 percent since we’ve gone from two competitors to five competitors, which has only been about a year, year and a half. My margins have gone down 8 percent. My [churn] has gone up 38 percent.” *Transcript*, at 110.

<sup>262</sup> *Transcript*, at 115.

<sup>263</sup> *Id.*, at 110.

<sup>264</sup> *Id.*, at 115.



something else -- free phones, free this -- let me tell you, that's competition."<sup>265</sup> Econ One's pricing study found evidence of this nationwide pricing effect, in that its study showed no differences in service costs between rural and urban markets.<sup>266</sup>

## 2. Other Competitors: Resellers and Satellite Operators

This section discusses two other types of operators that are competing in the mobile telephone segment: resellers and satellite operators.

### a. Resellers

Resellers offer service to consumers by purchasing airtime at wholesale rates from facilities-based providers and reselling it at retail prices.<sup>267</sup> According to information provided to the FCC in its ongoing local competition and broadband data gathering program, the resale sector accounts for approximately 5 percent of all mobile telephone subscribers.<sup>268</sup> WorldCom claims to be the largest reseller of post-paid wireless services in the United States with nearly 2 million customers;<sup>269</sup> however, in June 2002, the company announced that it had decided to exit the resale business.<sup>270</sup>

Recently, a new version of reseller, referred to as a "mobile virtual network operator," or "MVNO," has begun to appear in this country after experiencing some success in Europe and Asia. While some contend that MVNO is just a new catch phrase for reseller, others argue that MVNO arrangements differ from traditional resale in significant ways.<sup>271</sup> For example, advocates contend that MVNOs, by focusing on

---

<sup>265</sup> *Id.*, at 110-111.

<sup>266</sup> See Charles R. Matha, *Public Forum For the 7th Annual CMRS Competition Report*, Presentation, Econ One Research, Inc., Feb. 28, 2002, at slide 10 (*available at* <http://wireless.fcc.gov/services/cmrs/presentations/>).

<sup>267</sup> Interconnection and Resale Obligations Pertaining to Commercial Mobile Radio Services, *First Report and Order*, 11 FCC Rcd 18455, 18457 (1996).

<sup>268</sup> See Appendix C, Table 2, at C-3.

<sup>269</sup> WorldCom, Inc., Petition Pursuant to 47 U.S.C. Sec.160 For Forbearance From the Commercial Mobile Radio Service Number Portability Obligation, WT Docket No. 01-184, *Comments*, at 1 (filed Sept. 21, 2001). General Motor Corp. claims that its telematics system OnStar is the country's largest reseller of "cellular service." *General Motors Corp. - GM's OnStar Has Close to Two Million Subscribers*, CANADA STOCKWATCH, Nov 12, 2001 (2001 WL 31657384). OnStar services include automatic notification of air bag deployment, stolen vehicle tracking, remote door unlock, emergency services dispatch, roadside assistance, remote diagnostics, route support, convenience services and OnStar Concierge. At extra cost, subscribers can also use OnStar's "Personal Calling" service, which allows OnStar system customers to make and receive calls in their vehicles in cooperation with Verizon Wireless. *Cadillac and OnStar Offer Six-Months Directions & Connections Service at No Charge on Certified Pre-Owned Cadillacs*, News Release, OnStar, May 13, 2002. OnStar customers must pre-purchase minutes to use the service. OnStar, *What is OnStar: Services: Personal Calling* (visited Mar. 11, 2002) <[http://www.onstar.com/visitors/html/ao\\_personal\\_calling.htm](http://www.onstar.com/visitors/html/ao_personal_calling.htm)>. For a more complete discussion of OnStar, see Section II.B.4, Telemetry and Telematics, *infra*.

<sup>270</sup> *WorldCom, Inc. Announces Intention to Exit Wireless Resale Business*, News Release, WorldCom, Inc., June 5, 2002.

<sup>271</sup> Deborah Mendez-Wilson, *Changing Rules of the Game: MVNO Advocates Keep a Watchful Eye on Nextwave Case*, WIRELESS WEEK, Sept. 17, 2001, at 20.

brand development, have greater control over subscribers and will be better able to penetrate certain niche markets than a national company concerned with large market segments.<sup>272</sup>

Sprint PCS's arrangement with Richard Branson's Virgin Group, LLC ("Virgin") is one example of this. In October 2001, Sprint PCS and Virgin announced the formation of a joint venture, Virgin Mobile USA ("Virgin Mobile").<sup>273</sup> The venture plans to offer a new prepaid service to be marketed under the Virgin Mobile brand name using Sprint PCS's network.<sup>274</sup> To fund the venture, Sprint PCS will contribute up to \$150 million, the majority of which will be in the form of services and the remainder in cash, while Virgin will contribute up to \$150 million in cash.<sup>275</sup> Virgin Mobile plans to target the 15 to 30 year-old market in the United States.<sup>276</sup>

### b. Satellite Operators

As of year-end 2001, two carriers<sup>277</sup> were providing mobile satellite services ("MSS") in the United States, Globalstar Telecommunications LTD. ("Globalstar") and Iridium Satellite LLC. ("Iridium Satellite"). Another company, New ICO Global Communications Limited ("New ICO"), has announced plans to initiate service in 2003.

The following is a brief description of how satellite telephony works. An "outbound" communication from a MSS mobile phone is transmitted up to the satellite, using "service link" frequencies. The satellite then retransmits the signal back down to the earth, using "feeder link" frequencies, to a gateway ground station, where the call is interconnected with terrestrial networks, such as the PSTN. The return or "inbound" communication works the exact opposite way. The communication from the terrestrial network is transmitted from the gateway earth station up to the satellite, and then retransmitted by the satellite back down to the MSS mobile telephone. In systems with inter-satellite links, the inbound and outbound communications may be transmitted through multiple satellites in order to complete the connection between the originating mobile telephone and the receiving gateway ground station.

The following is a description of the products and services offered by Globalstar and Iridium Satellite as of year-end 2001.

---

<sup>272</sup> Deborah Mendez-Wilson, *Changing Rules of the Game: MVNO Advocates Keep a Watchful Eye on Nextwave Case*, WIRELESS WEEK, Sept. 17, 2001, at 20. See, also, Dominic Endicott, *MVNOs in the U.S.: Who Will Win and How . . . and Will It Be Worth It?*, RCR WIRELESS NEW, Sept. 20, 2001, at 42, and Lynette Luna, *Carriers Look Beyond Brand*, TELEPHONY, Feb. 18, 2002 (2002 WL 7733793).

<sup>273</sup> *Sprint and Virgin announce Joint Venture*, News Release, Sprint PCS, Oct. 5, 2001.

<sup>274</sup> *Id.*

<sup>275</sup> *Sprint and Virgin Announce Funding of Joint Venture*, News Release, Sprint PCS, May 17, 2002.

<sup>276</sup> *Sprint and Virgin Announce Joint Venture*, News Release, Sprint PCS, Oct. 5, 2001.

<sup>277</sup> Inmarsat Ltd. ("Inmarsat") and Mobile Satellite Ventures ("MSV"), a joint venture of Motient Corporation and TMI Communications and Company, LP, were also providing voice and data communications via satellite at year-end 2001. The companies offer voice and data services in fixed and mobile environments. The mobile environment consists of a laptop-sized or larger terminal that can be transported from one location to another. These voice and data services offered by Inmarsat and MSV are not discussed in this report as they do not compete directly with mobile telephony services.

Globalstar. In February 2000, Globalstar initiated commercial mobile voice service via satellite. As of year-end 2001, the company had about 66,000 subscribers and \$6.4 million in revenue over the course of the year.<sup>278</sup> Globalstar offers global voice and data services, including SMS.<sup>279</sup> The company's mobile satellite phone, GSP-1600, is manufactured by QUALCOMM, Inc. and retails for approximately \$1000.<sup>280</sup> Prices per month for service plans range from \$24.95 for five minutes to \$399.95 for 500 minutes. Additional minutes cost between \$0.89 and \$1.49, depending on the service plan chosen.<sup>281</sup> Globalstar has 15 distributors of its products and services in the United States.<sup>282</sup>

As reported in the *Sixth Report*, Globalstar was experiencing financial difficulties in 2000, and these difficulties continued in 2002.<sup>283</sup> In the company's third quarter 2001 report filed with the SEC, Globalstar notified investors that it planned to seek voluntary Chapter 11 bankruptcy protection in order to restructure financial commitments to its creditors.<sup>284</sup> On February 15, 2002, Globalstar sought Chapter 11 bankruptcy protection, despite cutting costs and doubling its subscriber base during 2001.<sup>285</sup> In its bankruptcy filing, the company claims assets of \$570 million and \$46 million in cash reserves.<sup>286</sup> However, Globalstar has liabilities of more than \$3.3 billion, and observers believe that the company will need additional cash to emerge from Chapter 11 bankruptcy protection.<sup>287</sup>

Iridium Satellite. Iridium Satellite, the company that emerged from bankruptcy in December 2000,<sup>288</sup>

---

<sup>278</sup> *GlobalStar Sees 2<sup>nd</sup> Qtr Reorg Plan*, TR DAILY, Apr. 16, 2002; Andy Pasztor, *Globalstar's Filing Reflects a Lack Of Restructuring Plan, Customers*, WALL STREET JOURNAL, Feb. 19, 2002; Pradnya Joshi, *Satellite Phones Find Their Calling*, NEW YORK TIMES, Jan. 8, 2002.

<sup>279</sup> Globalstar, *Systems Facts* (visited Feb. 19, 2002) <<http://www.globalstar.com/downloads/systemfacts.pdf>>.

<sup>280</sup> Pradnya Joshi, *Satellite Phones Find Their Calling*, NEWSDAY, Jan. 8, 2002 ("*Satellite Phones - Newsday*"); Satellite-Phones.org, *Satellite Phones and Cell Phone Accessories from Global Star, Iridium, and Inmarsat* (visited Feb. 19, 2002) <<http://www.satellite-phones.org/index.shtml>>.

<sup>281</sup> Globalstar, *Globalstar Pricing and Promotions* (visited Jan. 29, 2002) <<http://www.globalstarusa.com/pricing>>.

<sup>282</sup> Globalstar, *Globalstar USA : Our Distributors* (visited Jan. 29, 2002) <<http://www.globalstarusa.com/dealer>>.

<sup>283</sup> *See Sixth Report*, at 13386.

<sup>284</sup> *Globalstar Reports Results for Third Quarter of 2001*, News Release, Globalstar, Nov. 13, 2001.

<sup>285</sup> Andy Pasztor, *Globalstar's Filing Reflects a Lack Of Restructuring Plan, Customers*, WALL STREET JOURNAL, Feb. 19, 2002; Ben Berkowitz, *Globalstar Files for Chapter 11 Bankruptcy*, REUTERS, Feb. 15, 2002; *Globalstar, Creditors Finalize Agreement On Debt Restructuring and New Business Model*, News Release, Globalstar, Feb. 15, 2002.

<sup>286</sup> Andy Pasztor, *Globalstar's Filing Reflects a Lack Of Restructuring Plan, Customers*, WALL STREET JOURNAL, Feb. 19, 2002; Ben Berkowitz, *Globalstar Files for Chapter 11 Bankruptcy*, REUTERS, Feb. 15, 2002.

<sup>287</sup> *Id.*

<sup>288</sup> For a description of Iridium's emergence from bankruptcy, *see Sixth Report*, at 13384.

initiated commercial service at the end of March 2001. The original Iridium LLC company began commercial service on November 1, 1998.<sup>289</sup> Iridium Satellite has a network of 66 low-earth orbit satellites operating in the Ka-band, and seven in-orbit backup satellites. In addition to satellites, the company uses terrestrial gateways to connect users to terrestrial wireless and wireline networks. In December 2000, Iridium Satellite signed a two-year contract with the Department of Defense for at least 20,000 users at a cost of \$3 million per month.<sup>290</sup>

Iridium Satellite offers voice and data services throughout the world, and, in the United States, voice service costs \$1.00 to \$1.50 per minute for airtime.<sup>291</sup> There are two types of handsets available from Motorola that work on Iridium Satellite's network. The Satellite Series 9500 phone sells for \$950 and is capable of transmitting data at 2.4 kbps.<sup>292</sup> The Satellite Series 9505 phone is a similar, yet smaller phone, and sells for \$1,495.<sup>293</sup> In addition, the company offers two data services: Dial-Up Data and Direct Internet Data. Dial-Up Data offers customers speeds up to 2.4 kbps, while Direct Internet Data is slightly faster at 10 kbps.<sup>294</sup> Iridium Satellite also offers SMS, allowing customers to send and receive messages up to 120 characters long.<sup>295</sup>

### 3. International Developments

#### a. International Investments

*Foreign Investment in U.S. Mobile Operators.* Strategic foreign investment in U.S. mobile telecommunications companies remained relatively stable during 2001. As noted in the *Sixth Report*, the merger of VoiceStream and Powertel with Germany's Deutsche Telekom closed in May 2001, and Japan's NTT DoCoMo, Inc. ("NTT DoCoMo") acquired an approximate 16 percent stake in AT&T Wireless in November 2000.<sup>296</sup> In connection with AT&T Wireless's acquisition of former network affiliate TeleCorp, NTT DoCoMo exercised its preemptive rights by purchasing additional shares of AT&T Wireless to maintain its approximate 16 percent equity interest in the company after the

---

<sup>289</sup> *Iridium Satellite LLC Launches Global Communications Services*, News Release, Iridium Satellite, Mar. 28, 2001; Iridium Satellite, *Iridium – Our Story* (visited Jan. 25, 2002) <[http://www.iridium.com/corp/iri\\_corp-story.asp?storyid=4](http://www.iridium.com/corp/iri_corp-story.asp?storyid=4)>; Quentin Hardy, *Corporate Focus: Global Minded Iridium has Down-to-Earth Need: Profit*, WALL STREET JOURNAL, Jan. 26, 1999 at B4, available in 1999 WL-WSJ 5438178.

<sup>290</sup> Malcolm Spicer, *Iridium Satellite Lands Defense Contract*, CT WIRELESS, Dec. 7, 2000, available in 2000 WL 6392736.

<sup>291</sup> *Satellite Phones - Newsday*; Arik Hesseldahl, *The Return Of Iridium*, FORBES.COM, Nov. 30, 2001.

<sup>292</sup> World Communication Center, *Iridium Phones* (visited Feb. 11, 2002) <[http://www.wccp.com/Iridium\\_phones.htm](http://www.wccp.com/Iridium_phones.htm)>.

<sup>293</sup> *Satellite Phones - Newsday*; World Communication Center, *Iridium Phones* (visited Feb. 11, 2002) <[http://www.wccp.com/Iridium\\_phones.htm](http://www.wccp.com/Iridium_phones.htm)>; Global Satellite FWI, *9505 Order For* (visited Feb. 11, 2002) <<http://www.globalsatellitefwi.com/9505form.html>>.

<sup>294</sup> Iridium Satellite, *Iridium – Services* (visited Feb. 11, 2002) <[http://www.iridium.com/service/iri\\_service-detail.asp?serviceid=2&method=dialup](http://www.iridium.com/service/iri_service-detail.asp?serviceid=2&method=dialup)>.

<sup>295</sup> *Id.*

<sup>296</sup> See *Sixth Report*, at 13388.

acquisition was completed.<sup>297</sup>

*U.S. Investment in Foreign Mobile Operators.* Beginning in 2000, U.S. mobile telephone operators have been seeking to reduce their accumulated portfolio of investments in foreign mobile telephone companies, particularly in Europe. As noted in the *Sixth Report*, SBC sold off its ownership stakes in two European mobile operators in 2000.<sup>298</sup> This divestiture trend continued into 2001 and 2002.

In the third quarter of 2001, BellSouth closed on the sale of its 24.5 percent interest in SkyCell, a mobile operator in India.<sup>299</sup> New Delhi-based Bharti Enterprises bought out BellSouth's stake in SkyCell for a reported \$21.5 million.<sup>300</sup>

In August 2001, BellSouth announced its intention to dispose of its mobile phone investments in Europe and Israel in order to focus primarily on its holdings in Latin America along with its domestic business.<sup>301</sup> To this end, BellSouth announced on January 30, 2002 that it was exercising its option to exchange its entire 22.51 percent stake in German mobile operator E-Plus for a 9.42 percent stake in Dutch operator Royal KPN N.V. ("KPN"), which acquired the remaining 77.49 percent stake in E-Plus in December 1999.<sup>302</sup> BellSouth and KPN closed on their agreement to swap BellSouth's E-Plus shares for a stake in KPN on March 13, 2002.<sup>303</sup> BellSouth then disposed of its 9.42 percent stake in KPN by selling its shares in the Dutch company on March 19, 2002, the first day BellSouth was free to sell the shares.<sup>304</sup> BellSouth is reported to have raised 1.23 billion euros (\$1.1 billion) from the sale of its shares in KPN, and announced it will record an after-tax gain of approximately \$850 million as a result of the share swap and subsequent disposal.<sup>305</sup>

BellSouth has also signaled its desire to sell its stake in Danish mobile operator Sonafon, which is majority owned by Norwegian carrier Telenor with BellSouth as its partner.<sup>306</sup> While BellSouth has yet to find a buyer for Sonafon, its decision to dispose of its European wireless assets did affect bidder participation in Denmark's auction of 3G licenses in September 2001. In particular, Sonafon did not bid

---

<sup>297</sup> *NTT DoCoMo Plans to Exercise Right to Purchase Additional AT&T Wireless Stock*, News Release, AT&T Wireless, Dec. 21, 2001.

<sup>298</sup> See *Sixth Report*, at 13388-13389. See Appendix C, Table 9, at C-13 for a summary of U.S. operators' foreign holdings.

<sup>299</sup> *BellSouth Reports Third Quarter Earnings*, News Release, BellSouth, Oct. 18, 2001.

<sup>300</sup> Santosh Menon, *Bharti Increases SkyCell Stake*, REUTERS, Sept. 18, 2001; Santosh Menon, *India's Bharti Eyes Foreign-owned Stakes in SkyCell*, REUTERS, Aug. 3, 2001.

<sup>301</sup> Tally Goldstein, *BellSouth Set to Sell Stakes in Mobile Phones*, FT.COM, Aug. 28, 2001.

<sup>302</sup> *BellSouth Restructures Agreement with KPN*, News Release, BellSouth, Jan. 30, 2002.

<sup>303</sup> *BellSouth and KPN Close on Sale of E-Plus*, News Release, BellSouth, Mar. 14, 2002.

<sup>304</sup> *BellSouth Records \$850 million on Sale of KPN Shares*, News Release, BellSouth, Mar. 19, 2002; Richard Waters, *BellSouth Disposes of Stake in KPN*, FT.COM, Mar. 20, 2002.

<sup>305</sup> *Id.*

<sup>306</sup> Richard Waters, *BellSouth Disposes of Stake in KPN*, FT.COM, Mar. 20, 2002.

in the sealed-bid auction because Telenor and BellSouth were unable to reach an agreement to let their jointly owned subsidiary submit a bid.<sup>307</sup> Telenor submitted a bid on its own, but as the lowest of five bids for four licenses the bid was unsuccessful.<sup>308</sup>

In July 2001 the Atlantic West consortium of Verizon Communications and AT&T Wireless reached an agreement to sell the U.S. operators' combined 49 percent stake in Czech mobile operator EuroTel for nearly \$1.5 billion to Czech operator Cesky Telecom, which owns the remaining 51 percent stake in EuroTel.<sup>309</sup> However, Cesky Telecom later reopened the negotiations, arguing that market conditions had deteriorated and cutting the offered price to \$1.1 billion.<sup>310</sup> The negotiations were abandoned in November 2001 after the parties failed to reach an agreement on the purchase price and Atlantic West rejected Cesky Telecom's latest offer.<sup>311</sup>

In March 2002, SBC was reported to be seeking an exit from its investment in Belgian operator Belgacom, through which SBC has an interest in Belgian mobile operator Proximus.<sup>312</sup> To this end, the report indicated, SBC had pressed for an IPO of the Belgian operator, a majority of whose shares are owned by the Belgian government. An IPO would enable SBC to cash in its stake in Belgacom by selling shares on the stock market. Moreover, because Belgacom is one of the few incumbent European operators with practically no debt, SBC reportedly believes that Belgacom could be valued attractively through an IPO.

Like BellSouth, SBC has regarded its European holdings as non-core for more than a year.<sup>313</sup> In addition to its stake in Belgacom, SBC also has investments in Denmark's TDC (formerly Teledanmark) and France's Segetel, both of which own mobile operators in their respective home countries. SBC is reportedly willing to sell its stakes in both companies if it can obtain what it views as a reasonable price.<sup>314</sup>

While BellSouth has expressed its intention to maintain a strong presence in Latin America, other U.S. companies have taken steps to reduce their Latin American holdings. For example, Sprint and Leap Wireless have agreed to exit their investment in Mexican mobile operator Pegaso PCS ("Pegaso"). In March 2002, Spanish mobile operator Telefonica Moviles announced that it had signed a letter of intent to acquire 65 percent of Pegaso and had agreed to buy out the interests of U.S. investors Sprint and Leap Wireless for \$70.5 million in cash.<sup>315</sup> Pegaso is the only foreign mobile operator in which Sprint and Leap Wireless had held an ownership interest.

---

<sup>307</sup> Oida Taaffe, *Telia, Telenor Amongst Danish UMTS Bidders*, TOTAL TELECOM, Sept. 5, 2001.

<sup>308</sup> Anne Young, *Denmark Awards Four 3G Licenses*, TOTAL TELECOM, Sept. 20, 2001.

<sup>309</sup> Reuters staff, *Czech Telecom to Buy EuroTel for US\$1.5 Billion*, TOTAL TELECOM, July 30, 2001.

<sup>310</sup> Reuters staff, *Cesky Telecom's EuroTel Buy Hits Price Snag*, TOTAL TELECOM, Nov. 7, 2001.

<sup>311</sup> Reuters staff, *Cesky Telecom Abandons Talks on EuroTel Buy*, TOTAL TELECOM, Nov. 28, 2001.

<sup>312</sup> Juliana Ratner, *SBC Presses for Belgacom IPO to Cash in Stake*, FT.COM, Mar. 13, 2002.

<sup>313</sup> *Id.*

<sup>314</sup> *Id.*

<sup>315</sup> Leslie Crawford, *Telefonica to Take Over Mexican Mobile Operator*, FT.COM, Mar. 8, 2002.

SBC has reorganized its Latin American interests. SBC entered 2002 with an 8 percent interest in America Movil, a wireless provider in Mexico and Latin America that was spun off from Mexican operator Telmex in 2001, and a 12.8 percent interest in Telecom Americas, a joint venture among America Movil, SBC, and Bell Canada with investments in several wireless operators in Brazil.<sup>316</sup> In January 2002, as part of a deal in which SBC purchased America Movil's 50 percent interest in Cellular Communications of Puerto Rico, America Movil acquired an option to purchase SBC's stake in Telecom Americas within three years.<sup>317</sup> According to SBC, this represents a forward sale of its interest in Telecom Americas.<sup>318</sup>

Furthermore, Verizon announced on March 28, 2002 that it had cut its ownership stake in Argentine wireless communications company CTI Holdings S.A. ("CTI") in order to reduce its financial exposure to Argentina's economy.<sup>319</sup> In particular, Verizon reduced its ownership stake in CTI from 65 percent to 48 percent by transferring 5.5 million shares in CTI to a newly created trust for CTI employees. The trust will distribute the shares to a program to be developed by CTI to give employees an equity-based stake in the company. In addition to reducing its ownership stake, Verizon said it is reducing its representation on the CTI Board of Directors from a maximum of five directors on the nine-member body to a maximum of four. According to Verizon, CTI has been under significant financial pressure as the value of the Argentine peso has continued to drop and Argentina's economy has deteriorated. CTI recently announced its decision to suspend principal and interest payments on its debt, and retained a financial adviser to assist in restructuring its approximately \$1 billion of U.S.-dollar denominated debt, about 90 percent of which is non-recourse to Verizon. As a result of Verizon's actions, CTI will no longer be consolidated into Verizon's financial statements.

In an exception to the foregoing divestiture trend, Western Wireless International Corporation ("WWI"), a subsidiary of Western Wireless Corporation, announced in July 2001 that it had completed the acquisition from Vodafone of tele.ring Telekom Service GmbH ("tele.ring"), a mobile and fixed-line operator in Austria.<sup>320</sup> Under the terms of the transaction, a new subsidiary of WWI purchased all of the outstanding shares of tele.ring for a nominal consideration, and an affiliate of Vodafone Group Plc agreed to provide tele.ring with a 250 million euro term loan for operating capital.

WWI also has the option to acquire, also for a nominal consideration, the Vodafone entity that acquired one of the six Austrian 3G licenses awarded through an auction in November 2000.<sup>321</sup> However, WWI decided not to submit a bid for one of Ireland's four 3G licenses through Meteor, the Irish mobile

---

<sup>316</sup> *Annual Report 2001*, SBC Communications Inc., at 38; Fiona Ortiz, *Telecom Americas Owners Plan Overhaul*, REUTERS, Dec. 4, 2001.

<sup>317</sup> *America Movil Reshuffles Latin American Interests*, TOTAL TELECOM, Jan. 29, 2002.

<sup>318</sup> *Annual Report 2001*, SBC Communications Inc., at 32.

<sup>319</sup> *Verizon Communications Establishes Trust for Employees; Reduces Ownership of Wireless Company in Argentina*, News Release, Verizon Communications, Mar. 28, 2002.

<sup>320</sup> *Western Wireless International Announces Completed Acquisition of tele.ring*, News Release, Western Wireless International, July 3, 2001.

<sup>321</sup> *Id.*

operator that is majority owned by WWI.<sup>322</sup> Just three operators applied for the four Irish 3G licenses, which are to be awarded through comparative selection (“beauty contest”) with a nominal license fee. In announcing the decision not to bid, WWI cited the investment requirements for license fees and rapid infrastructure rollout, and indicated Meteor would better serve its customers by continuing its focus and investment on the delivery of its GSM and 2.5G voice and data services.<sup>323</sup>

In July 2001 AT&T Wireless agreed to buy out British Telecommunications Plc’s entire interest in a partnership between the two companies that held a stake in Canadian mobile operator Rogers Wireless for \$379 million.<sup>324</sup> The all-cash transaction increased AT&T Wireless’s stake in the Canadian operator to 33.3 percent from 19 percent.

## b. International Comparisons

*Mobile Growth and Penetration.* As anticipated in the *Sixth Report*, a significant trend in the mobile telephone markets of Western European countries in 2001 was the sharp slowdown in the growth of mobile subscribership.<sup>325</sup> Mobile subscribers in Western Europe totaled 288.8 million on January 1, 2002, up 45.3 million, or approximately 15.5 percent, from the beginning of 2001. This rate of increase in subscribership, while healthy by the standards of most industry sectors, is significantly below the record annual growth of nearly 90 million new subscribers, or roughly 58 percent, set in 2000.<sup>326</sup> Mobile penetration in Western Europe averaged 74.3 percent at the end of 2001, up from 62.5 percent at the end of 2000.<sup>327</sup>

There remain significant differences in the penetration rates of individual Western European countries, but the range of penetration rates narrowed slightly as compared with the situation at the end of 2000. In addition, the rankings of certain countries shifted significantly in the course of 2001. Luxembourg finished 2001 with the highest penetration rate in Western Europe at more than 90 percent, moving up from the sixth highest penetration rate at the end of 2000. Italy and Portugal followed closely behind with penetration rates of 88 percent and 86 percent, respectively.<sup>328</sup> Norway and Sweden, which had, respectively, the first and second highest penetration rates at the end of 2000, found themselves in the middle tier of Western European countries at the end of 2001. For the second year in a row, France had Western Europe’s lowest penetration rate with 62 percent of the population using a mobile phone at the end of 2001, up from 50 percent at the end of 2000.<sup>329</sup>

---

<sup>322</sup> Anne Young, *Three Operators Apply for Four Irish 3G Licenses*, TOTAL TELECOM, Mar. 27, 2002.

<sup>323</sup> *Id.*

<sup>324</sup> Emily Bourne, *AT&T Wireless Buys BT’s Stake in Rogers Wireless*, TOTAL TELECOM, July 4, 2001; *AT&T Wireless Increases Stake in Rogers Wireless*, REUTERS, July 3, 2001.

<sup>325</sup> *See Sixth Report*, at 13392.

<sup>326</sup> Robert Budden, *Mobile Sales Across Europe Hit by Slowdown*, FT.COM, Feb. 3, 2002.

<sup>327</sup> *Id.*

<sup>328</sup> Paul Wuh, *et al.*, *Wireless 2002 – Focusing on Profitability*, Global Equity Research, Goldman Sachs, May 3, 2002, at 4 and 46 (“*Focusing on Profitability*”).

<sup>329</sup> *Id.*



Despite the sharp slowdown in Western Europe's mobile subscriber growth, mobile subscribership grew at a roughly comparable pace in Western Europe and the United States in 2001. As a result, while Western Europe's mobile markets continued to achieve higher penetration levels than the U.S. mobile market in 2001, the margin of difference between the U.S. penetration level and the West European average remained roughly the same as it was at the end of 2000. As noted previously, the U.S. mobile penetration rate was approximately 45 percent at the end of 2001, as compared with the West European average of 74.3 percent. The ratio of Western Europe's average mobile penetration rate to the U.S. penetration rate was therefore 1.7 at the end of 2001, as compared with 1.6 at the end of 2000.

In common with Western Europe, the Asian-Pacific countries of Japan, Australia, and New Zealand also experienced a slowdown in mobile subscriber growth in 2001.<sup>330</sup> As was the case at the end of 2000,<sup>331</sup> these three countries are continuing to achieve mobile penetration levels that are higher than the U.S. penetration level, but lower than the Western European average. At the end of 2001, mobile penetration rates were 54 percent in Japan, 61.6 percent in Australia and 63.5 percent in New Zealand.<sup>332</sup> In contrast, mobile penetration levels in several smaller Asian-Pacific countries, including Taiwan and Hong Kong, have exceeded the Western European average in the past two years. Taiwan claimed a mobile penetration rate of 96 percent at the end of 2001, followed by Hong Kong at 81 percent.<sup>333</sup>

A word of caution is in order, however, in comparing mobile penetration levels in different countries. As explained in the *Sixth Report*, mobile penetration rates tend to become inflated in countries with a high share of prepaid service users in their mobile subscriber base.<sup>334</sup> Prepaid users can easily switch service providers, and those who do switch are likely to be "double counted" for a period of time if the country's wireless operators are not diligent about removing inactive prepaid users from their subscriber base. The *Sixth Report* discussed the impact of this problem in the context of assessing European mobile subscriber figures,<sup>335</sup> but subsequent reports suggest that the problem may be even more severe in certain Asian countries such as Taiwan, Hong Kong, and Singapore.<sup>336</sup>

According to the Wall Street Journal, many Taiwanese, especially the young, own several prepaid phones, and carriers count each phone sold as a subscriber.<sup>337</sup> As a result, while Taiwan government figures put its country's mobile penetration rate at more than 90 percent, analysts' estimates range anywhere from 70 to 85 percent.<sup>338</sup> In Singapore, the mobile penetration rate dropped from nearly 80

---

<sup>330</sup> *Wireless Matrix*, at 17, 27 and 31.

<sup>331</sup> *See Sixth Report*, at 13392.

<sup>332</sup> *Focusing on Profitability*, at 4 and 37-38.

<sup>333</sup> *Id.*, at 38.

<sup>334</sup> *See Sixth Report*, at 13391.

<sup>335</sup> *Id.*

<sup>336</sup> *Operators Clean Up Subs Numbers and Focus on Profitability*, GLOBAL MOBILE, Feb. 27, 2002, at 14-15.

<sup>337</sup> Connie Ling, *Prepaid Mobile-Phone Lines Tangle Calculation of Market Penetration*, WSJ.COM, Jan. 24, 2002.

<sup>338</sup> *Id.*

percent to just under 70 percent in the last quarter of 2001 after wireless operators made downward adjustments in their prepaid subscriber numbers in an aggressive effort to weed out inactive customers from their customer base.<sup>339</sup>

As first noted in the *Sixth Report*,<sup>340</sup> analysts believe that prepaid was the primary driver of the rapid penetration gains in Western Europe over the past couple of years.<sup>341</sup> Although some European mobile operators such as Vodafone have revised their subscriber counts downward to adjust for inactive prepaid subscribers,<sup>342</sup> some analysts believe that subscriber figures reported by European mobile operators continue to overstate the actual number of mobile subscribers and, accordingly, mobile penetration levels. For example, after adjusting the UK's and Germany's reported mobile penetration levels for estimates of inactivity levels in each of these countries, Merrill Lynch analysts found that mobile penetration in 2001 dropped from 79 percent to 72 percent in the UK and from 68 percent to 62 percent in Germany.<sup>343</sup> Even with this adjustment, Merrill Lynch analysts believe that the remaining disparity between penetration in Western Europe and the United States may still be somewhat overstated because U.S. accounting practices may in some instances be more conservative than some of the methodologies used to calculate inactivity levels at some of the Western European carriers.<sup>344</sup>

*Mobile Usage.* As in previous years, U.S. subscribers continued to use their mobile phones more intensively than European subscribers in 2001, with the difference between average monthly usage per subscriber in the United States and Western Europe widening still further. According to one estimate, MOUs in Western Europe averaged 130 minutes per subscriber per month in 2001, while in the U.S. per subscriber MOUs averaged 338.<sup>345</sup> By comparison, the same source estimates that in 2000 MOUs in the U.S. were, at 248, only slightly more than double the West European average that year of 119.<sup>346</sup> Average U.S. mobile usage is also higher than usage levels in the Asia Pacific.<sup>347</sup> Hong Kong comes the closest to the U.S. level with estimated average MOUs of 300 minutes.<sup>348</sup> At 177 minutes, Japan's estimated average MOUs are lower than the U.S. level but higher than the Western European average.<sup>349</sup>

---

<sup>339</sup> *Id.*

<sup>340</sup> *See Sixth Report*, at 13390-13391.

<sup>341</sup> *NextGen VI*, at 16; Paul Wuh *et al.*, *Prepaid in Europe, Lessons for the United States*, Global Equity Research, Goldman Sachs, Dec. 22, 2001, at 1, 3.

<sup>342</sup> *See Sixth Report*, 13391.

<sup>343</sup> *NextGen VI*, at 14.

<sup>344</sup> *Id.*

<sup>345</sup> J. McIntyre, *TMT Edge*, Global Equity Research, Bear Stearns, Jan. 24, 2002, at 4. For the purpose of this comparison, we are using a source that provides an estimate of U.S. MOUs that is comparable to its estimate of the Western European average, but somewhat lower than the estimates of U.S. MOUs from other sources cited earlier.

<sup>346</sup> *Id.*

<sup>347</sup> *Wireless Matrix*, at 3.

<sup>348</sup> *Id.*

<sup>349</sup> *Id.*

*Mobile Pricing and Competition.* The *Sixth Report* observed that, while a higher percentage of the population in Western Europe currently subscribes to mobile telephone service, certain categories of users may be paying less for mobile telephone service in the United States.<sup>350</sup> This conclusion continues to be supported by two different measures of the cost of mobile service. The first measure involves estimating the cost of a defined “basket” of mobile services, and the second measure focuses on the average revenue per minute of mobile voice service.

The *Sixth Report* cited international comparisons of the cost of a basket of mobile services based on a pair of basket definitions developed by Teligen in cooperation with the Organization for Economic Cooperation and Development (“OECD”).<sup>351</sup> The Teligen/OECD basket definitions represent two usage profiles, one for high-volume users, which are designated “business” users, and the other for lower volume users, which are designated “residential” or “personal” users. In either case, only outgoing mobile calls are included in the basket. The prices of the services included in each basket are taken from a selected calling plan of a single operator, and the two baskets are updated on a quarterly basis with the latest available prices for the calling plan.<sup>352</sup>

As related in the *Sixth Report*, the Teligen/OECD basket estimates for the quarter ending February 1, 2001 suggested that the cost of the “business” basket in the United States was well below the Western European average, whereas the cost of the “personal” basket was above the Western European average.<sup>353</sup> Updated Teligen/OECD mobile basket estimates for February 2002 continue to tell the same story.<sup>354</sup> In addition, a comparison of the Teligen/OECD mobile basket estimates for the United States with the average for selected Asian-Pacific countries – specifically, Japan, South Korea, Australia, and New Zealand – reveals the same pattern as the U.S.-Western Europe comparison. In particular, U.S. mobile subscribers appear to pay less for the business basket, but more for the residential basket, than their Asian-Pacific counterparts.

There are a number of drawbacks to the mobile basket approach to international mobile pricing comparisons in the Teligen/OECD study. We mention two here. First, the mobile baskets in the study include only outgoing mobile calls. The exclusion of incoming calls reflects the predominance of the calling party pays (CPP) principle in OECD member countries. Whereas mobile subscribers in the United States and Canada typically pay both to make and receive calls, in Western Europe and parts of the Asia Pacific the party who initiates the call to a mobile phone pays for it. Accordingly, the cost of calls made from fixed wireline networks to mobile subscribers is reflected in the Teligen/OECD PSTN baskets for wireline telephone service rather than the mobile baskets. As a consequence, however, the mobile baskets for the United States and Canada are not fully comparable with those for other OECD member countries. Second, average monthly usage per subscriber in the U.S. (385 minutes) is higher than the usage in the Teligen/OECD high-volume business basket, which is defined to include 315 minutes per month. Indeed,

---

<sup>350</sup> See *Sixth Report*, at 13393.

<sup>351</sup> *Id.*

<sup>352</sup> In the case of the United States, Teligen calculates two business and two residential baskets using selected calling plans of two mobile operators, namely, Sprint PCS and Qwest.

<sup>353</sup> See *Sixth Report*, at 13394.

<sup>354</sup> *Teligen T-Basket – Mobile (GSM/PCS) Basket*, Teligen Limited, Feb. 2002. See Appendix C, Table 10, at C-15.

bucket plans with 250-400 peak minutes and very large quantities of night and weekend minutes appear to be increasingly popular with “residential” subscribers and are targeted in carrier promotions and advertising to that group.

As an alternative to the Teligen/OECD mobile baskets, in this report we also consider Merrill Lynch’s estimates of revenue per minute (“RPM”) for selected mobile markets in Western Europe, the Asia Pacific, and the United States and Canada (see Appendix C, Table 10). Merrill Lynch calculates RPM by dividing ARPU by MOUs. Unlike the Teligen/OECD mobile baskets, RPM reflects the pricing and volume of calls both to and from mobile phones. More specifically, in the United States and Canada mobile service revenue includes the monthly service charges and other usage fees paid by mobile subscribers for incoming and outgoing calls. In the countries of Western Europe and the Asia Pacific, service revenue includes the service charges and fees paid by mobile subscribers for outgoing calls, while for incoming calls the principal revenue component of RPM is the wholesale interconnection rate the mobile operator charges the originating operator to terminate traffic on the mobile operator’s network. Merrill Lynch analysts believe RPM is a good proxy for mobile pricing.<sup>355</sup>

At \$0.16, the United States’ RPM is lower than the RPM of all other countries in the group except Canada (\$0.13) and New Zealand (\$0.15). The U.S. level compares with an average of \$0.22 for the Western European countries and \$0.21 for the Asian-Pacific countries. Japan’s RPM, at \$0.31, is nearly double the U.S. level and the highest in the group.

The relatively low level of RPM in the U.S. mobile market may in part reflect differences in the competitive environment for outgoing mobile calls. In CPP and non-CPP countries alike, mobile competition exerts pressure on mobile operators to keep the price of outgoing calls paid for by the mobile subscriber at levels sufficiently low to attract and retain customers. Most Western European governments have licensed three to four GSM operators in an effort to stimulate competition in mobile service markets.<sup>356</sup> Nevertheless, comments by some analysts suggest that competition in Western European mobile markets has tended to be less than robust. For example, one group of analysts asserts that “outgoing tariffs remain high in Europe,” and characterizes the competitive environment there as being “more benign than anticipated.”<sup>357</sup>

Analysts also point to differences in the competitive environment of individual European mobile markets. For example, equity analysts typically describe pricing competition in the UK’s mobile market as being relatively intense and aggressive compared to other Western European markets.<sup>358</sup> However, in a September 2001 review of mobile competition in the United Kingdom, British telecommunications regulator OfTel concluded that the market for services purchased by mobile subscribers is “prospectively competitive” but “not yet effectively competitive.”<sup>359</sup>

---

<sup>355</sup> *Wireless Matrix*, at 4.

<sup>356</sup> *ERO Information Document on GSM Frequency Utilisation Within Europe*, European Radiocommunications Office, Feb. 2001.

<sup>357</sup> Fanos Hira, Jerry Dellis Paul Harper and Jeremy Hudson, *The Cellular Review*, European Equity Research, Bear Stearns, Jan. 2002, at 12.

<sup>358</sup> *Wireless Matrix*, at 37; Fanos Hira, Jerry Dellis Paul Harper and Jeremy Hudson, *mmO<sub>2</sub>*, European Equity Research, Bear Stearns, Dec. 12, 2001, at 21.

<sup>359</sup> *Effective Competition Review: Mobile*, OfTel, Sept. 26, 2001, at v.

Some analysts have also explicitly compared the United States and Western Europe with regard to mobile competition. These analysts agree that the U.S. mobile market is more competitive than most mobile markets in Europe, and that this is one of the primary reasons for lower RPM in the United States.<sup>360</sup>

Apart from a less intense competitive environment for outgoing calls, analysts explain that the higher levels of RPM observed in Western Europe reflect the CPP environment in which European wireless carriers operate and the impact of CPP in raising the cost of calls to mobile phones.<sup>361</sup> In this regard, given that neither Canada nor the United States has made it mandatory for mobile operators to implement CPP, it may be significant that RPM is lower in both the United States and Canada than in all the countries in which CPP is mandatory except New Zealand.

For fixed-to-mobile calls in Western Europe, the originating wireline carrier pays an interconnection charge to terminate traffic on the mobile operator's network, and separately bills the charges incurred by its own customers based on published per-minute rates for fixed-to-mobile calls. British telecommunications regulator Oftel argues in a September 2001 report that there is little incentive for mobile operators in a CPP environment to reduce the interconnection rates they charge for terminating calls to their networks.<sup>362</sup> Oftel stresses that callers have no choice but to terminate their calls on the mobile network chosen by the mobile subscriber, while mobile subscribers generally choose their network operator based primarily on the cost of making calls, not on what it costs others to call them. Oftel concludes that "competitive pressures do not currently exert sufficient constraints on termination charges nor are they likely to do so in the near future."<sup>363</sup> Other foreign regulators in CPP jurisdictions share Oftel's view that CPP may confer a form of market power on mobile carriers with regard to the setting of mobile termination charges, including the European Commission and the Australian Competition and Consumer Commission.<sup>364</sup> In contrast, because U.S. and Canadian mobile subscribers pay both to make and receive calls, mobile competition in these two countries is equally effective in constraining the price of incoming and outgoing mobile services.

While the foregoing discussion has been limited to an explanation of pricing differences in the West European and North American mobile markets, a group of Merrill Lynch analysts argue that the same considerations may explain why Japan's RPM is nearly double the U.S. level. In particular, Merrill Lynch's analysts state their belief that "pricing differences with the U.S. largely stem from a relatively less intensive competitive environment" for outgoing calls in Japan.<sup>365</sup> They further argue that "two additional differentiating factors may be that Japan has implemented calling party pays and that its fixed-

---

<sup>360</sup> *NextGen VI*, at 24; Paul Wuh *et al.*, *Prepaid in Europe, Lessons for the United States*, Global Equity Research, Goldman Sachs, Dec. 22, 2001, at 9.

<sup>361</sup> See, for example, *Focusing on Profitability*, at 66.

<sup>362</sup> *Review of the Charge Control on Calls to Mobiles*, Oftel, Sept. 26, 2001, at 1.

<sup>363</sup> *Id.*

<sup>364</sup> See *Draft Guidelines on Market Analysis and the Calculation of Significant Market Power*, Commission of the European Communities, Mar. 28, 2001, at 17; *Pricing Methodology for the GSM Termination Service – Final Report*, Australian Competition and Consumer Commission, July 2001, at 12.

<sup>365</sup> *Wireless Matrix*, at 27.

to-mobile interconnection rates are the highest in the world at \$0.27 per minute.<sup>366</sup>

---

<sup>366</sup> *Id.*

## B. Mobile Data

### 1. Introduction

#### a. Domestic Developments

For purposes of this report, the Commission considers mobile data service to be the delivery of non-voice information to a mobile device. Two-way mobile data services include the ability not only to receive non-voice information on an end-user device but to send it from an end-user device to the PSTN as well using wireless technology. During the past year, the mobile data industry continued to grow and to evolve. Estimates of the number of mobile Internet users at the end of 2001 range from approximately 8 to 10 million, up from 2 to 2.5 million at the end of 2000.<sup>367</sup> Since the publication of the *Sixth Report*, several mobile data operators have begun upgrading their networks with advanced wireless service technologies,<sup>368</sup> cdma2000 1xRTT and GPRS, to allow for faster data access speeds and more advanced services.<sup>369</sup> As of March 2002, four nationwide mobile telephone operators were offering mobile Internet

---

<sup>367</sup> Kagan estimates that there were 7.8 million wireless Internet subscribers in the United States at the end of 2001. *U.S. Wireless Industry Data Sub and Revenue Projections*, Interactive Mobile Investor, Kagan World Media, Mar. 31, 2002, at 3. The Yankee Group states that wireless Internet adoption is “rapidly approaching 10 million users.” This includes wireless Internet users on all devices. See Yankee Group, *The Yankee Group: Highlights of New Surveys and Publications* (visited Mar. 6, 2002) <<http://www.yankeegroup.com/webfolder/yc21a.nsf/0/16AE3A28DBFF8E5C85256B19005F8428?OpenDocument>>. The *Sixth Report* stated that there were approximately 2.5 million wireless web users at the end of 2000. See *Sixth Report*, at 13396, note 323. However, that figure was a sum of the number of wireless web users reported by individual mobile telephone carriers, and most carriers have since stopped reporting their total number of wireless web users. See Section II.B.2.a, Mobile Data Mobile Telephone Sector, *infra*. The Yankee Group estimated there were more than 2 million wireless data users at the end of 2000. See *Sixth Report*, at 13396, note 323. Kagan also estimates that mobile telephone carriers’ wireless Internet revenue totaled \$649 million at the end of 2001, or 0.8% of total 2001 revenue. *U.S. Wireless Industry Data Sub and Revenue Projections*, Interactive Mobile Investor, Kagan World Media, Mar. 31, 2002, at 3.

<sup>368</sup> As mentioned above, the term “advanced wireless services” is used to describe the interim technologies that carriers are using or plan to use in migrating from 2G to 3G technologies. See note 32, *supra*. In the United States, the two major advanced wireless service technologies currently being deployed are: 1) General Packet Radio Service (“GPRS”), which is being rolled out by carriers using GSM/TDMA, and 2) cdma2000 1xRTT (also referred to as “cdma2000 1X” or “1xRTT”), which the current CDMA carriers are upgrading their networks to. Some in the industry describe 1xRTT, which will double voice capacity and allow maximum data transfer speeds of up to 144 kbps, as a 2.5G technology, while CDMA carriers and equipment manufacturers generally characterize it as the first stage of 3G deployment. GPRS is a packet-based data-only network upgrade that allows for faster data rates by aggregating up to eight 14.4 kbps channels and is characterized as a 2.5G service. See *Fifth Report*, at 17700. See also, note 399, *infra*. Most U.S. GSM/TDMA carriers plan to deploy Enhanced Data Rates for GSM Evolution (“EDGE”) and eventually Wideband CDMA (“WCDMA,” also known as Universal Mobile Telecommunications System, or “UMTS”). The major CDMA carriers have plans to build out cdma 1XEV or cdma EV-DO. See Section II.B.2.a, Mobile Data Mobile Telephone Sector, *infra*, for a more detailed discussion.

<sup>369</sup> The deployment of GPRS and cdma2000 1xRTT by mobile telephone carriers is discussed in more detail in Section II.B.2.a, Mobile Data Mobile Telephone Sector, *infra*. Many analysts and industry players believe that the widespread deployment of 3G networks is still several years away, given certain technological and economic obstacles yet to be overcome. Danni Gladden Green, Americas Strategic Marketing Manager for Texas Instruments Inc.’s semiconductor group, stated in January 2002, “I think the bulk of the revenue in 2003 will still come from 2G and, to a smaller percentage, 2.5G services.” See Alex Romanelli, *2G is Still King; 3G important, but older*

access service for mobile telephone handsets, PDAs, and/or laptops at speeds generally ranging from 25-60 kbps,<sup>370</sup> with maximum bursting rates of 144 kbps for at least one carrier, in at least some portion of U.S. counties covering approximately 181 million people.<sup>371</sup> Hence, nearly 63 percent of the U.S. population could have access to the Internet while mobile at speeds close or comparable to those on a 56 kbps wireline dial-up modem. Most of the nationwide U.S. carriers have plans to make advanced wireless services available in some form throughout most of their networks by the end of this year.<sup>372</sup> Furthermore, competition within the mobile data sector is developing successfully, as evidenced by the multitude of dynamic services, service packages, and pricing plans available to consumers from a variety of providers.

The three general categories of mobile data providers and their corresponding devices discussed in this report are: (1) mobile telephone operators offering services primarily on mobile telephone handsets, (2) providers of mobile data access to handheld PDA devices and laptop computers, and (3) paging carriers offering services on pagers and two-way messaging devices. The first mobile data section, "Industry Structure and Performance," discusses the key developments and events related to these three categories of carriers and devices that occurred during 2001 and early 2002. During the past year, the types of mobile data services available on mobile data devices have become increasingly similar. With the exception of traditional one-way pagers, most mobile data devices offer some form of text messaging, web browsing, and e-mail access.<sup>373</sup> Therefore, this year's report provides details on the major mobile data services available to consumers in a separate section following the discussion of the three categories of mobile data providers and devices.<sup>374</sup>

---

*technology won't go away*, ELECTRONIC NEWS, Jan. 1, 2002. "Given the economy is slowing down and no one knows what the killer applications are going to be, I think we're going to see a more incremental approach than what has been suggested," said Joe Laszlo, broadband and wireless analyst for Jupiter Media Matrix. See Amy Shafer, *Sprint considers 3G rollout a relaunch of the company*, ASSOCIATED PRESS, Feb. 15, 2002. Samuel May, U.S. Bancorp Piper Jaffray senior research analyst, said, "We're nowhere [with 3G rollout]. We're at a starting gate with no starting gun." See Kent German, *An unproven promise*, UPSIDE, Mar. 2002. Another difficulty for 3G has been the development of applications. According to Knox Bricken, a wireless telecommunications analyst with Yankee Group, "The applications aren't there yet." See Katie Hafner, *The Future of Cellphones Is Here. Sort Of*, NEW YORK TIMES, Feb. 14, 2002. See also Brad Smith, *Filming the Wireless Data Sequel*, WIRELESS WEEK, Jan. 7, 2002; Ric Prentiss, *"S-Curve" Ahead Wireless Voice Plateaus in 2004 When Data Kicks-In*, Raymond James, Sept. 5, 2001; Craig Mathias, *A good year for wireless?*, ELECTRONIC ENGINEERING TIMES, Jan. 28, 2002.

<sup>370</sup> See Section II.B.2.a, Mobile Data Mobile Telephone Sector, *infra*.

<sup>371</sup> This analysis is based on publicly-available information, such as news articles and operators' press releases, web sites, and filings with the Commission. There are several caveats to note when considering this data. First, in order to be considered as "covering" a county, an operator need only be offering GPRS or 1xRTT service in a portion of that county. Second, the population figure in this analysis includes the total population of the counties counted as having any GPRS or 1xRTT rollout. Third, all population figures are based on 2000 Census estimates.

<sup>372</sup> See Section II.B.2.a, Mobile Data Mobile Telephone Sector, *infra*.

<sup>373</sup> Other types of mobile data services such as location-based services and short-range data transmissions are discussed as well. See Sections II.B.3.e., Location-Based Services and II.B.3.f., Short-Range Data Transmissions, *infra*.

<sup>374</sup> The various types of mobile data services available to consumers are generally distinct from each other and from voice service. For example, sending e-mail is distinguishable from browsing web pages. However, not all mobile data services fit in particular categories, and providers frequently bundle several mobile data services together in their pricing arrangements. This report therefore describes the various mobile data services currently



Not only has the mobile data industry witnessed a further convergence of data services across devices during the past year, but a convergence of voice and data services as well. The defining feature that, in the past, divided mobile telephones from PDAs was whether the devices offered voice capabilities; mobile telephones did, while PDAs did not. Furthermore, mobile telephones offered voice capabilities as their primary feature and had limited data capabilities, while handheld devices offered more advanced mobile data features but little or no voice ability.<sup>375</sup> During the past year, the distinction between mobile telephones and PDAs began to blur with the emergence of smartphones. As discussed below, several of the major mobile data providers have released smartphone devices that combine the organizational and data-centric features of PDAs with the voice capabilities of mobile telephones.<sup>376</sup> One catalyst for the convergence of mobile voice and mobile data during the past year has been the deployment of GPRS and 1xRTT, which, by increasing data transfer speeds, allow and increase the demand for advanced mobile data services.

While U.S. mobile carriers have the flexibility to deploy advanced wireless, including 3G, technologies using their existing CMRS spectrum, the Commission has continued its efforts during the past year to allocate additional spectrum suitable for offering advanced wireless, including 3G, services. As part of these efforts, the Commission released in August 2001 a Further Notice of Proposed Rulemaking,<sup>377</sup> which explores the possible use of additional spectrum bands for 3G services beyond the initial bands proposed in the Notice of Proposed Rulemaking released in January 2001 and discussed in the *Sixth Report*.<sup>378</sup> Specifically, the *3G FNPRM* proposed the use and reallocation of the following bands for advanced wireless services: 1910-1930 MHz, 1990-2025 MHz, 2150-2160 MHz, 2165-2200 MHz, and 2390-2400 MHz.<sup>379</sup> These bands are currently used for the following services: Mobile Satellite Service, Unlicensed PCS, Amateur Radio Service, and Multipoint Distribution Service (“MDS”).<sup>380</sup>

---

available without concluding that they are necessarily separate and distinct markets. See Appendix D, Table 2, at D-5 for an overview of mobile Internet access services.

<sup>375</sup> At the writing of the *Sixth Report*, the Handspring VisorPhone was the only voice capability offered for a PDA. See *Sixth Report*, at 13416.

<sup>376</sup> However, some smartphones remain largely focused on data applications, while others are more voice application-centric. See Mark Heinzl and Pui-Wing Tam, *Research in Motion, Palm Unveil New Handhelds, Raising Rivalry*, WALL STREET JOURNAL, Mar. 4, 2002 (IBS Warburg analyst Michael Urlocker said, “the new BlackBerry will appeal to those who want ‘lots of data with some phone,’ while the new Handspring Treo appeals to those who want ‘lots of phone with some data.’”).

<sup>377</sup> Amendment of Part 2 of the Commission’s Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems, *Memorandum Opinion and Order and Further Notice of Proposed Rulemaking*, 16 FCC Rcd 16043 (2001) (“*3G FNPRM*”).

<sup>378</sup> See *Sixth Report*, at 13400.

<sup>379</sup> *3G FNPRM*, at 16044. See Appendix A, Fixed Wireless Voice and Data Services, *infra*, for a further discussion of MDS.

<sup>380</sup> *3G FNPRM*, 16044.

## b. International Developments

Mobile telephone carriers in other countries have continued to deploy next generation mobile data services since the writing of the *Sixth Report*. One of the most notable international developments was the launch of 3G service using WCDMA technology by NTT DoCoMo in Japan in October 2001. As mentioned in the *Sixth Report*, NTT DoCoMo had once planned to offer 3G service by May 2001, but in April 2001, delayed the launch until October. NTT DoCoMo's 3G service, which the company calls FOMA (Freedom of Multimedia Access), allows users to access the Internet at speeds of up to 384 kbps, transmit and download video clips, and send large data files quickly.<sup>381</sup> However, FOMA's adoption rate has been lower than expected due to problems such as limited coverage, low battery life, and the high cost of handsets.<sup>382</sup> As of the end of April 2002, NTT DoCoMo had approximately 105,000 FOMA customers, compared to 32.6 million subscribers to its popular 2G mobile data service, i-mode, which is used by nearly 80 percent of DoCoMo's voice subscribers.<sup>383</sup>

While other countries around the world have delayed their WCDMA launches until at least 2003,<sup>384</sup> carriers in many countries are currently offering service using advanced wireless technologies such as GPRS and cdma2000 1X. GPRS service is available in most western European countries,<sup>385</sup> while cdma2000 1X has been launched by SK Telecom Company ("SK Telecom") in South Korea. In South Korea, cdma 1X services have proven to be fairly popular thus far. As of March 2002, SK Telecom had over 5 million 1xRTT subscribers, up from approximately 2 million in October 2001.<sup>386</sup> Furthermore, SK Telecom's wireless Internet revenue rose 55 percent during the first quarter of 2002 and represented 6.6 percent of the company's total revenue, up from 4.1 percent during the previous quarter.<sup>387</sup> On the other hand, the adoption rate of GPRS service has been lower than expected in many countries, and the popularity of GPRS service does not match the level of popularity that SMS has achieved around the world. One analyst estimates there were only one million GPRS customers in all of Europe at the end of 2001, due to problems with handset availability as well as relatively low speeds and limited content

---

<sup>381</sup> NTT DoCoMo, *Revolutionary 3G Service* (visited Mar. 20, 2002) <<http://www.nttdocomo.com/top.html>>; Ken Wieland, *Lessons from Japan: NTT DoCoMo Has Wisely Adopted a Step-by-Step Approach to Service Provisioning*, TELECOMMUNICATIONS (INTERNATIONAL EDITION), Feb. 1, 2002, at 16.

<sup>382</sup> *NTT DoCoMo Sees 6 mln 3G Subscribers by 2004 Despite Initial Low Take-Up*, AFX-ASIA, Mar. 1, 2002. According to NTT DoCoMo, the 3G network will not be available to 97 percent of Japan's populated areas until 2004. *Id.* However, DoCoMo announced in February 2002 that it would expand 3G service in April 2002 to areas outside of Tokyo, increasing the coverage to 60 percent of Japan's populated areas. *DoCoMo Hopes for More Customers with Expanded 3G Service*, AGENCE FRANCE PRESSE, Feb. 22, 2002.

<sup>383</sup> NTT DoCoMo, *Current Information – Subscriber Growth* (visited June 3, 2002) <<http://www.nttdocomo.com/top.html>>. See *Sixth Report*, at 13396-13397, for a further discussion of i-mode.

<sup>384</sup> Sarah Parker, *Europe Sidelines UMTS in Favor of UMTS Focus*, GLOBAL WIRELESS, Feb. 15, 2002, at 1. Reasons for the delays in 3G launches include the high cost of infrastructure deployment (added to the large amounts paid for 3G licenses in some countries), technical problems with both network infrastructure and handsets, and uncertainty over consumer demand. *Id.*

<sup>385</sup> *Id.*

<sup>386</sup> SK Telecom, *1st Quarter Earnings for the Period Ending March 31, 2002*, May 6, 2002, at 9.

<sup>387</sup> *Wireless Internet Shows Promise in South Korea*, WALL STREET JOURNAL, May 13, 2002, at A6.

offered by carriers.<sup>388</sup> SMS, on the other hand, continues to be a widely-used mobile data application abroad. Approximately 30 billion SMS messages were sent worldwide during December 2001, more than double the 14 billion sent during December 2000.<sup>389</sup>

## 2. Industry Structure and Performance

### a. Mobile Telephone Sector

The *Fifth and Sixth Reports* discussed in depth the various next-generation technology standards in development and which of these technologies mobile telephone carriers were planning to use to migrate from their existing 2G technologies in order to offer mobile data services at higher speeds.<sup>390</sup>

Since the writing of the *Sixth Report*, several developments have occurred on the road to 3G. During 2001, five of the nationwide telephone operators in the United States initiated service on newly deployed advanced wireless networks.<sup>391</sup> The two largest mobile telephone carriers that currently use CDMA as their 2G technology, Verizon Wireless and Sprint PCS, announced at the end of 2001 the availability of cdma2000 1X as the first phase of their 3G technology rollout.<sup>392</sup> In January 2002, Verizon Wireless initiated service on its high-speed data network, and the service, called Express Network, was available in approximately 20 percent of Verizon Wireless's network footprint in the Northeast, San Francisco Bay Area, and Salt Lake City as of March 2002.<sup>393</sup> Verizon Wireless's cdma2000 1XRTT network transmits data at speeds up to 144 kbps; however, the company states that the average customer download speed is 40-60 kbps.<sup>394</sup> Sprint PCS is upgrading its network and expects to rollout cdma2000 1X wireless data services, which it expects will be capable of speeds up to 144 kbps, nationwide in mid-year 2002.<sup>395</sup> Both carriers plan to deploy cdma2000 1xEV, Verizon Wireless in 2002 for data only and Sprint PCS in 2004

---

<sup>388</sup> Sarah Parker, *Europe Sidelines UMTS in Favor of UMTS Focus*, GLOBAL WIRELESS, Feb. 15, 2002, at 1 (citing UK consulting firm Analysys).

<sup>389</sup> GSM Association, *SMS Messages Sent Per Month* (visited Mar. 20, 2002) <<http://www.gsmworld.com/news/statistics/index.shtml>>. See Section II.B.3.b., SMS and Instant Messaging, *infra*, for a further discussion of SMS service in the United States.

<sup>390</sup> See *Fifth Report*, at 17697-17703.

<sup>391</sup> *AT&T Wireless On Target To Deliver 3G Services*, News Release, AT&T Wireless, July 17, 2001 (“*AT&T Wireless 3G News Release*”); *Cingular Wireless First to Deliver 2.5G Services to Consumers*, News Release, Cingular Wireless, Aug. 27, 2001; *Verizon Wireless Launches Nation's First Major Advanced Wireless Network: The Verizon Wireless Express Network*, News Release, Verizon Wireless, Jan. 28, 2002; *VoiceStream Extends GET MORE Value proposition to offer High-Speed Wireless Data Service to Customers Nationwide*, News Release, VoiceStream, Nov. 14, 2001.

<sup>392</sup> *Sprint Leads Evolution to 3G with Nation's Clearest, Fastest, Most Economical Migration Strategy*, News Release, Sprint PCS, Mar. 20, 2001; *Verizon Wireless and Lucent Technologies Plan to Speed Introduction of Third-Generation (3G) Technologies to U.S.*, News Release, Verizon Wireless, Mar. 19, 2001.

<sup>393</sup> Christopher Stern, *High-Speed Wireless Network to Debut*, WASHINGTON POST, Jan. 27, 2002.

<sup>394</sup> *Verizon Wireless Launches Nation's First Major Advanced Wireless Network: The Verizon Wireless Express Network*, News Release, Verizon Wireless, Jan. 28, 2002.

<sup>395</sup> *Sprint Showcases First Live Public Demonstration of its Wireless Third Generation Network*, News Release, Sprint PCS, Jan. 8, 2002.

for data and voice.<sup>396</sup> Cdma2000 1xEV is expected to boost network data speeds to at least 2.4 Mbps. In addition, Nextel's iDEN network transmits data at speeds of 15 to 20 kbps for mobile handsets and 30 kbps for laptops and PDAs.<sup>397</sup> Nextel has not yet made a commitment to a 3G technology.<sup>398</sup>

The major TDMA/GSM carriers in the United States, AT&T Wireless, VoiceStream, and Cingular Wireless, are taking a different migration path to 3G technology. All three carriers began deploying GPRS<sup>399</sup> technology during 2001 on their nationwide networks.<sup>400</sup> Data speeds on the carriers' GPRS networks range from 25 to 56 kbps.<sup>401</sup> AT&T Wireless, which currently uses TDMA as its 2G

---

<sup>396</sup> Sprint PCS, *Media Center: Sprint PCS Third Generation Network Questions and Answers* (visited Jan. 30, 2002) <[http://www.sprintpcs.com/aboutsprintpcs/Cdma\\_3g/AQ.html](http://www.sprintpcs.com/aboutsprintpcs/Cdma_3g/AQ.html)>; *Verizon Wireless and Lucent Technologies Plan to Speed Introduction of Third-Generation (3G) Technologies to U.S.*, News Release, Verizon Wireless, Mar. 19, 2001. Sprint PCS claims that its cdma2000 1xEV data and voice network will be capable of transmitting data at speeds of 3.5 to 5 Mbps. *Id.*

<sup>397</sup> Frank Marsala, *Nextel Communications; Strategy Holds Together, Execution Looks Good*, ROBERTSON STEPHENS, Mar. 11, 2002, at 2; Christopher Lindquist, *Wireless Data Will Get A Boost In 2002-But How Much Of One Depends On Whom You Ask*, CIO, Mar. 15, 2002; *Nextel Launches Faster Wireless Access to Web Content and New Wireless Modem Device; Data Compression Solution Accelerates Industry's Largest, Nationwide 2.5G Network*, News Release, Nextel, May 14, 2002.

<sup>398</sup> Peggy Albright, *Lessons Learned From Current Next-Gen Nets*, WIRELESS WEEK, Dec. 17, 2001. A clear timeline for Nextel's 3G network overlay has not yet been disclosed; however, one analyst believes the company will use cdma2000 and begin building the network in 2003 or beyond. Frank Marsala, *Nextel Retains Exclusive Rights To Direct Connect on CDMA Network*, Robertson Stephens, Jan. 10, 2002.

<sup>399</sup> See note 16, *supra*, for an additional description of GRPS and other 2.5G and 3G wireless technologies. The channel aggregation technology used in GRPS reportedly caused unacceptable heating and battery drain problems in the initial GPRS handset models. Accordingly, handset manufacturers have been forced to limit the amount of channel aggregation, which has therefore affected GPRS data transfer speeds. See Dan Meyer, *Rolling Out GPRS Only Half The Battle; Carriers Address Delicate Marketing, Handset Issues*, RCR WIRELESS NEWS, Jan. 28, 2002; Peggy Albright, *Will GPRS Comply with SAR Standards?*, WIRELESS WEEK, Apr. 30, 2001. GPRS data speeds also have been affected by network configurations that dedicate the majority of channels to voice rather than data traffic. Brad Smith, *Next-Gen Networks Battle For Fastest Data Rates*, WIRELESS WEEK, Dec. 17, 2001; Peggy Albright, *Lessons Learned From Current Next-Gen Nets*, WIRELESS WEEK, Dec. 17, 2001.

<sup>400</sup> *AT&T Wireless 3G News Release*. As of year-end 2001, AT&T Wireless offered GPRS in 16 cities. Paul Wuh *et al.*, *AT&T Wireless Group*, US Wireless Services, Goldman Sachs, Jan. 25, 2002, at 1. *Cingular Wireless First to Deliver 2.5G Services to Consumers*, News Release, Cingular Wireless, Aug. 27, 2001. As of June 2002, Cingular Wireless had deployed GPRS in 38 markets. Cingular, *Wireless Internet Availability* (visited June 18, 2002) <[http://www.cingular.com/beyond\\_voice/wi\\_availability](http://www.cingular.com/beyond_voice/wi_availability)>. *VoiceStream Extends GET MORE Value proposition to offer High-Speed Wireless Data Service to Customers Nationwide*, News Release, VoiceStream, Nov. 14, 2001. VoiceStream has deployed GPRS across its entire network.

<sup>401</sup> Dan Meyer, *Rolling Out GPRS Only Half the Battle; Carriers Address Delicate Marketing, Handset Issues*, RCR WIRELESS NEWS, Jan. 28, 2002. Early results in AT&T's launched markets yielded speeds of 20-40 kbps. AT&T Wireless estimates data rates on its GPRS network are 25 kbps on average. On the other hand, VoiceStream claims that its network yields speeds up to 56 kbps and 40 kbps on average. See Dan Meyer, *GSM gains ground in United States; AT&T, VoiceStream detail launch, migration plans*, RCR WIRELESS NEWS, Nov. 19, 2001; Brad Smith, *Next-Gen Networks Battle For Fastest Data Rates*, WIRELESS WEEK, Dec. 17, 2001. Several sources estimate maximum GPRS speeds will be 115 kbps. See Jonathan Roubini, *GPRS Phone Service Delivers on Speed Promises; Evaluation*, PC MAGAZINE, Feb. 26, 2002; Brad Smith, *Next-Gen Networks Battle for Fastest Data Rates*, WIRELESS WEEK, Dec. 17, 2001; Blesson Mathews, *Generation Wireless*, NETWORK COMPUTING, June

technology, plans to deploy GPRS to all of its markets by the end of 2002.<sup>402</sup> After rolling out GPRS, these three carriers have announced that they will migrate to and deploy EDGE as an intermediate technology between GPRS and WCDMA.<sup>403</sup> EDGE and WCDMA are expected to raise network speeds to 384 kbps and 2 Mbps, respectively.<sup>404</sup> Cingular Wireless is reportedly planning to build out EDGE to all of its markets during 2003 and 2004.<sup>405</sup> AT&T Wireless has announced that it expects to migrate to EDGE during 2002 and to WCDMA beginning in 2003.<sup>406</sup>

### b. Handheld Devices

PDAs or handheld devices began as electronic organizers containing personal information management (“PIM”) functions, such as an address book, calendar, and to-do list, that could be “synched” with PIM software on a user’s desktop computer. Most handheld devices also include the ability to download additional software programs that do not come pre-loaded on the device.<sup>407</sup> While PDAs still contain these core PIM and software features, handhelds are being repositioned as wireless communication devices instead of simple organizers.<sup>408</sup> All of the PDA models introduced by the major manufacturers during 2001 and early 2002 – including Palm, Inc. (“Palm”), Handspring, Inc. (“Handspring”), Sony, Compaq Computer Corporation (“Compaq”), Casio, Inc. (“Casio”), Hewlett-Packard (“HP”), and Research in Motion, Inc. (“RIM”) – allowed users some method of connecting to the Internet wirelessly.

---

11, 2001; Harry Newton, *NEWTON’S TELECOM DICTIONARY: 16<sup>TH</sup> EXPANDED & UPDATED EDITION*, CMP Books, July 2000, at 397.

<sup>402</sup> *AT&T Wireless 3G News Release*. By year-end 2001, AT&T Wireless had built-out GPRS to 45 percent of its covered POPs. *Goldman Sachs AT&T Wireless Group*, at 4.

<sup>403</sup> Cingular Wireless has not established a timeline for installing WCDMA. In fact, the company has stated that it will need more spectrum to deploy WCDMA. See Kelly Carroll, *Cingular Backs Away From Wideband CDMA*, TELEPHONY, Nov. 5, 2001; Frank Marsala, *Implications of Cingular’s Technology Announcement*, ROBERTSON STEPHENS, Oct. 31, 2001; Kelly Carroll, *Cingular Attaches Billions To Its EDGE Commitment*, TELEPHONY, Dec. 10, 2001; Kelly Carroll, *An Alternate Reality For 3G Wireless*, TELEPHONY, Oct. 15, 2001.

<sup>404</sup> Blesson Mathews, *Generation Wireless*, NETWORK COMPUTING, June 11, 2001; Margot Suydam, *Might As Well Jump; 3G: The Cellular Industry’s Leap Of Faith*, COMMVERGE, Nov. 1, 2001; Kent German, *An Unproven Promise*, UPSIDE, Mar. 2002.

<sup>405</sup> Cingular Wireless LLC, SEC Form S-4, Jan. 24, 2002; Frank Marsala, *Implications of Cingular’s Technology Announcement*, Robertson Stephens, Oct. 31, 2001.

<sup>406</sup> See *AT&T Wireless 3G News Release*; Paul Wuh, *AT&T Wireless Group: Analyst Meeting Companion*, Goldman Sachs, Jan. 25, 2002.

<sup>407</sup> See Section II.B.2.c.ii, Operating Systems, *infra*.

<sup>408</sup> One analyst stated in January 2002, “[W]ireless is ultimately the most important aspect of any kind of handheld device.” See Jon Fortt, *Device Arrives at a Critical Time for Firm, Palm Unveils Its Wireless Handheld i705*, SAN JOSE MERCURY NEWS, Jan. 28, 2002 (quoting Thomas Sepenzis, an analyst at CIBC World Markets, who also stated, “Twelve months from now, if it’s not wireless, it’s pretty much useless.”). Palm stated in January 2002, “Handheld usage is shifting. While the [electronic organizer] is significant, what’s going to be driving the industry is communications functionality.” See Vanessa Hua, *Palm Rides Wireless Wave*, SAN FRANCISCO CHRONICLE, Jan. 28, 2001, at E1 (quoting John Cook, Palm’s senior director of product management). In January 2002, Handspring announced that it would eventually stop producing traditional handheld organizers and would offer wireless communicators instead. Ian Fried, *Handspring to Developers: Remain Calm*, CNET NEWS.COM, Jan. 23, 2001.

According to one analyst, 6.6 million PDAs were sold in the United States during 2001, a 20 percent increase from the 5.5 million sold during 2000.<sup>409</sup> According to another analyst, U.S. sales of handheld devices totaled 2.5 million during the second and third quarters of 2001.<sup>410</sup> Palm devices accounted for 39.1 percent of that total,<sup>411</sup> Handspring PDAs accounted for 19.6 percent, while RIM devices accounted for 7.5 percent, and the three major Pocket PC manufacturers (Compaq, Casio, and HP)<sup>412</sup> accounted for a combined 23.6 percent.<sup>413</sup>

There are four different methods by which PDAs can connect to the Internet while mobile. First, some PDAs, including RIM devices and the Palm VII and i705,<sup>414</sup> have built-in, or embedded, wireless modems. These devices therefore do not require an additional attachment in order to connect to the Internet wirelessly. The Palm VII and i705 connect to Cingular Wireless's Mobitex dedicated data network,<sup>415</sup> while some of RIM's devices use Cingular Wireless's network and others use Motient Corporation's ("Motient") dedicated data network.<sup>416</sup> These devices can access the Internet at speeds of between 8.6 and 14.4 kbps,<sup>417</sup> which are comparable to the speeds offered by mobile telephone carriers for their 2G mobile data services, but lower than the speeds offered on these carriers' GPRS and 1xRTT

---

<sup>409</sup> *eTForecasts: Pocket PC PDAs to Surpass PalmOS PDAs in 2005*, BUSINESS WIRE, Dec. 12, 2001 (citing "Worldwide PDA Markets," a market research report by eTForecasts).

<sup>410</sup> *Gartner Dataquest Says Announced Release of Pocket PC 2002 May Have Slowed PDA Sales in 3Q01*, BUSINESS WIRE, Nov. 5, 2001.

<sup>411</sup> Palm is the largest PDA producer. According to one analyst, since its inception, the company has sold a total of 20 million devices, about 13 to 14 million of which are currently in use. *Patrick Seitz, Palm Setting Its Sights on Corporate Spending with New i705 Device Lets Users Check Their E-Mail*, INVESTOR'S BUSINESS DAILY, Jan. 29, 2002, at 5 (citing Todd Kort, an analyst with Gartner Inc.).

<sup>412</sup> Compaq and HP are in the process of merging. In March, the Federal Trade Commission closed its review of the pending merger. *Federal Trade Commission Clears HP-Compaq Merger*, News Release, HP, Mar. 6, 2002.

<sup>413</sup> *Gartner Dataquest Says Announced Release of Pocket PC 2002 May Have Slowed PDA Sales in 3Q01*, BUSINESS WIRE, Nov. 5, 2001.

<sup>414</sup> The Palm i705 was released in January 2002 and is an updated version of the Palm VII series, which was originally released in the second half of 1999 and is discussed in greater detail in the *Sixth Report*, at 13413-13414, and *Fifth Report*, at 17722-17723. The Palm i705 costs \$450. Users can also purchase a thumb keypad to slip on to the bottom of the device. *Patrick Seitz, Palm Setting Its Sights on Corporate Spending with New i705 Device Lets Users Check Their E-Mail*, INVESTOR'S BUSINESS DAILY, Jan. 29, 2002, at 5. The device includes a 33 MHz Dragonball processor, 8 megabytes ("MB") of RAM, and 4 MB of storage, and provides always-on access to e-mail and messaging. *Kristen Kenedy, Palm Eyes Security – Data Protection Key as Enterprise Arena Considers Handhelds*, COMPUTER RESELLER NEWS, Jan. 28, 2002, at 96 ("Palm Eyes Security").

<sup>415</sup> *Palm Eyes Security*. Cingular Wireless's Mobitex network allows users to roam in 260 U.S. metropolitan areas without incurring additional charges. *Palm i705 Handheld Debuts: Only Secure, Integrated Wireless, Email Solution with Web Access*, News Release, Palm, Jan. 28, 2002.

<sup>416</sup> *Cingular Powers New Palm i705 Wireless Handheld*, News Release, Cingular Wireless, Jan. 28, 2002.

<sup>417</sup> *Palm Eyes Security*.

networks, which range from 25-60 kbps.<sup>418</sup>

A second method by which many PDAs connect to the Internet while mobile is with the attachment of a wireless modem card. The major manufacturers of wireless modem cards include Novatel Wireless, Sierra Wireless, and Enfora, and each modem card is usually made to work with a specific PDA model.<sup>419</sup>

Most wireless modem cards connect to Cellular Digital Packet Data (“CDPD”) networks operated by mobile telephone carriers such as AT&T Wireless and Verizon Wireless and give users Internet access speeds of around 19.2 kbps. However, modem cards that connect to GPRS and 1xRTT networks and can provide users with higher mobile Internet access speeds started to become available in early 2002. In January 2002, Verizon Wireless and Sierra Wireless announced the commercial availability of the AirCard 555 wireless modem card, which connects laptops and PDAs to Verizon Wireless’s cdma2000 1xRTT network and gives users Internet access speeds of 40-60 kbps.<sup>420</sup> VoiceStream sells a wireless modem card for laptops and PocketPC PDAs that connects to GSM/GPRS networks and allows users to receive Internet access speeds of up to 56 kbps in areas where GPRS service is available.<sup>421</sup>

A third way in which PDAs can connect to the Internet is with the attachment of an Internet-enabled mobile phone. With this “piggybacking” method, many of the factors associated with the Internet connection, including speed, reliability, and service pricing, are dependent upon the mobile telephone carrier providing the Internet access.<sup>422</sup> Handspring offers a modified version of piggybacking method of mobile Internet access. All of its Visor PDA models include a Springboard where users can attach various modules, including two devices, called the VisorPhone and Sprint PCS DigitalLink, that allow a Visor to function as an Internet-ready mobile telephone, giving users both a mobile voice and data connection.<sup>423</sup>

---

<sup>418</sup> See Section II.B.2.a, Mobile Data Mobile Telephone Sector, *supra*, for a further discussion of advanced wireless network deployments by mobile telephone carriers.

<sup>419</sup> These manufacturers also make wireless modem cards for laptops, allowing them to connect to the Internet wirelessly.

<sup>420</sup> *Sierra Wireless and Verizon Wireless Connect Mobile Users on the First 1xRTT “Express Network,”* News Release, Sierra Wireless, Jan. 28, 2002.

<sup>421</sup> The wireless modem card is the Merlin G100, made by Novatel Wireless. VoiceStream, *G100 iStream PC Card* (visited Mar. 4, 2002) <<http://www.voicestream.com/products/services/istream/wirelessinbox.asp#>>. See Section II.B.2.a, Mobile Data Mobile Telephone Sector, *supra*, for a discussion of advanced wireless service rollouts and network deployments by mobile telephone carriers.

<sup>422</sup> However, even when using a mobile telephone for a connection, PDA users can typically access additional or more advanced Internet services and applications not available on mobile telephone handsets. See Sections II.B.2.a, Mobile Data Mobile Telephone Sector, *supra*, and II.B.3, Mobile Data Services, *infra*.

<sup>423</sup> The VisorPhone connects to GSM networks, while the DigitalLink works with Sprint PCS’s CDMA network. The DigitalLink module is also compatible with Sprint PCS’s 1xRTT network, which is being deployed nationwide during 2002 and is expected to increase data speeds to up to 144 kbps. Handspring, *VisorPhone* (visited February 13, 2002) <<http://www.handspring.com/products/visorphone/index.jhtml>>; Handspring, *Sprint PCS Wireless Web DigitalLink* (visited February 13, 2001) <<http://www.handspring.com/products/sbmodules/sprintpcs.jhtml>>.

(i) Smartphones

During the past year, the wireless industry witnessed the further convergence of the mobile telephone and PDA sectors, marked by the emergence of smartphones, which provide a fourth method of PDA mobile Internet access. Smartphones combine the voice and data capabilities of mobile telephones with the PIM functions of PDAs. While smartphones constituted less than one percent of all mobile phone sales during 2001,<sup>424</sup> one analyst has stated that “the line between PDAs and cellphones ha[s] blurred.”<sup>425</sup> Compared to traditional mobile handsets, smartphones generally have larger screens, more advanced graphics and processing capabilities, more memory, a more user-friendly operating system, some form of keypad, and the ability to synch data with and download software from a desktop computer. Smartphones also integrate traditional mobile telephone phone number storage and access with a PDA’s address book so users are not required to store numbers in two different places.

In the fall of 2001, Kyocera and Samsung released PalmOS-based smartphones<sup>426</sup> that operate on the CDMA networks of Sprint PCS and Verizon Wireless. And in February 2002, Handspring released its smartphone model, the Treo, which operates on GSM networks.<sup>427</sup> In mid-2002 Handspring is scheduled to release a software upgrade that will allow the Treo to work on GPRS networks, giving users faster Internet access speeds of up to 56 kbps.<sup>428</sup> Handspring also announced in March 2002 that it is developing with Sprint PCS another version of the Treo that will work on Sprint PCS’s CDMA network, including its 1xRTT network, expected to launch in mid-2002.<sup>429</sup> RIM announced the availability of a new smartphone in February 2002, the BlackBerry 5810, that allows users to make voice calls over GSM networks as well as access RIM’s BlackBerry e-mail service.<sup>430</sup> In February 2002, Microsoft and HP

---

<sup>424</sup> Andrea Ahles, *Cellphones That Are Also PCs, PDAs, Pagers the Device of the Year*, FORT WORTH STAR-TELEGRAM, Jan. 9, 2002 (quoting Todd Kort, Gartner Group).

<sup>425</sup> *Id.*

<sup>426</sup> Jon Fortt, *Device Arrives at a Critical Time for Firm, Palm Unveils Its Wireless Handheld i705*, SAN JOSE MERCURY NEWS, Jan. 28, 2002. See Section II.B.3.b(ii), Operating Systems, *infra*, for a discussion of PDA operating systems.

<sup>427</sup> The Treo currently transmits data at around 9.6 kbps. Jon Fortt, *Device Arrives at a Critical Time for Firm, Palm Unveils Its Wireless Handheld i705*, SAN JOSE MERCURY NEWS, Jan. 28, 2002; Rob Pegoraro, *Even the Best of the Phone-PDA Combos Aren’t Good Enough*, WASHINGTON POST, Jan. 27, 2002, at H7. Treo users can send and receive SMS messages, access POP3 e-mail accounts (see note 496, *infra*, for a discussion of POP3 e-mail accounts), and surf the web using Handspring’s browser, Blazer, which does display graphical web pages in a recognizable form. The Treo does not contain Handspring’s signature Springboard expansion slot, but it does have an integrated thumb keypad. See Bruce Brown, *Handspring Gets the Phone/PDA Combo Right*, PC MAGAZINE, Feb. 12, 2002, at 34; Rob Pegoraro, *Even the Best of the Phone-PDA Combos Aren’t Good Enough*, WASHINGTON POST, Jan. 27, 2002, at H7.

<sup>428</sup> Rob Pegoraro, *Even the Best of the Phone-PDA Combos Aren’t Good Enough*, WASHINGTON POST, Jan. 27, 2002, at H7.

<sup>429</sup> *Handspring and Sprint Developing CDMA Version of Treo Communicator*, News Release, Handspring, Mar. 19, 2002.

<sup>430</sup> *RIM Adds Phone to BlackBerry, Takes on Cell Giants*, REUTERS, Mar. 4, 2002. See Section II.B.3.d, E-mail and Corporate Server Access, *infra*, for a discussion of e-mail service on mobile devices. RIM also announced an agreement with Nextel and Motorola in January 2002 to develop a RIM device that will include RIM’s BlackBerry e-mail service and voice access over Nextel’s iDEN network, including Nextel’s DirectConnect two-



unveiled the HP Jornada 928, which incorporates Microsoft's newly-designed operating system for mobile telephones, Pocket PC 2002 Phone Edition. The Jornada 928, which will connect to GSM/GPRS networks, integrates voice capabilities with the data communication functions and Microsoft software found on other Pocket PC devices.<sup>431</sup> And in the spring of 2002, Verizon Wireless released a smartphone manufactured by Audiovox, called Thera, which runs Pocket PC 2002 and connects to Verizon Wireless's cdma2000 1xRTT network.<sup>432</sup>

## (ii) Operating Systems

While there are several PDA device manufacturers, most PDAs use one of two major operating systems: Palm's PalmOS or Microsoft's Pocket PC.<sup>433</sup> In addition to producing approximately 50 percent of all PDAs sold, Palm also licenses its PalmOS operating system to other handheld device and mobile telephone handset manufacturers, including Handspring, Sony, Samsung, and Kyocera. Approximately 72 percent of all PDAs sold in the United States during 2001 run PalmOS.<sup>434</sup> In the fall of 2001, Palm began creating a separate subsidiary, now called PalmSource, Inc, for its PalmOS product.<sup>435</sup> One of the major sources of demand for PalmOS products has been the multitude of software and applications developed by third party companies that can be downloaded on to PalmOS devices at little or no additional expense.<sup>436</sup> For example, one company, DataViz, has developed software called Documents To Go that allows PalmOS device users to open and edit documents created in Microsoft Word and Excel,

---

way digital radio service. *Nextel, RIM and Motorola Agree to Purchase Voice-enabled Handheld*, News Release, Nextel and RIM, Jan. 24, 2002. Nextel's iDEN network technology is manufactured by Motorola. *Id.*

<sup>431</sup> *Microsoft Rings in Pocket PC Phone Edition*, News Release, Microsoft, Feb. 19, 2002. The mobile data services offered with devices running the Pocket PC 2002 and Pocket PC 2002 Phone Edition operating systems are discussed in more detail in Section II.B.3.d., E-mail and Corporate Server Access, *infra*. At the same time Microsoft unveiled the Jornada 928, the company announced an agreement with Intel in which the two companies will support each other's components in smartphone platform design. Microsoft agreed to support Intel's Personal Internet Client Architecture (Intel PCA) while Intel's components will integrate Microsoft's operating system with the goal of creating a standard platform for smartphone/PDA software development. *Microsoft and Intel Announce Wireless Development Initiative*, News Release, Microsoft, Feb. 19, 2002.

<sup>432</sup> Verizon Wireless, *Introducing Thera* (visited May 22, 2002) <<http://www.verizonwireless.com>>.

<sup>433</sup> The major exceptions are devices made by RIM. The BlackBerry 5810 uses a Java operating system developed by Sun Microsystems that can reportedly be read and understood by all other operating systems. *RIM Adds Phone to BlackBerry, Takes on Cell Giants*, REUTERS, Mar. 4, 2002.

<sup>434</sup> About 22 percent of the PDAs sold during 2001 run Microsoft's Pocket PC or Windows CE, and the remaining 6 percent run other operating systems. *eTForecasts: Pocket PC PDAs to Surpass PalmOS PDAs in 2005*, BUSINESS WIRE, Dec. 12, 2001 (citing "Worldwide PDA Markets," a market research report by eTForecasts).

<sup>435</sup> *Palm, Inc. Second Quarter, Fiscal 2002 Analyst Teleconference Remarks - Eric Benhamou, Chairman and Chief Executive Officer*, News Release, Palm, Dec. 19, 2001; *Palm, Inc. Third Quarter Fiscal 2002 Analyst Teleconference Remarks - Judy Bruner, Senior Vice President and Chief Financial Officer*, News Release, Palm, Mar. 21, 2002.

<sup>436</sup> As of December 2001, there were approximately 175,000 registered PalmOS third party application and software developers. *Palm Reports Second Quarter Revenue Up 36 Percent Over First Quarter, Sequential Improvement in Operating Results*, News Release, Palm, Dec. 19, 2001.

and to view documents created in Microsoft PowerPoint.<sup>437</sup> The second major PDA operating system, Pocket PC, is similar to Windows, and all Pocket PC devices include PDA versions of most of the Microsoft Office desktop software applications, including Outlook, Word, Excel, PowerPoint, and Internet Explorer. In October 2001, Microsoft released an updated version of its PDA operating system, Pocket PC 2002, and several Pocket PC device manufacturers, including Compaq, Casio, and HP, simultaneously released new PDA models that run the new operating system. The improvements in mobile access to e-mail and corporate servers allowed by Pocket PC 2002 are discussed further in Section II.B.3.d., E-mail and Corporate Server Access, *infra*. According to one analyst, worldwide shipments of Windows CE and Pocket PC PDAs increased 120 percent during 2001.<sup>438</sup>

### c. Paging Sector

The paging mobile data subsector, as described herein, includes carriers that use paging and narrowband PCS spectrum to offer traditional one-way paging services as well as two-way advanced messaging services, which are discussed in more detail below.<sup>439</sup> Arch Wireless Communications, Inc. (“Arch Wireless”) and Metrocall, Inc. (“Metrocall”) are the largest paging carriers and had a combined total of 13.7 million units in service at the end of 2001.<sup>440</sup> The Commission estimates there were 18 million paging units in service as of mid-2001.<sup>441</sup> Other major paging carriers include SkyTel Communications, Inc. (“SkyTel”)<sup>442</sup> and WebLink Wireless, Inc. (“WebLink”). In addition to these major carriers, there are hundreds of smaller paging operators who compete with these larger carriers.

During 2001, paging carriers endured financial difficulties as a result of the continuing decline in demand for traditional one-way paging services,<sup>443</sup> which has long constituted the bulk of these carriers’ revenue,<sup>444</sup> as well as intense competition from other mobile data providers in the market for more

---

<sup>437</sup> *Palm i705 Handheld Debuts: Only Secure, Integrated Wireless, Email Solution With Web Access*, News Release, Palm, Jan. 28, 2002. Documents To Go is pre-loaded on all Palm i705 devices. *Id.*

<sup>438</sup> *Microsoft Rings in Pocket PC Phone Edition*, M2 PRESSWIRE, Feb. 19, 2002 (citing IDC).

<sup>439</sup> See Section II.B.3, Mobile Data Services, *infra*.

<sup>440</sup> Arch Wireless Communications Inc., SEC Form 10-K, Mar. 21, 2002, at 11; Metrocall, Inc., SEC Form 10-K, Apr. 12, 2002, at 16.

<sup>441</sup> NRUF database. See note 114, *supra*, for a description of this source.

<sup>442</sup> SkyTel Communications, Inc. is a wholly owned subsidiary of WorldCom that was acquired on October 1, 1999. See *Fifth Report*, at 17720-17721.

<sup>443</sup> The number of paging subscribers of the major carriers fell substantially during the past year. Arch Wireless’s units in service declined 29 percent from 11.6 million at the end of 2000 to 8.2 million at the end of 2001. Arch Wireless Communications Inc., SEC Form 10-K, Mar. 21, 2002, at 11. Metrocall’s units in service declined 13 percent from 6.3 million at the end of 2000 to 5.5 million at the end of 2001. Metrocall, Inc., SEC Form 10-K, Apr. 12, 2002, at 16.

<sup>444</sup> Both Arch and Metrocall generates about 90 percent of their revenue from traditional one-way paging services. Arch Wireless Communications Inc., SEC Form 10-K, Mar. 21, 2002, at 4; *Last Call for Metrocall?*, WASHINGTON BUSINESS JOURNAL, Nov. 23, 2001, at 23.

advanced mobile data services.<sup>445</sup> As mentioned in the *Sixth Report*, TSR Wireless, Inc. filed for bankruptcy in December 2000, and WebLink filed for Chapter 11 bankruptcy in May 2001.<sup>446</sup> In October 2001, WebLink filed a restructuring plan detailing how the company intended to emerge from bankruptcy.<sup>447</sup> In December 2001, Arch Wireless and its subsidiaries filed for Chapter 11 bankruptcy protection, and in January 2002 filed a plan of reorganization with the bankruptcy court.<sup>448</sup> Finally, Metrocall filed a Chapter 11 bankruptcy petition for reorganization in June 2002.<sup>449</sup>

Paging carriers have continued to compete with each other and with other mobile data providers by offering advanced, two-way mobile data services and by upgrading their networks to allow for such services. During 2001, SkyTel upgraded its ReFLEX network to version 2.7, and Arch announced that it was planning to upgrade its network to version 2.7 during 2002.<sup>450</sup> This upgrade reduces network latency, or the time it takes to transfer a message through the network, thereby allowing chat and instant messaging applications among subscribers. Paging carriers claim that the upgraded 2.7 networks are powerful enough to compete with the data networks operated by Cingular Wireless and Motient,<sup>451</sup> through which many handheld devices connect to the wireless Internet.<sup>452</sup>

On December 5, 2001, the Commission completed the auction of over 15,000 20- and 40-kilohertz paging licenses in the 35 MHz, 43 MHz, 152 MHz, 454 MHz, 929 MHz, and 931 MHz bands.<sup>453</sup> Most licenses were auctioned on an EA geographic basis, while the 929 and 931 MHz band licenses were auctioned by

---

<sup>445</sup> See *Last Call for Metrocall?*, WASHINGTON BUSINESS JOURNAL, Nov. 23, 2001, at 23 (citing Roberta Wiggins, an analyst for the Yankee Group); John Sullivan, *Motorola's Exit: Death Knell Or New Dawn For Paging Market?*, WIRELESS DATA NEWS, Dec. 19, 2001 (citing analyst Herschel Shostek of the Shostek Group); Deborah Mendez-Wilson, *An International Mobile Network; WebLink Wireless Crosses Borders With Two-Way Messaging*, WIRELESS WEEK, Sept. 17, 2001, at 22; Arch Wireless Communications Inc., SEC Form 10-K, Mar. 21, 2002, at 7. See Sections II.B.2.a, Mobile Data Mobile Telephone Sector and II.B.2.b, Handheld Devices, *supra*; and Section II.B.3, Mobile Data Services, *infra*, for a further discussion of competing providers of advanced mobile data services.

<sup>446</sup> See *Sixth Report*, at 13405.

<sup>447</sup> *WebLink Wireless Prepares to File Plan to Emerge from Chapter 11*, PR NEWswire, Oct. 31, 2001. In its reorganization filing, WebLink announced it planned to emerge from bankruptcy as a stand-alone company but was also soliciting proposals from outside investors. Mike Dano, *WebLink's Bankruptcy Restructure Includes Talks with Strategic Partners*, RCR WIRELESS NEWS, Nov. 5, 2001, at 2.

<sup>448</sup> *Arch Agrees to Debt Restructuring Plan With Majority of Its Secured Creditors*, News Release, Arch Wireless, Dec. 6, 2001; *Arch Wireless Files Plan of Reorganization*, News Release, Arch Wireless, Jan. 15, 2002.

<sup>449</sup> *Metrocall Files Voluntary Chapter 11 Petition*, News Release, Metrocall, June 3, 2002. Metrocall expects to continue to provide service without interruption during its reorganization process. *Id.*

<sup>450</sup> Mike Dano, *Arch Upgrades to 2.7 ReFLEX Network*, RCR WIRELESS NEWS, Nov. 5, 2001, at 4.

<sup>451</sup> Motient filed for Chapter 11 bankruptcy during 2001 but emerged from bankruptcy with significantly less debt on April 25, 2002. Yuki Noguchi, *Motient Corp. Leaves Bankruptcy, Cuts Debt*, WASHINGTON POST, Apr. 26, 2002, at E5.

<sup>452</sup> See Section II.B.2.b, Handheld Devices, *supra*, for a discussion of how handheld devices connect to the Internet wirelessly.

<sup>453</sup> Lower and Upper Paging Bands Auction Closes, *Public Notice*, DA 01-2858, Dec. 11, 2001.

MEAs. These licenses were encumbered by the operations of existing paging carriers using site licenses. In this auction, 182 bidders won 5,323 licenses, and net high bids totaled \$12.9 million.<sup>454</sup> The fact that many of the licenses remained unsold probably reflects the fact that the operations of existing licensees were in some cases so extensive that the “white space” available was not sufficient to attract bidders. Moreover, capital market constraints facing the paging industry also likely influenced the limited demand for certain licenses.

### 3. Mobile Data Services

#### a. Paging

Traditional paging service consists of one-way data communications sent to a mobile device that alerts the user when it arrives. The communication could consist of a phone number for the user to call, a short message, or an information update. Other mobile data providers in addition to paging carriers offer paging services. For instance, most digital mobile telephone handsets include a paging component or Caller ID feature that allows users to view the phone number of someone who has called them. While paging carriers have faced competition with these types of features offered by mobile telephone carriers, traditional paging devices are generally less expensive and, in some cases, receive better in-building coverage than mobile telephone handsets.<sup>455</sup> The more advanced two-way mobile data services offered by paging carriers, such as two-way messaging and web and e-mail access, are discussed below in their respective subsections.

#### b. SMS and Instant Messaging

SMS provides the ability for users to send and receive text messages to and from mobile handsets with maximum message length ranging from 120 to 500 characters.<sup>456</sup> SMS also can be used to deliver a wide range of information to mobile users, including stock prices, sport scores, news headlines, weather reports, and horoscopes. Worldwide, SMS has become increasingly popular, growing to 250 billion messages sent over wireless networks worldwide in 2001.<sup>457</sup>

Two-way SMS was introduced in the United States in May 2000 when VoiceStream began to offer the service.<sup>458</sup> As of year-end 2001, the six nationwide mobile telephone carriers, as well as handheld

---

<sup>454</sup> *Id.* See Appendix B, Table 3, at B-6.

<sup>455</sup> John Sullivan, *Motorola's Exit: Death Knell Or New Dawn For Paging Market?*, WIRELESS DATA NEWS, Dec. 19, 2001.

<sup>456</sup> U.S. carriers have set varying character limits. For example, Verizon Wireless limits users to 120 characters, whereas Nextel allows users to send and receive messages up to 500 characters long. See Verizon Wireless, *Welcome to Verizon Wireless*, (visited Mar. 7, 2002) <[http://www.verizonwireless.com/aboutus/products\\_services/mobile\\_messenger\\_fact\\_sheet.shtml](http://www.verizonwireless.com/aboutus/products_services/mobile_messenger_fact_sheet.shtml)>; Nextel, *Nextel – Two-Way Messaging* (visited Jan. 29, 2002) <[http://www.nextel.com/phone\\_services/mobilemessaging/twowaymessaging.shtml](http://www.nextel.com/phone_services/mobilemessaging/twowaymessaging.shtml)>.

<sup>457</sup> Brad Smith, *Signs Point To A Surge In SMS*, WIRELESS WEEK, Mar. 4, 2002 (citing GSM Association).

<sup>458</sup> *VoiceStream Wireless Launches Wireless Internet Services*, News Release, VoiceStream, May 10, 2000. Verizon Wireless and AT&T Wireless initiated SMS services during the fourth quarter of 2000. *AT&T Wireless Brings the International Text Messaging Craze to the U.S.*, News Release, AT&T Wireless, Oct. 17, 2000; *Verizon Wireless Customers Can Now Let Their Fingers Do The Talking*, News Release, Verizon Wireless, Nov. 30, 2000.

providers and some smaller mobile telephone carriers, were offering SMS.<sup>459</sup> At the end of 2001, AT&T Wireless became the first carrier to offer cross-carrier network SMS capabilities.<sup>460</sup> A short time later, most of the nationwide carriers announced similar plans.<sup>461</sup> Mobile telephone carriers that offer cross-carrier SMS have reported increased traffic since implementing this capability on their networks. AT&T Wireless stated that it has experienced 29 percent SMS growth from November 2001 through the end of March 2002, while Verizon has reported SMS traffic up to 4 million messages per day.<sup>462</sup>

Pricing plans for SMS offered by mobile telephone carriers vary; however, with most carriers, charges are usually incurred in addition to monthly voice and/or wireless web service plan fees. Providers typically charge a fixed monthly fee for a set number of messages, although subscribers can also pay per message.<sup>463</sup> For example, Verizon Wireless offers customers a plan for \$2.99 per month for 100 messages and a plan for \$7.99 per month for 600 messages. With both plans, additional sent messages are \$0.10 and received messages are \$0.02.<sup>464</sup> Both Cingular Wireless and Nextel offer SMS *à la carte* or bundled with their wireless web plans. Nextel offers a plan for \$5 that allows unlimited messages,<sup>465</sup> or users can receive 300 messages as part of the company's wireless Internet package.<sup>466</sup>

In addition to SMS, some mobile telephone carriers offer instant messaging ("IM") services for mobile devices. Instant messaging services, such as AOL Instant Messenger ("AIM") and MSN Messenger, enable users to send and receive messages within a community of users, creating a chat-style atmosphere, whereas SMS is communication between two individuals.<sup>467</sup> AT&T Wireless, Sprint PCS, and

---

<sup>459</sup> According to company websites, carriers offering SMS include the following: AT&T Wireless, CenturyTel, Cingular, Einstein PCS, MetroPCS, Nextel, Ntelos, Sprint PCS, US Cellular, Verizon Wireless, VoiceStream, and Western Wireless.

<sup>460</sup> Dan Meyer, *AT&T Wireless move gives SMS legs in U.S.*, RCR WIRELESS NEWS, Nov. 26, 2001.

<sup>461</sup> *Cingular to Offer Text Messaging Without Boundaries*, News Release, Cingular Wireless, Feb. 27, 2002; *Sprint to Expand Sprint PCS Short Mail to Include Intercarrier Messaging*, News Release, Sprint PCS, Mar. 13, 2002; *Verizon Wireless Deploys InphoMatch Platform To Manage Inter-Carrier Text Messaging Traffic*, News Release, Verizon Wireless, Apr. 9, 2002; *VoiceStream Expands Two-Way Text Messaging Service*, News Release, VoiceStream, Mar. 1, 2002.

<sup>462</sup> Frank Marsala, *Mid-Quarter Look Reveals Some Positive Trends*, ROBERTSON STEPHENS, May 22, 2002.

<sup>463</sup> In addition to paying service plan fees, customers must also purchase handsets capable of text messaging.

<sup>464</sup> Verizon Wireless, *Welcome To Verizon Wireless*, (visited Mar. 7, 2002) <[http://www.verizonwireless.com/aboutus/products\\_services/mobile\\_messenger/splash\\_a.shtml](http://www.verizonwireless.com/aboutus/products_services/mobile_messenger/splash_a.shtml)>.

<sup>465</sup> Nextel, *Nextel – Two-Way Messaging* (visited Jan. 29, 2002) <[http://www.nextel.com/phone\\_services/mobilemessaging/twowaymessaging.shtml](http://www.nextel.com/phone_services/mobilemessaging/twowaymessaging.shtml)>.

<sup>466</sup> Nextel, *Nextel – Nextel Online*, (visited Jan. 29, 2002) <[http://www.nextel.com/phone\\_service/wirelessweb/nextelonline.shtml](http://www.nextel.com/phone_service/wirelessweb/nextelonline.shtml)>; *Nextel – Nextel Online Plus*, Nextel, <[http://www.nextel.com/phone\\_service/wirelessweb/nextelonlineplus.shtml](http://www.nextel.com/phone_service/wirelessweb/nextelonlineplus.shtml)> (visited Jan. 29, 2002).

<sup>467</sup> Devine Kofiloto and Mike Woolfrey, *'SMS – Unexploited Potential' Messaging Conference Hears*, EMC MARKET DATA, Jan. 31, 2001.

VoiceStream offer AIM to their mobile customers,<sup>468</sup> and Cingular Wireless offers MSN Messenger to its mobile customers.<sup>469</sup> Users of the Palm i705 also receive “always on” access to AIM.<sup>470</sup> From their mobile devices, AIM users are able to tell whether or not someone from their “buddy list” – a list of other AIM users with whom the initial user communicates – is online. In addition, AIM users can communicate with their “buddies” regardless of whether the buddies are on a PC or on a mobile phone.<sup>471</sup> We note that many in the industry have raised concerns about competitiveness and access issues in instant messaging.<sup>472</sup>

### c. Web Content

Using their existing and next generation networks, at least seven major mobile telephone service providers<sup>473</sup> currently offer text-based wireless web<sup>474</sup> services via mobile telephone handsets at speeds ranging from approximately 14.4 kbps on 2G networks to 60 kbps on advanced wireless networks.<sup>475</sup>

---

<sup>468</sup> AT&T Wireless, *AT&T Wireless 2-Way Text Messaging Service* (visited Mar. 7, 2002) <[http://www.attws.com/personal/txt\\_msg/index.jhtml;dsessionid=HM4ZVMPIXT533R1M5W1CFFA](http://www.attws.com/personal/txt_msg/index.jhtml;dsessionid=HM4ZVMPIXT533R1M5W1CFFA)>; *Sprint and America OnLine Launch the AOL Instant Messenger Service on the Sprint PCS Wireless Web*, News Release, Sprint PCS, Oct. 19, 2000; VoiceStream, *VoiceStream – products & services* (visited Jan. 29, 2002) <<http://www.voicestream.com/aim/default.asp>>.

<sup>469</sup> Cingular Wireless, *Wireless Window – Cingular Wireless*, (visited Jan. 29, 2002) <<http://www.mywirelesswindow.com/features>>.

<sup>470</sup> *Palm Delivers Wireless Always-on, AOL Instant Messenger(AIM) Service on New Palm i705 Handheld*, News Release, Palm, Jan. 28, 2002; Patrick Seitz, *Palm Setting Its Sights on Corporate Spending with New i705 Device Lets Users Check Their E-Mail*, INVESTOR’S BUSINESS DAILY, Jan. 29, 2002, at 5.

<sup>471</sup> eCare, E-mail correspondence, Sprint PCS, May 16, 2001.

<sup>472</sup> See Consumer Federation of America, Media Access Project, and Center for Media Education, Applications for Consent to the Transfer of Control of Licenses and Section 214 Authorizations by Time Warner Inc. and America Online, Inc., Transferors, to AOL Time Warner Inc., Transferee, CS Docket No. 00-30, *Petition to Deny*, at 32-33 (filed Apr. 26, 2000); Testimony of Esther Dyson, Chairman, EDventure Holdings, FCC En Banc Hearing, CS Docket No. 00-30 (July 27, 2000); Testimony of Mark Cooper, Director of Research, Consumer Federation of America, FCC En Banc Hearing, CS Docket No. 00-30 (July 27, 2000); Testimony of William F. Reddersen, Executive Vice President, BellSouth Corporation, FCC En Banc Hearing, CS Docket No. 00-30 (July 27, 2000); Testimony of Ross Bagully, CEO, Tribal Voice Inc., FCC En Banc Hearing, CS Docket No. 00-30 (July 27, 2000); Prepared Testimony of Preston R. Padden, Executive Vice President of Government Relations, The Walt Disney Co., at 3, FCC En Banc Hearing, CS Docket No. 00-30 (July 27, 2000).

<sup>473</sup> The wireless carriers offering wireless web service include ALLTEL, AT&T Wireless, Cingular Wireless, Nextel, Sprint PCS, Verizon Wireless, and VoiceStream. As mentioned in the *Sixth Report*, wireless telephone carriers began offering wireless web access in 1999. *Sixth Report*, at 13410.

<sup>474</sup> The terms “wireless web” and “mobile web” are used throughout Section II.B., Mobile Data, to mean mobile Internet access via mobile telephone handsets.

<sup>475</sup> As mentioned in the *Sixth Report*, the technologies and speeds used for wireless web services vary by mobile telephone carrier. As of March 2002, several carriers now offer data services at higher rates on their advanced wireless service networks than the speeds offered on their 2G networks. Verizon Wireless offers an average speed of 40 to 60 kbps on its cdma2000 1xRTT network, while AT&T Wireless, Cingular Wireless, and VoiceStream offer rates of 25 to 56 kbps on GPRS networks installed during 2001 and 2002. For more on network deployment, see Section II.B.2.a, Mobile Data Mobile Telephone Sector, *supra*. Christopher Stern, *High-Speed*

During 2001, mobile telephone providers expanded their data service offerings as they began migrating their networks to higher speed technologies. In addition to offering wireless web service on mobile telephone handsets, several carriers offer wireless Internet connections via wireless modem cards for PDAs and laptop computers as well.

As explained in the *Sixth Report*, mobile telephone service providers offer wireless web services that enable customers to surf web sites for news, stock quotes, traffic reports, weather forecasts, movie listings, shopping, and other text-based information.<sup>476</sup> To deliver wireless web content to wireless handset users, carriers continue to employ the “walled garden” approach, which means all carriers currently restrict the content users can access via wireless handsets on their networks.<sup>477</sup> However, customers who connect to the Internet via a mobile telephone or wireless modem card attached to a laptop are able to access the full content of the web.<sup>478</sup>

Many PDAs have the ability to access almost the entire content of the web. For example, Pocket PC PDAs, which include a PDA version of Microsoft’s Internet Explorer web browser, are able to access any web site designed in HTML or WAP formats.<sup>479</sup> Handspring PDAs and Treo smartphones, as well as certain PalmOS-based devices,<sup>480</sup> can access web content with Handspring’s Blazer browser, which supports web pages written in HTML, cHTML, or WAP.<sup>481</sup> While many PDAs have the potential to access web content with their browsing software, they still require a subscription to a wireless Internet Service Provider (“WISP”) in order to connect to the wireless Internet. WISPs such as EarthLink, Inc. (“EarthLink”) and GoAmerica offer monthly wireless Internet access subscriptions for numerous handhelds, including Pocket PC and PalmOS devices, RIM BlackBerry PDAs, and two-way pagers such as the Motorola Talkabout T900.<sup>482</sup> While RIM’s BlackBerry service focuses on the delivery of e-mail

---

*Wireless Network to Debut*, WASHINGTON POST, Jan. 27, 2002; *VoiceStream Extends GET MORE Value proposition to offer High-Speed Wireless Data Service to Customers Nationwide*, News Release, VoiceStream, Nov. 14, 2001; Katie Hafner, *The Future of Cellphones Is Here. Sort Of.*, NEW YORK TIMES, Feb. 14, 2002.

<sup>476</sup> See *Sixth Report*, at 13408.

<sup>477</sup> See *Sixth Report*, at 13409; *U.S. Wireless Phone Penetration Climbs*, WIRELESS INSIDER, Oct. 1, 2001; Sean Buckley, *Mobile IP: Breaking the on-size-fits-all mentality*, TELECOMMUNICATIONS, Sept. 2001.

<sup>478</sup> A wireless modem card allows full access to the Internet just like a traditional modem. The difference is that a laptop with a wireless modem card will access the Internet via a wireless network, whereas a traditional modem accesses the Internet via a wireline network.

<sup>479</sup> Microsoft, *Pocket Internet Explorer* (visited Mar. 19, 2002) <<http://www.microsoft.com/mobile/pocketpc/software/features/internetexplorer.asp>>. Pocket PC PDAs require the attachment of a wireless modem card in order to access the Internet, and users can choose to access web content in a text-only format. *Id.*

<sup>480</sup> Blazer can be downloaded on PalmOS devices with at least 8 MB of memory running PalmOS version 3.5 or higher. Blazer is not available for Palm i705 and VII devices, which must use the Palm.Net web clipping applications. As mentioned above, Handspring PDAs require the attachment of a mobile phone, a VisorPhone, or a wireless modem card in order to access the wireless Internet. See Section II.B.2.b, Handheld Devices, *supra*.

<sup>481</sup> Handspring, *Handspring Software: Blazer Details* (visited Mar. 19, 2002) <[http://www.handspring.com/software/blazer\\_details.jhtml](http://www.handspring.com/software/blazer_details.jhtml)>.

<sup>482</sup> GoAmerica, *Go.Web Service* (visited Mar. 19, 2002) <<http://www.goamerica.com/goweb/>>; EarthLink, *EarthLink Wireless Services* (visited Mar. 19, 2002) <<http://www.earthlink.net/mobile/>>. On December 7, 2001,

instead of web content, BlackBerry users can access web content while mobile through services offered by third party WISPs such as EarthLink, GoAmerica, Oracle Mobile, and WolfeTech.<sup>483</sup>

Palm i705 and VII users must access the Internet with a monthly subscription to Palm's Palm.Net wireless Internet access service. Palm.Net subscribers do not have access to the entire web, but browse the web with Palm's web clipping applications, which allow users to view text-based information from over 600 web-clipped Internet sites that have been specially designed for Palm.Net.<sup>484</sup>

For wireless web service on 2G networks, most mobile telephone carriers charge an additional monthly fee beyond voice service ranging from \$6 to \$14.<sup>485</sup> In addition, Internet access minutes are deducted from the customer's minutes included in their monthly service plans.<sup>486</sup> If customers exceed their allotted monthly minutes, they must pay per-minute airtime charges for wireless web or voice service.<sup>487</sup>

For wireless web service on advanced wireless networks, users typically receive a bucket of MB to download depending on their plan, and additional MB downloaded beyond the plan limit cost extra. Prices for this type of high-speed data plan vary by provider, since some providers bundle other services with their plans. For example, VoiceStream allows customers to add-on wireless web service to any voice plan for \$2.99 for one MB of data and \$10 per extra MB.<sup>488</sup> Verizon Wireless also allows customers to add-on high-speed wireless web service with unlimited usage for \$30.<sup>489</sup> AT&T Wireless offers two types of rate plans. Customers can add data services to existing voice plans starting at \$29.99

---

EarthLink announced its plans to acquire the assets of OmniSky Corporation as part of OmniSky's Chapter 11 bankruptcy proceedings. As of that time, OmniSky had approximately 32,000 customers. *EarthLink Announces Plans to Purchase OmniSky's Subscriber Base and Key Operational Assets*, News Release, EarthLink, Dec. 7, 2001.

<sup>483</sup> BlackBerry, *Third Party Solutions* (visited Mar. 19, 2002) <<http://www.blackberry.net/products/thirdparty/index.shtml#web>>; EarthLink, *EarthLink Wireless Services* (visited Mar. 19, 2002) <<http://www.earthlink.net/mobile/>>.

<sup>484</sup> See *Sixth Report*, at 13414; Palm, *The Wireless-Ready Web with Web Clipping Applications* (visited Mar. 19, 2002) <<http://www.palm.com/products/palmi705/webclipping.html>>.

<sup>485</sup> See Appendix D, Table 2, at D-5.

<sup>486</sup> Verizon Wireless, *Welcome To Verizon Wireless* (visited Jan. 29, 2002) <[http://www.verizonwireless.com/mobile\\_web\\_plus/index.jsp](http://www.verizonwireless.com/mobile_web_plus/index.jsp)>; Cingular, *My Wireless Window* (visited Jan. 1, 2002) <<http://www.mywirelesswindow.com/pricing>>; Sprint PCS, *Sprint PCS Wireless Sites* (visited Jan. 29, 2002) <[http://www.sprintpcs.com/wireless/wwbrowsing\\_getit.html](http://www.sprintpcs.com/wireless/wwbrowsing_getit.html)>.

<sup>487</sup> In addition to paying monthly service fees and airtime charges, all mobile telephone Internet customers must purchase Internet-ready handsets.

<sup>488</sup> VoiceStream offers wireless web service only via its GPRS data network. *VoiceStream Extends GET MORE Value proposition to offer High-Speed Wireless Data Service to Customers Nationwide*, News Release, VoiceStream, Nov. 14, 2001; VoiceStream, *VoiceStream – products & services* (visited Jan. 29, 2002) <<http://www.voicestream.com/products/services/istream/rateplans.asp>>.

<sup>489</sup> *Verizon Wireless Launches Nation's First Major Advanced Wireless Network: The Verizon Wireless Express Network*, News Release, Verizon Wireless, Jan. 28, 2002.



for 5 MB of downloaded data.<sup>490</sup> The company also offers plans that bundle high-speed wireless web service with voice services. Bundled voice and data plans start at \$39.99 for 250 voice minutes and one MB of downloaded data.<sup>491</sup>

#### d. E-mail and Corporate Server Access

As workers become increasingly more mobile and remote, the ability for employees outside the office to access e-mail messages and files stored electronically on corporate servers is likely to become an increasingly more important mobile data application.<sup>492</sup> Analysts claim that giving employees mobile access to e-mail as well as to data and applications stored on corporate servers are two of the most important uses of PDAs in the enterprise market.<sup>493</sup> One recent survey of U.S. firms that plan to deploy mobile systems for employees found that 83 percent listed mobile access to e-mail as the top priority,<sup>494</sup> and another recent survey of 400 large corporations found that 47 percent are deploying wireless e-mail access.<sup>495</sup>

Different types of mobile e-mail access services are currently available on different devices from various providers. Some mobile carriers and devices allow users to access e-mail messages from a personalized account provided by the carrier, such as `username@carrier.com`. Some mobile e-mail services allow users to access existing web-based, or POP3, e-mail accounts provided by web portals such as Yahoo or MSN.<sup>496</sup> The most advanced mobile e-mail services give users direct access to their existing corporate or office-based e-mail accounts. Some mobile e-mail services are “pushed” or always-on, meaning users will receive their messages whenever their device is turned on, while other e-mail services are “pulled” and require users to dial-up periodically in order to receive their messages.

---

<sup>490</sup> AT&T Wireless offers four plans ranging from \$29.99 to \$99.99 for 5 to 40 MB of downloaded data. AT&T Wireless, *AT&T Wireless GSM™ / GPRS Network – Service Plan* (visited Jan. 29, 2002) <[http://www.attws.com/mobileinternet/equip\\_rateplans.jhtml](http://www.attws.com/mobileinternet/equip_rateplans.jhtml)>.

<sup>491</sup> The bundled voice and data plans offered by AT&T Wireless range from \$39.99 to \$159.99, and all plans include one MB of downloaded data. AT&T Wireless, *AT&T Wireless GSM™ / GPRS Network – Service Plan* (visited Jan. 29, 2002) <[http://www.attws.com/mobileinternet/equip\\_rateplans.jhtml](http://www.attws.com/mobileinternet/equip_rateplans.jhtml)>.

<sup>492</sup> One analyst expects the number of mobile and remote workers to increase by nearly 20 percent by 2004 to 55 million, up from 46 million currently. *Palm i705 Handheld Debuts: Only Secure, Integrated Wireless, Email Solution with Web Access*, News Release, Palm, Jan. 28, 2002 (citing IDC, “U.S. Mobile and Remote Worker Market Forecast and Analysis 1999-2004,” doc. 23020).

<sup>493</sup> *Patrick Seitz, Palm Setting Its Sights on Corporate Spending with New i705 Device Lets Users Check Their E-Mail*, INVESTOR’S BUSINESS DAILY, Jan. 29, 2002, at 5.

<sup>494</sup> *Palm i705 Handheld Debuts: Only Secure, Integrated Wireless, Email Solution with Web Access*, News Release, Palm, Jan. 28, 2002 (citing Jupiter Media Metrix, “Jupiter Metrics: Wireless Infrastructure,” 2Q 2001 [September]).

<sup>495</sup> Sue Marek, *Java Will Drive Data Adoption*, WIRELESS WEEK, Mar. 18, 2002, at 1, 8 (citing a survey by Evans Data Group).

<sup>496</sup> POP3 (Post Office Protocol 3) e-mail servers attached to the Internet are independent of the transport mechanism used to access them. Therefore, POP3 e-mail account subscribers can access their e-mail messages from any Internet connection anywhere in the world. See Harry Newton, *NEWTON’S TELECOM DICTIONARY: 16<sup>TH</sup> EXPANDED & UPDATED EDITION*, CMP Books, July 2000, at 692.

The pioneer provider of mobile access to corporate e-mail accounts has been RIM with its BlackBerry service. BlackBerry allows users to receive pushed e-mail messages automatically from an existing corporate e-mail account on one of RIM's mobile devices. About 289,000 people in North America have subscribed to BlackBerry service since 1999,<sup>497</sup> and more than 13,000 North American organizations have integrated BlackBerry into their office e-mail systems.<sup>498</sup>

While the e-mail services available from mobile telephone carriers on mobile telephone handsets vary, most carriers offer the ability to send and receive messages from a personalized carrier account and from a POP3 account. For example, AT&T Wireless offers its voice subscribers e-mail access with its PocketNet Plus plan for an additional \$6.99 per month beyond voice service.<sup>499</sup> E-mail subscribers receive a personalized AT&T Wireless PocketNet account and can access existing Yahoo, AOL, or AT&T WorldNet e-mail accounts.<sup>500</sup> They can send, receive, and forward messages and Microsoft Word or text document attachments.<sup>501</sup> VoiceStream's newly-introduced iStream WirelessInbox service allows customers to access their corporate Microsoft Outlook or Lotus Notes-based e-mail accounts, as well as POP3 e-mail accounts.<sup>502</sup> Users can send, receive, reply to, delete, and forward messages.<sup>503</sup> The service can be accessed from a Motorola P280 GPRS handset, a Pocket PC PDA, or a laptop computer (using either the P280 handset or the G100 wireless modem card for a connection).<sup>504</sup>

The Palm i705 allows users to receive pushed e-mail messages from up to eight different accounts,

---

<sup>497</sup> Vanessa Hua, *Palm Rides Wireless Wave*, SAN FRANCISCO CHRONICLE, Jan. 28, 2001, at E1.

Approximately 54 percent of RIM's fiscal year 2001 (ended Feb. 28, 2002) revenue of \$221 million was derived from its Blackberry service. Research in Motion, 2001 Annual Report, at 15.

<sup>498</sup> *Nextel, RIM and Motorola Agree to Purchase Voice-enabled Handheld*, News Release, Nextel and RIM, Jan. 24, 2002.

<sup>499</sup> AT&T Wireless, *PocketNet Service* (visited Mar. 4, 2002) <<http://www.attws.com/personal/pocketnet/>>.

<sup>500</sup> *Id.*

<sup>501</sup> *Id.*

<sup>502</sup> VoiceStream, *WirelessInbox – "Your" E-mail on Your Phone* (visited Mar. 4, 2002) <<http://www.voicestream.com/products/services/istream/wirelessinbox.asp>>; VoiceStream, *Introducing the iStream Wireless Data Network* (visited Mar. 4, 2002) <<http://www.voicestream.com/products/services/istream/overview.asp>>.

<sup>503</sup> VoiceStream, *WirelessInbox – "Your" E-mail on Your Phone* (visited Mar. 4, 2002) <<http://www.voicestream.com/products/services/istream/wirelessinbox.asp>>.

<sup>504</sup> VoiceStream, *iStream Service Plans* (visited Mar. 4, 2002) <<http://www.voicestream.com/products/services/istream/rateplan.asp>>. Telephone handset users of iStream can download one MB of data per month for \$2.99 with additional MBs costing \$10 per MB. VoiceStream, *iStream Service Plans* (visited Mar. 4, 2002) <<http://www.voicestream.com/products/services/istream/rateplan.asp>>. iStream PDA customers can download 5 MB of data for \$19.99 per month while laptop customers can download 10 MB of data for \$39.99 per month. VoiceStream, *iStream Service Plans* (visited Mar. 4, 2002) <<http://www.voicestream.com/products/services/istream/rateplan.asp>>. Additional MB cost \$5 per MB for the PDA service and \$4 per MB for the laptop service. *Id.* User's downloaded data can consist of e-mail messages or web pages or a combination of the two. *Id.*

including a Microsoft Outlook-based corporate e-mail account, a Palm.net account, an EarthLink account, and POP3 accounts such as Yahoo.<sup>505</sup> Unlimited Internet access, including access to e-mail, the web, and IM, costs \$39.99 per month, or \$34.99 per month with a one-year commitment.<sup>506</sup> The device vibrates or flashes when new messages arrive.<sup>507</sup>

In addition to offering the ability to access corporate e-mail accounts, some mobile data providers offer a related service, the ability to access electronic files stored on a corporate server from a mobile device. Microsoft became a leading facilitator of this service with the release of its Pocket PC 2002 operating system in October 2001 and its Pocket PC 2002 Phone Edition smartphone operating system in February 2002.<sup>508</sup> Both operating system editions allow users of Pocket PC 2002 devices to establish a secure virtual private network (“VPN”) connection over the wireless Internet to retrieve e-mail messages and files that are stored on corporate servers.<sup>509</sup>

Many mobile data companies offer customized mobile access products directly to business customers. For example, GoAmerica sells a service to enterprise customers called Mobile Office that allows their employees to access proprietary corporate data applications with wireless-enabled PDAs, including the Palm i705.<sup>510</sup> In January 2002, Arch Wireless began offering its Enterprise Solution product to businesses. The product can reportedly give a business’s mobile workforce secure, real-time access to firewall-protected files, e-mail, calendar functions, and enterprise applications on a variety of wireless devices.<sup>511</sup>

#### e. Location-Based Services

The Commission’s Enhanced 911 rules (“E911”) provide that starting on October 1, 2001, wireless carriers were required to begin a phase-in of automatic location identification (“ALI”) for 911 calls upon

---

<sup>505</sup> Palm, *Wireless Email with the Palm i705 Handheld* (visited Feb. 20, 2002) <<http://www.palm.com/products/palmi705/email.html>>.

<sup>506</sup> *Palm i705 Handheld Debuts: Only Secure, Integrated Wireless, Email Solution with Web Access*, News Release, Palm, Jan. 28, 2002.

<sup>507</sup> Patrick Seitz, *Palm Setting Its Sights on Corporate Spending with New i705 Device Lets Users Check Their E-Mail*, INVESTOR’S BUSINESS DAILY, Jan. 29, 2002, at 5.

<sup>508</sup> Jon Fortt, *Microsoft Takes Another Shot at Palm with New Handheld OS*, SAN JOSE MERCURY NEWS, Oct. 3, 2001.

<sup>509</sup> Tish Williams, *Comparing the Pocket PC with the Palm*, THESTREET.COM, Nov. 8, 2001; *Pocket PC Launch Byting the Palm*, LOS ANGELES TIMES, Oct. 18, 2001, at T2; *Microsoft Rings in Pocket PC Phone Edition*, News Release, Microsoft, Feb. 19, 2002. The security features of the VPN connection allowed with Pocket PC 2002 devices include password support with encryption, Windows 2000 password rules, and an “active period” after which a user’s authentication ends. Marge Brown and Bruce Brown, *Microsoft Takes on Palm – Again*, PC MAGAZINE, Nov. 6, 2001, at 41.

<sup>510</sup> *GoAmerica to Support Palm i705 Enterprise Solution*, News Release, GoAmerica, Jan. 29, 2002.

<sup>511</sup> *Arch Wireless Launches Wireless Enterprise Solution Nationwide*, News Release, Arch Wireless, Jan. 29, 2002.

request by public safety answering points (“PSAPs”).<sup>512</sup> Carriers have announced plans for complying with these requirements, called E911 Phase II, but generally at later dates than set by the rules.<sup>513</sup> The Commission has granted waivers allowing delays in initial deployment by the major national wireless carriers, while setting more specific, detailed deployment benchmarks than in the original rules and continuing to target complete deployment by the end of 2005.<sup>514</sup> Similar waiver requests from smaller carriers are under consideration.<sup>515</sup> In addition, several matters concerning compliance with the E911 Phase II requirements have been investigated by the Enforcement Bureau.<sup>516</sup>

Wireless carriers may comply with the ALI requirement using any of several location technologies, or combinations of technologies.<sup>517</sup> For example, carriers may employ network-based or handset-based technologies, or hybrid technologies that require upgrades to both handsets and carrier networks. Currently, wireless carriers plan to deploy three primary location technologies, depending upon the carrier’s air interface technology. Nationwide CDMA carriers Sprint PCS and Verizon Wireless and iDEN carrier Nextel plan to employ Assisted GPS (“A-GPS”), a hybrid technology that requires handsets upgraded to include Global Positioning System (“GPS”) location capability and assistance from network components.<sup>518</sup> For their GSM networks, AT&T Wireless, Cingular Wireless, and VoiceStream are planning to deploy a hybrid technology called Enhanced Observed Time Difference of Arrival (“E-OTD”) that requires handsets with E-OTD software plus added network equipment and upgrades to

---

<sup>512</sup> Under Phase II E911 rules, wireless carriers offering cellular-type voice service must provide a PSAP the telephone number of the wireless caller and a precise measurement of the location of the caller, by latitude and longitude. 47 C.F.R. § 20.18(e).

<sup>513</sup> See FCC, *Phase II Automated Location Identification Reports* <<http://www.fcc.gov/911/enhanced>>.

<sup>514</sup> Revision of the Commission’s Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems, *Fourth Memorandum Opinion and Order*, 15 FCC Rcd 17442 (2000). The Commission also granted individual waivers to five national wireless carriers in a series of orders released in October 2001. See, e.g., Revision of the Commission’s Rules To Ensure Compatibility with Enhanced 911 Emergency Calling Systems Request for Waiver by AT&T Wireless Services, Inc., *Order*, 16 FCC Rcd 18253 (2001). For more information regarding the Commission’s wireless 911 rules and orders, see <<http://www.fcc.gov/911/enhanced>>.

<sup>515</sup> Commission Establishes Schedule for E911 Phase II Requests by Small and Mid-Sized Wireless Carriers, *Public Notice*, FCC 01-302 (rel. Oct. 12, 2001).

<sup>516</sup> See, e.g., Cingular Wireless, LLC, *Order*, FCC 02-132 (rel. May 9, 2002); AT&T Wireless Services, Inc., *Notice of Apparent Liability for Forfeiture*, FCC 02-142 (rel. May 20, 2002).

<sup>517</sup> 7 C.F.R. § 20.18(e), (f). See OET Bulletin No. 71, Guidelines for Testing and Verifying the Accuracy of Wireless E911 Location Systems, Apr. 12, 2000.

<sup>518</sup> Sprint PCS First Quarterly E911 Implementation Report at 9-12, filed Feb. 1, 2002; Verizon E911 Status Report at 1, filed Feb. 1, 2002; Nextel Communications, Inc. Phase II E911 Quarterly Report at 2-5, filed Feb. 1, 2002.

network software.<sup>519</sup> In addition, some carriers are deploying network-based technologies.<sup>520</sup> These network-based ALI solutions do not require changes to handsets. For its TDMA networks, Cingular has indicated that it will deploy a network-based solution and has entered a consent decree with the Commission whereby it will deploy its E911 solution in accordance with specific benchmarks.<sup>521</sup> AT&T Wireless is currently in consent decree negotiations with the Enforcement Bureau relating to a similar issue.

Phase II E911 deployment began in the fall of 2001 in the state of Rhode Island and in individual counties in Illinois and Indiana. Sprint PCS began distributing ALI-capable handsets in October 2001, and reports that, as of the end of 2001, it had sold over 120,000 handsets with A-GPS capability.<sup>522</sup> Verizon Wireless began selling similar A-GPS handsets in December 2001.<sup>523</sup> Sprint PCS has committed to selling 100 percent A-GPS handsets by the end of this year.<sup>524</sup> Verizon Wireless has committed to selling 50 percent of its handsets with A-GPS capabilities beginning in the second quarter of 2003, ramping up to 100 percent by the end of that year.<sup>525</sup> The three largest carriers using GSM have committed to begin selling EOTD handsets this fall and plan to have 100 percent of their new handsets be EOTD capable by the summer of 2003.<sup>526</sup>

In addition to E911, ALI can be used for a variety of other location-based services such as driving directions, mobile yellow pages, and the location of retailers, restaurants, or movie theaters. Application service providers are currently developing software that will enable a range of location-based services and can be tailored to a customer's needs based upon their location. For example, AirFlash, Inc. is an application service provider that develops software that plots the location of businesses, hotels and restaurants. The software also allows the user to share the information with others via e-mail.<sup>527</sup>

Carriers' abilities to obtain and transmit precise location information in fulfillment of the Commission's E911 rules trigger privacy considerations. In 1999, Congress adopted the Wireless Communications and

---

<sup>519</sup> VoiceStream Wireless Corporation April 2002 Semi-Annual Report on E911 Phase II Implementation Plan at 13-15, filed Apr. 1, 2002; AT&T Wireless Services, Inc. Quarterly Report at 1-3, filed Feb. 1, 2002; Cingular Wireless LLC First Quarterly E911 Implementation Report at 1-2, filed Feb. 1, 2002.

<sup>520</sup> See, e.g., Verizon Enhanced 911 Status Report at 3-4, filed Feb. 1, 2002 (regarding completed network deployments in St. Clair County, IL and Lake County, IN, and planned deployments in Chicago and Cook County, IL; St. Louis County, MO; and Harris County, TX)

<sup>521</sup> See Cingular Wireless, LLC, FCC 02-132 (released May 9, 2002).

<sup>522</sup> Sprint First Quarterly E911 Implementation Report at 12-13, filed Feb. 1, 2002.

<sup>523</sup> Verizon Enhanced 911 Status Report at 1, filed Feb. 1, 2002.

<sup>524</sup> Sprint Second Quarterly E911 Implementation Report at 14, filed April 29, 2002.

<sup>525</sup> Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems Request for Waiver by Verizon, *Order*, 16 FCC Rcd 18364 (2001).

<sup>526</sup> See, e.g., VoiceStream Wireless Corporation April 2002 Semi-Annual Report on E911 Phase II Implementation Plan at 25, filed Apr. 1, 2002.

<sup>527</sup> See, e.g., *Zagat Survey And Airflash Partner To Serve Up Localized Restaurant Finder And Reviews To Wireless Users On-The-Go*, News Release, AirFlash, May 8, 2001.

Public Safety Act (“911 Act”) to encourage the use of wireless services and to promote public safety by providing protection to users’ location information and specifying the conditions for the release of such information. Specifically, Section 5 of the 911 Act amended Section 222 of the Communications Act that governs carriers’ use or disclosure of customer proprietary network information (“CPNI”). Under the 911 Act, the disclosure or use of wireless location information without the express prior authorization of the customer is restricted, except in specified emergency situations to respond to a wireless user’s emergency call or in the transmission of automatic crash data.

In September 2000, Ericsson, Motorola, and Nokia founded the Location Interoperability Forum, whose purpose is to define, develop, and promote a common and ubiquitous location services solution.<sup>528</sup> The Forum announced a draft protocol in December 2001 to define a common interface for the exchange of location information between location-based applications and the wireless networks. This proposed standard is intended to promote rapid introduction of location-based services worldwide.<sup>529</sup> Companies have also entered into a number of partnerships to develop location-based services. For example, MapInfo, Inc. and Siemens have partnered to enable wireless carriers to deliver personalized Internet services based on a customer’s current or intended location.<sup>530</sup>

#### f. Short Range Data Transmissions

While these services are not CMRS and hence are beyond the scope of this report, we mention them here briefly because of their increasing presence in the wireless data market. Short-range data transmission is device-to-device communication over short distances, typically via unlicensed spectrum.<sup>531</sup> The three main short-range data transmission technologies are infrared, Bluetooth, and Wireless Fidelity (“WiFi”). Infrared, a well-established technology, is currently used in some PDAs to allow users to transfer data between two devices. Infrared is also the technology commonly used in remote controls and requires line-of-sight transmission. Bluetooth enables multipoint, broadcasting applications, and WiFi enables devices to connect to wireless local area networks (“WLAN”).

*Bluetooth.* Bluetooth is a technology used to establish wireless connectivity between electronic devices that are up to 10 meters apart.<sup>532</sup> Bluetooth allows users to send signals and transfer data among numerous electronic devices, thus creating a personal area network (“PAN”).<sup>533</sup> Bluetooth uses

---

<sup>528</sup> *SignalSoft Becomes First Member of Location Interoperability Forum*, News Release, SignalSoft Corp., Oct. 15, 2000.

<sup>529</sup> *Location Interoperability Forum Launches Draft Mobile Location Protocol Specifications for Public Comments*, News Release, Location Interoperability Forum, Dec. 3, 2001.

<sup>530</sup> *MapInfo in Cooperation with Siemens IC Mobile Makes Mobile Location Services a Reality as Wireless Becomes a Way of Life*, News Release, MapInfo, Mar. 15, 2002.

<sup>531</sup> Unlicensed spectrum is also used to provide fixed wireless high-speed Internet access to home and businesses in neighborhoods and communities across the United States. See Appendix A, *infra*, for a discussion of fixed wireless services.

<sup>532</sup> The name Bluetooth comes from the Danish King Harald Blatand II who peacefully unified Denmark and Norway. Doug Bedell, *The Cutting Edge Cuts Loose*, DALLAS MORNING NEWS, Jan. 10, 2002; Lynn Greiner, *Products Looking For A Home*, COMPUTER DEALER NEWS, Dec. 14, 2001.

<sup>533</sup> PAN is a term used to describe the network that is created when wireless devices are connected in a small office or home environment. Motorola, *Motorola Bluetooth, Personal Area Networks* (visited Feb. 20, 2002)

unlicensed spectrum in the 2.4 GHz band and transmits data at speeds close to one Mbps. Bluetooth also uses frequency hopping spread spectrum techniques to provide enhanced communications performance and an initial level of transmission security.<sup>534</sup>

As mentioned in the *Fifth Report*, Bluetooth is widely backed by major players in the wireless industry, including Ericsson, Intel Corp., International Business Machines Corp. (“IBM”), Nokia, Toshiba, 3Com Corp., Lucent, Microsoft, and Motorola.<sup>535</sup> As a result of industry cooperation, analysts forecast a large market for Bluetooth products. For example, Frost & Sullivan estimates there will be more than one billion Bluetooth-enabled devices shipped by 2007, generating \$318 billion.<sup>536</sup> Cahners In-Stat Group predicts that 780 million chip-set units will be shipped in 2005.<sup>537</sup>

*WiFi*. Another wireless networking technology sharing the 2.4 GHz frequency band with Bluetooth is the Institute of Electrical and Electronics Engineers (“IEEE”)<sup>538</sup> 802.11b standard, also called WiFi. The 802.11b standard is used to connect devices to WLANs, and allows a maximum throughput of 11 Mbps.<sup>539</sup> Analysts have made several predictions about the growth of the WLAN market and WiFi. Frost & Sullivan predicts that WLAN industry revenues will reach \$884 million by 2002, compared to \$415 million in revenues forecast in 1999.<sup>540</sup> The Dell’Oro Group expects the WiFi market to grow by 35 percent in 2002.<sup>541</sup> Gartner Group estimates 95 percent of notebook computers will be 802.11b-enabled

---

<<http://www.motorola.com/bluetooth/pan/pan.html>>; all talking.com, *What is a Personal Area Network* (visited Feb. 20, 2002) <<http://www.alltalking.com/apps/pan.htm>>; Wikipedia, *Personal area network: encyclopedia article from Wikipedia* (visited Feb. 20, 2002) <[http://www.wikipedia.com/wiki/Personal\\_area\\_network](http://www.wikipedia.com/wiki/Personal_area_network)>.

<sup>534</sup> The Bluetooth standard calls for frequency hopping, spread-spectrum techniques that make 1,600 hops per second among different frequencies within the 2.4 GHz ISM band. Bluetooth, *Bluetooth Wireless, FAQ, Technical Information* (visited Feb. 20, 2002) <<http://www.bluetooth.com/util/faq4.asp>>.

<sup>535</sup> See *Fifth Report*, at 17706. Bluetooth has been under development since 1994 when Ericsson began conducting a feasibility study. In 1998, the Bluetooth Special Interest Group (SIG) was formed. The group, which promotes the Bluetooth standard, has over 2,000 adopter companies.

<sup>536</sup> Frost & Sullivan, *Bluetooth Vision On The Verge Of Reality As First Products Hit Mass Market*, M2 PRESSWIRE, Nov. 7, 2001; Lynn Greiner, *Products Looking For A Home*, COMPUTER DEALER NEWS, Dec. 14, 2001.

<sup>537</sup> *Cahners In-Stat Group Says Bluetooth Chips Kick Butt*, BUSINESS WIRE, Dec. 5, 2001.

<sup>538</sup> IEEE is a technical society that sponsors conferences, publishes technical papers, and provides a forum for the development of standards. IEEE standards include those for computers and telecommunications, specifically standards used for LANs such as 802.11b. Harry Newton, *NEWTON’S TELECOM DICTIONARY: 16<sup>TH</sup> EXPANDED & UPDATED EDITION*, CMP Books, July 2000, at 439.

<sup>539</sup> J. William Gurley, *The next big thing? Try 802.11b*, CNET.COM, Feb. 19, 2001; Curtis Franklin, *Cut The Cord*, INTERNETWEEK, Mar. 12, 2001, available in 2001 WL 8007251; Terry Sweeney, *802.11B: One Standard Worth Waiting For*, TECHWEBUK.COM, Nov. 16, 2000.

<sup>540</sup> Wireless Ethernet Compatibility Alliance, *Wi-Fi Value and the Benefit of Standards* (visited Feb. 21, 2002) <<http://www.wi-fi.org/benefitsfaq.asp>>.

<sup>541</sup> Greg Tally, *Back to Basics: Last Mile Broadband Trends for 2002 and how they affect your Business*, BOARDWATCH MAGAZINE, Feb. 2002.

by 2005.<sup>542</sup>

The technology is being used in a number of WLAN settings, such as college campuses, business parks, office buildings, and even private houses. It is also being implemented by a number of vendors in public places such as airports, hotels and Starbucks stores to give users of WiFi-enabled notebook computers, handheld devices, and smartphones wireless Internet access anywhere inside those locations.<sup>543</sup> For example, Wayport, a broadband service provider, has installed WiFi networks in nine airports, 3,500 hotel conference rooms, and 800 other WiFi access points or “hot spots.”<sup>544</sup> In September 2001, Wayport signed an agreement with IPass, a global provider of network access to ISPs, to provide IPass subscribers Internet access via Wayport’s WiFi networks in airports and hotels around the U.S.<sup>545</sup>

Boingo Wireless (“Boingo”), a WiFi service provider, also offers wireless broadband Internet access in popular venues such as major hotels, airports, and coffee shops across the nation.<sup>546</sup> Boingo integrates WiFi hot spots from various providers to deliver broadband Internet service to its customers.<sup>547</sup> As of May 2002, Boingo had was offering WiFi broadband Internet access in nearly 600 hot spots across the United States.<sup>548</sup> The company plans to be connected to over 2,000 hot spots by the end of 2002.<sup>549</sup>

On May 11, 2001, the Commission amended Part 15 of its rules for spread spectrum devices and proposed the following changes to systems operating in the 2.4 GHz band: revise rules for frequency hopping spread spectrum systems; eliminate the processing gain requirement for direct sequence spread spectrum systems; and allow digital transmission technologies to operate pursuant to the same rules as spread spectrum systems.<sup>550</sup>

---

<sup>542</sup> J. William Gurley, *The Next Big Thing? Try 802.11b*, CNET.COM, Feb. 19, 2001.

<sup>543</sup> John C. Dvorak, *Wireless Whale*, FORBES, Mar. 5, 2001, available in 2001 WL 2184050; *Michael Dell Puts Wireless in Focus; Sees Standards, Notebooks as Easy Way for Customers to be Connected*, BUSINESS WIRE, Mar. 20, 2001. In January 2001, Starbucks announced it would begin installing MobileStar Network’s (now owned by VoiceStream) wireless broadband network in stores, allowing customers with 802.11b-enabled notebook computers, handheld devices, and smartphones to access broadband content and services in Starbucks stores. *Starbucks and Microsoft Blend Coffee Retailer’s Expertise With Technology Leader’s Software and Services to Deliver Wireless Cof*, News Release, Starbucks, Jan. 3, 2001.

<sup>544</sup> Paul Wuh *et al.*, *Telecom Service: Wireless Communication; Why Wireless Carriers Should Care about Wi-Fi*, Global Equity Research, Goldman Sachs, May 3, 2002, at 14.

<sup>545</sup> Steve Gold, *Wi-Fi Access Coming To More Than 400 Airports, Hotels*, NEWSBYTES, Sept. 27, 2001.

<sup>546</sup> Boingo Wireless, *Boingo Wireless – Market Overview* (visited May 22, 2002) <<http://www.boingo.com/marketoverview.html>>.

<sup>547</sup> *Id.*

<sup>548</sup> Paul Wuh *et al.*, *Telecom Service: Wireless Communication; Why Wireless Carriers Should Care about Wi-Fi*, Global Equity Research, Goldman Sachs, May 3, 2002, at 12.

<sup>549</sup> *Id.*

<sup>550</sup> Amendment of Part 15 of the Commission’s Rules Regarding Spread Spectrum Devices and Wi-LAN, Inc. Application for Certification of an Intentional Radiator Under Part 15 of The Commission’s Rules, *Further Notice of Proposed Rulemaking And Order*, 16 FCC Rcd 10036 (2001).



#### 4. Telemetry and Telematics

Telemetry and telematics both involve the use of wireless technology to transfer data between systems and devices. Wireless telemetry is the monitoring of mobile or fixed equipment in a remote location. The most common example of wireless telemetry is the remote monitoring of utility meters by utility and energy companies, called automatic meter reading (“AMR”). With telematics systems, a person in a remote location can access information using various wireless technologies. Telematics is most often used to describe vehicle navigation systems, such as OnStar, where drivers and passengers employ GPS technology to obtain directions, track their location, and obtain assistance when a vehicle is in an accident.<sup>551</sup>

Location-based services first appeared in vehicles as navigational devices using GPS technology to determine the vehicle’s location.<sup>552</sup> However, OnStar, a wholly owned subsidiary of General Motors, Inc. (“GM”) formed in 1996, employs both GPS technology and terrestrial wireless networks. The basic, original OnStar service connects drivers to a live OnStar operator who pinpoints the location of the vehicle and provides verbal driving directions.<sup>553</sup> OnStar also offers a variety of other in-vehicle communication and location-based, telematics services, including remote access to a vehicle’s horn, door locks, and headlights; automatic alerting of public safety officials if an airbag is deployed; roadside assistance; mobile telephone service; and e-mail and Internet access.<sup>554</sup> As of January 2002, OnStar was available in 36 vehicle models and had more than 2 million subscribers.<sup>555</sup>

As mentioned above, wireless telemetry systems are used mainly for AMR, but can also be used to monitor a variety of other fixed and mobile machines, including health care equipment, HVAC systems,

---

<sup>551</sup> See Section II.B.3.e, Location-Based Services, *supra*.

<sup>552</sup> Many of these devices use a small screen and an extensive database contained on DVD or CD-ROM to display maps and directions. The DVD- and CD-ROM-dependent devices are available for about \$2,000, including installation. Bill Howard, *The Right Direction; using GPS systems*, PC MAGAZINE, Feb. 12, 2002; Jill Amadio, *The Thinker: Watch Out! Your Car May Be Getting Smarter Than You; Wheels; Lexus Link Navigational System*, ENTREPRENEUR, Feb. 1, 2002; Micheline Maynard, *Personal Business; Navigation Aids: No Longer Just for Luxury Cars*, NEW YORK TIMES, Jan. 27, 2002.

<sup>553</sup> Steve Ditlea, *Wheels Online*, MC TECHNOLOGY MARKETING INTELLIGENCE, March 1, 2001, available in 2001 WL 15717085.

<sup>554</sup> There are three OnStar service plans: Safe & Sound, Directions & Connections, and Luxury & Leisure. The Safe & Sound plan offers live connection to an OnStar operator, remote access to the vehicle’s horn, door locks and headlights, and contact with public safety officials if the airbag deploys. This plan costs \$16.95 per month or \$199 per year. In addition to the basic service, the Directions & Connections plan offers directions as well as information services such as finding hotels, ATMs, restaurants, and service stations. This plan costs \$34.95 per month or \$399 per year. The Luxury & Leisure plan adds one premium service to the Directions & Connections plan, Personal Concierge Service. Subscribers to this plan may obtain tickets, purchase gifts, and receive other assistance through a live OnStar concierge operator. This plan costs \$69.95 per month or \$799 per year. OnStar, *What is OnStar: Frequently Asked Questions* (visited Mar. 13, 2002) <[http://www.onstar.com/visitors/html/ao\\_faq.htm](http://www.onstar.com/visitors/html/ao_faq.htm)>; OnStar, *What is OnStar: Services* (visited Mar. 13, 2002) <[http://www.onstar.com/visitors/html/ao\\_features.htm](http://www.onstar.com/visitors/html/ao_features.htm)>.

<sup>555</sup> The number of subscribers includes the owners of GM models who receive the service free for one year whether they use it or not.

gas and oil pipelines, vending machines, alarm systems, parking meters, streetlights, smoke/fire detectors, factory process systems, and photocopiers. Businesses and consumers can also employ wireless telemetry systems to remotely monitor the location and status of vehicles. A few examples of this include LoJack, corporate fleet tracking, and remote engine diagnostic systems. LoJack is a system used to recover stolen vehicles. Consumers can purchase the LoJack VHF transponder unit for their vehicles, and the LoJack Corporation and law enforcement agencies maintain the system used to track the location of vehicles in the case that they are stolen.<sup>556</sup> Over 40,000 stolen vehicles equipped with LoJack have been recovered by U.S. law enforcement agencies.<sup>557</sup>

The two major AMR providers are Itron, Inc. (“Itron”) and Schlumberger Resource Management Services, Inc. (“Schlumberger”).<sup>558</sup> Itron focuses exclusively on providing AMR telemetry equipment and is the largest provider in that market. As of the end of 2001, Itron had connected 17.6 million AMR units for 625 utility companies in North America.<sup>559</sup> As of the end of 2000, Schlumberger had connected over 5 million consumers to its CellNet wireless telemetry network.<sup>560</sup>

Many mobile data providers discussed above, including WebLink, SkyTel, Motient, and Cingular, offer a variety of telemetry services, either directly to end users or through other telemetry providers who create and maintain telemetry computer systems for end users but rely on the networks of mobile data providers.<sup>561</sup> As mentioned in the *Sixth Report*, many analysts and industry players believe that the telemetry market could represent a significant business opportunity for paging/messaging carriers.<sup>562</sup> In addition, Aeris.net (“Aeris”) and NumereX Corp. lease capacity on mobile telephone networks to offer telemetry products. Aeris sells the use of its network to other telemetry service providers.<sup>563</sup>

---

<sup>556</sup> LoJack Corporation, SEC Form 10-K/A, Mar. 13, 2000.

<sup>557</sup> LoJack Corporation, *Company Overview* (visited Apr. 29, 2002) <<http://www.lojack.com/about/index.htm>>.

<sup>558</sup> See Appendix D, Table 4, at D-9 for an overview of their services.

<sup>559</sup> Itron, Inc., SEC Form 10-K/A, Mar. 1, 2002, at 4.

<sup>560</sup> See *Sixth Report*, at 13430. Schlumberger no longer reports results on its telemetry business unit.

<sup>561</sup> See Appendix D, Table 4, at D-9 for the details on the services offered by these carriers.

<sup>562</sup> See *Fifth Report*, at 17727.

<sup>563</sup> See Appendix D, Table 4, at D-9.

### III. CONCLUSION

The past year has continued the positive trends of increased competition in the CMRS industry described in previous reports. In 2001, the mobile telephone sector experienced another year of impressive subscriber growth, increased usage, and declining prices. As of December 2001, the Commission estimates that the sector had 128.5 million subscribers, which translates into a nationwide penetration rate of roughly 45 percent.<sup>564</sup> Other key metrics also demonstrate the increased demand for and reliance placed on mobile services. During 2001, MOUs and ARPU increased, while, according to BLS, the price of mobile telephone service fell by 5.5 percent.<sup>565</sup>

Digital technology is now dominant, with 97 percent of the total U.S. population living in counties where operators offer digital mobile telephone service, and 80 percent of all mobile telephone subscribers using digital phones at the end of 2001.<sup>566</sup>

Mobile telephony providers continued to expand their nationwide footprints and buildout their networks.<sup>567</sup> To date, 268 million people, or 94 percent of the total U.S. population, have three or more different operators offering mobile telephone service in the counties in which they live. Over 229 million people, or 80 percent of the U.S. population, live in counties with five or more mobile telephone operators competing to offer service. And 151 million people, or over 53 percent of the population, can choose from among six or more different mobile telephone operators.

In addition, while few wireless customers have “cut the cord” in the sense of canceling their subscription to wireline telephone service, there is growing evidence that consumers are substituting wireless service for traditional wireline communications.<sup>568</sup> According to one poll, almost one in five mobile telephony subscribers regard their wireless phone as their primary phone.

Competition continues to be an integral force in shaping the mobile data sector. A multitude of dynamic mobile data services, service packages, and pricing plans are available to consumers from a variety of providers, including mobile telephone carriers, paging carriers, and handheld device providers. Analysts estimate there were approximately 8 to 10 million mobile Internet users at the end of 2001, up from 2 to 2.5 million at the end of 2000.<sup>569</sup> Furthermore, as of March 2002, four nationwide mobile telephone operators were offering mobile Internet access services for mobile telephone handsets, PDAs, and/or laptops at speeds generally ranging from 25 to 60 kbps,<sup>570</sup> with maximum bursting rates up to 144 kbps for at least one carrier. These advanced wireless services using GPRS and 1xRTT networks were

---

<sup>564</sup> See Section II.A.1.b(i), Subscriber Growth, *supra*.

<sup>565</sup> See Section II.A.1.b Market Performance, and Section II.A.1.d, Pricing Data and Trends, *supra*.

<sup>566</sup> See Section II.A.1.c, Digital Deployment, *supra*.

<sup>567</sup> See Section II.A.1.b(vi), Market Entry, *supra*.

<sup>568</sup> See Section II.A.1.e, Wireless/Wireline Competition, *supra*.

<sup>569</sup> See note 367, *supra*.

<sup>570</sup> See Section II.B.2.a, Mobile Data Mobile Telephone Sector, *supra*.

available in at least some portion of U.S. counties covering approximately 181 million people.<sup>571</sup> Paging carriers have continued to compete in the mobile data sector by upgrading their networks and offering a variety of advanced, two-way messaging services.<sup>572</sup> Furthermore, nearly all of the estimated 6.6 million PDAs sold during 2001 offered users some method of connecting to the Internet while mobile.<sup>573</sup> Mobile data providers offer their customers a variety of services, including messaging, Web content, and e-mail access, and these services have become increasingly similar across devices during the past year.<sup>574</sup>

The GPRS and 1xRTT deployments by mobile telephone carriers have contributed to the further convergence of voice and data services. During the past year, the distinction between mobile telephones, which have traditionally been voice-centric devices, and PDAs, which were primarily data-centric devices, began to blur with the emergence of smartphones. As discussed above, several major mobile data providers have released smartphone devices that combine the organizational and data-centric features of PDAs with the voice capabilities of mobile telephones.<sup>575</sup> The industry is likely to witness an even greater level of voice and data convergence as mobile data providers make their planned deployments of further network upgrades over the next few years.<sup>576</sup>

As evidenced by this year's forum and report, the Commission is always interested in improving the quality and quantity of the data contained in this Report. To that end, for next year's report, for the first time, the Commission will issue a Notice of Inquiry to solicit additional data from the public. In doing so, our goal is to provide the most complete picture possible of the state of CMRS competition. In particular, we hope to build on the new data in this year's report on the state of competition in rural areas to provide a fuller picture of the state of competition throughout the United States. We encourage the public to participate fully in this process to ensure the best information available for our Report to Congress.

---

<sup>571</sup> See Section II.B.2.a, Mobile Data Mobile Telephone Sector, *supra*.

<sup>572</sup> See Section II.B.2.c, Paging Sector, *supra*.

<sup>573</sup> See Section II.B.2.b, Handheld Devices, *supra*.

<sup>574</sup> See Section II.B.3., Mobile Data Services, *supra*.

<sup>575</sup> See Section II.B.2.b.(i), Smartphones, *supra*.

<sup>576</sup> See Section II.B.2.a, Mobile Data Mobile Telephone Sector, *supra*.

**IV. ADMINISTRATIVE MATTERS**

This Seventh 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

Marlene H. Dortch  
Secretary

**STATEMENT OF COMMISSIONER**  
**MICHAEL J. COPPS**

June 13, 2002

*RE: 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.*

I support today's Report because we have made progress in improving the quality of the data we rely on; because we state that our data is still incomplete; and because the Commission has committed to a wide-ranging Notice of Inquiry to gather more adequate data before the next CMRS Competition Report.

CMRS is a real success story. This Report shows how, in many areas, there is real competition, declining prices, reduced roaming charges, and innovative service offerings. Consumers are benefiting from this competition everyday. As cable and fixed telephone rates increase, we can all see what happens for consumers when many strong competitors exist – prices decline.

However, I want to point out two dark clouds on the horizon of this sunny sky. First, our Report shows that this competition is not uniform across the country. Rural consumers have far less choice than urban consumers. In 50% of the country, consumers have a choice of two or fewer wireless companies. The majorities or close to majorities of Alaska, Arizona, Colorado, Kentucky, Missouri, Montana, Nebraska, Nevada, New Hampshire, North Dakota, South Dakota, Vermont, and West Virginia are served by two or fewer carriers. Such areas are, of course, far less populated than more urban states. But they are no less important for that.

So I am concerned that our Report continues to define an entire county as being served by a carrier if any part of the county is served. This means we count an entire county as served even though only a highway that runs through it is actually served. And we find competition in a county even where two apparent competitors do not venture into each other's territory to actually compete. Finding more granular data is difficult. But, just as in the broadband context of Section 706, when we have insufficient data, we should not rush to judgment and assume competition without proof. I'm glad that the Report notes that we lack "data specific to rural markets." The Commission sought additional data in a forum on data collection earlier this year. Unfortunately, most of the data collected was anecdotal. This is not enough. While we can make a judgement on competition in urban areas, better data is needed to give us clear answers on competition throughout the country. The NOI has the potential to give us what we need.

The second dark cloud is that this Report does not mean, nor should it be read to imply, that the competition we celebrate is safe from threats. We should not be tempted to see this report as license to declare the wireless industry uniformly competitive or invulnerable to serious competitive problems. Mergers, some of them far-reaching, are altogether likely in the wireless industry. The competition we have seen develop could yet be lost if we are not vigilant.

I would also like to point out that nothing in this Report changes the Commission's

previous finding that the CMRS market is already characterized by “moderate to high concentration levels.”<sup>577</sup> Going further, Leap Wireless, in another proceeding, offering economic studies that state that the average Herfindahl-Hirshman Indices (HHIs) for even the top 25 wireless markets – which are more competitive than smaller markets – are “well above the level considered to be ‘highly concentrated’ by antitrust authorities.”<sup>578</sup> The Commission has previously stated that “[w]e find that the limited amount of spectrum suitable for CMRS available today creates a significant barrier to entry, at least in MSAs.”<sup>579</sup> Is a highly concentrated market consistent with “a high level of competition?”<sup>580</sup> What does the presence of a “significant barrier to entry” mean for the continuance of a high level of competition? If the industry consolidates significantly more, what happens to the current levels of competition we cite today? We need to explore this issue further.

I also must note that in discussing “churn” in this Report we are less than clear about the fact that our churn data is insufficient and our findings inconclusive. We have not found that current churn rates suggest either increasing or decreasing competition.

I want to conclude by commending the staff who put this Report together. It’s a daunting task, and they did it well. We all have lots more work ahead of us, I’m afraid, but I’m confident that we can continue to improve our understanding of this market with such a high-quality team. And, I hope, with widespread input from all interested stakeholders – and they should be many.

---

<sup>577</sup> *Spectrum Cap Order* at ¶ 33. It is important to note that these concentration levels are present with the spectrum aggregation limits intact. The majority does not explore the consequences for lifting the limits on HHI, as I believe it was required to do. Additionally, the decreases in HHI-measured concentration that the majority relies upon, *id.* at 32, occurred while the limits were in place.

<sup>578</sup> Leap Reply Comments in Spectrum Cap Proceeding at p. 28.

<sup>579</sup> *Spectrum Cap Order* at ¶ 40.

<sup>580</sup> *Report* at p. 19

## APPENDIX A: FIXED WIRELESS VOICE AND DATA SERVICES

### I. Introduction and Overview

In this section, the Commission reviews the current state of the fixed wireless<sup>1</sup> industry, including the market for voice and data services to both residential and business customers. The first part of Appendix A provides an overview of fixed wireless systems. The second part discusses recent developments in the industry, including the recent financial difficulties faced by many operators, two notable service terminations, the current level of service deployment, and significant policy changes related to spectrum bands used for fixed wireless service.

The *Sixth Report* gave an overview of fixed wireless technology<sup>2</sup> and many of its advantages over wireline systems.<sup>3</sup> Fixed wireless operators use several spectrum bands, including Multipoint Distribution Service (“MDS”),<sup>4</sup> Wireless Communications Service (“WCS”),<sup>5</sup> unlicensed spectrum bands, 24 GHz, Local Multipoint Distribution Service (“LMDS”), and 39 GHz, to provide such service. In addition, some licensees of spectrum bands traditionally used for CMRS are using that spectrum to provide fixed wireless services.<sup>6</sup> This report groups operators into two major categories:

---

<sup>1</sup> “Fixed wireless” services are also sometimes referred to as “wireless broadband” or “wireless DSL.”

<sup>2</sup> See *Sixth Report* at 13433-13437. In a fixed wireless access system, a provider attaches a radio transmitter to a customer’s premises that communicates with the provider’s central antenna site. This antenna site acts as the gateway to the PSTN or the Internet. This technology functions as a replacement for the “last mile” of copper wire that has traditionally provided individual customers with telecommunications services, and thus allows wireless providers to compete with a traditional wireline service providers. The “last mile” is also referred to as the “local loop”; thus, fixed wireless access is often referred to as “Wireless Local Loop,” or “WLL” for short. WLLs afford fixed wireless competitors direct access to an individual customer’s building, thereby lessening their reliance on the facilities of local exchange carriers (“LECs”).

<sup>3</sup> See *Sixth Report*, at 13433-13434 and *Fifth Report*, at 17785. Fixed wireless technology generally has lower network deployment costs compared to wireline service and is better suited to serve rural and underserved markets.

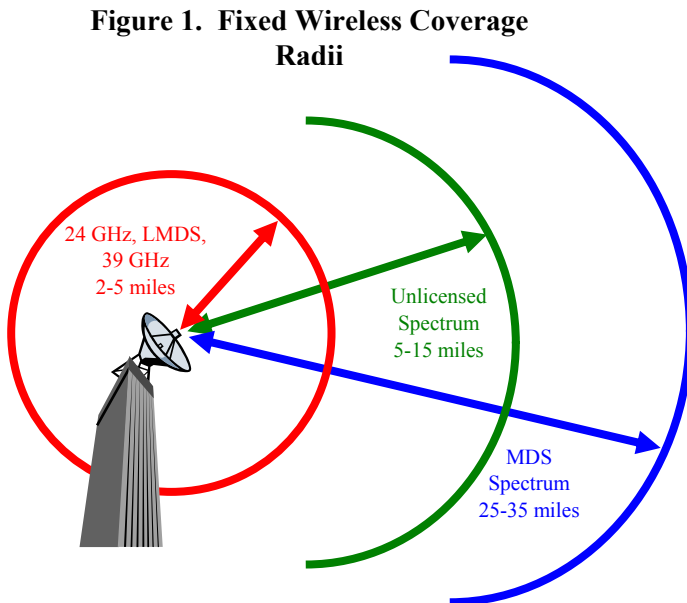
<sup>4</sup> What is commonly referred to as MDS or wireless cable spectrum includes 33 different 6 megahertz channels in the 2.1-2.2 GHz and 2.5-2.7 GHz spectrum bands. These channels include the Multipoint Distribution Service (“MDS”), Multichannel Multipoint Distribution Service (“MMDS”), and Instructional Television Fixed Service (“ITFS”) channels. MDS operators generally use the MMDS and MDS channels and lease excess capacity from ITFS operators.

<sup>5</sup> The WCS band at 2305-2320 MHz and 2345-2360 MHz surrounds the Digital Audio Radio Service (“DARS”) spectrum at 2320-2345 MHz and is used by licensees Sirius Satellite Radio and XM Radio to offer digital satellite radio service. In order to augment their satellite networks and achieve nationwide coverage, DARS licensees are seeking to deploy terrestrial repeater networks that have the potential to cause interference. Therefore, in November 2001, the Commission sought comment on specific proposals to resolve interference issues between DARS and WCS, ITFS, and MDS licensees related to these repeater networks. See Request for Further Comment on Selected Issues Regarding the Authorization of Satellite Digital Audio Radio Service Terrestrial Repeater Networks, *Public Notice*, DA 01-2570 (rel. Nov. 1, 2001).

<sup>6</sup> “Licensees of cellular systems may use alternative cellular technologies and/or provide fixed services on a co-primary basis with their mobile offerings, including personal communications services . . . on the spectrum within their assigned channel block.” 47 CFR § 22.902(d).



lowerband providers (800 MHz to 5.8 GHz) and upperband providers (24 GHz to 39 GHz)<sup>7</sup> due to the similar technical characteristics of the bands within each category.



Operators using lowerband spectrum are able to serve a wider geographic area with a single transmitter than operators using upperband spectrum (see Figure 1). Lowerband systems generally have a service radius of five to 35 miles from a central hub, depending on the particular spectrum band, the power of the transmitter, and the terrain. Upperband systems, on the other hand, face significant losses of signal strength due to atmospheric conditions, most notably precipitation (*i.e.*, rain, snow, and fog).<sup>8</sup> Therefore, the range of individual transmitters in the upperbands is approximately two to five miles.

## II. Recent Developments

### A. Bankruptcies

During 2001, several carriers exited the fixed wireless business, either through bankruptcy or service terminations. As discussed in the *Sixth Report*, three major upperband carriers – Winstar Communications, Inc. (“Winstar”), Teligent, Inc. (“Teligent”) and Advanced Radio Telecom (“ART”) – filed for bankruptcy during 2001.<sup>9</sup> These bankruptcies have led to less competition in the fixed

<sup>7</sup> The lowerbands consist of the cellular (800 MHz) and broadband PCS (1900 MHz) bands, the MDS (2.5-2.7 GHz) band, the WCS (2.3 GHz) band, and the unlicensed bands. The upperbands consist of the 24 GHz (DEMS) band, the LMDS (28 GHz) band, and the 39 GHz band.

<sup>8</sup> However, by adjusting factors such as cell size and transmission power, the networks can be engineered to the standard level of reliability in a telecommunications network, 99.999 percent. This level of reliability is also known as “five 9’s.” See *Sixth Report*, at 13435, note 602.

<sup>9</sup> See *Sixth Report*, at 13446-13447.

wireless market, and less intermodal competition for telecommunications services to business users.<sup>10</sup>

Teligent, which filed for bankruptcy in May 2001,<sup>11</sup> has since sold a large portion of its assets, including \$1 million worth of transmission equipment, office space, and supplies to NextWave Telecom.<sup>12</sup> In January 2002, a group of lenders announced that they plan to use the proceeds from the sale of Teligent's assets, as well as additional financing, to fund a successor fixed wireless company.<sup>13</sup> The new, yet unnamed company will reportedly hold the former Teligent's wireless licenses and plans to abandon the retail business in favor of becoming a wholesale carrier of fixed wireless access for other carriers.<sup>14</sup>

Winstar filed for Chapter 11 bankruptcy protection in April 2001.<sup>15</sup> In January 2002, IDT Corp. ("IDT") received approval from the bankruptcy court to purchase Winstar's assets for \$42.5 million.<sup>16</sup> IDT is currently in the process removing the former Winstar from the wireline resale business, terminating its fixed wireless operations in certain smaller markets, and consolidating some of its facilities with IDT's business.<sup>17</sup> IDT also plans to increase Winstar's buildings on-net by 600 in 22 of

---

<sup>10</sup> For a more comprehensive discussion of competition in the fixed wireless industry and broadband telecommunications services generally, see Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps To Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, *Third Report*, 17 FCC Rcd 2844 (2002).

<sup>11</sup> See *Sixth Report*, at 13447. In November 2001, Teligent announced it would discontinue service to all but 4,000 of its remaining customers, and that it would only provide private line service (not Internet access or local phone service) to those 4,000. Tony Weber, *As Latest Plan Falls Through, Teligent Short of Options*, TELEPHONY, Nov. 26, 2001. At the end of 2000, Teligent served 35,500 customers, and, as of April 2001, it operated in 43 U.S. markets. See *Sixth Report*, at 13447-13448.

<sup>12</sup> *Bankruptcy Court Approves Assets Transfer from Teligent to NextWave*, GLOBAL WIRELESS, Mar. 1, 2002, at 2. In January 2002, Teligent hired Venture Assets Group to manage the sale of 21 of its central offices in 17 states. *Venture Asset Group to Manage Sale of Teligent Central Offices*, PR NEWswire, Jan. 24, 2002. Teligent also sold its data and videoconference subsidiary, Executive Conference Inc., in January 2002 to Bahrain's Investcorp for \$60 million. Greg Johnson, *Teligent Hires Venture Asset*, DAILY DEAL, Jan. 25, 2002.

<sup>13</sup> *Teligent Announces Lender Support for Fixed Wireless Successor Company*, News Release, Teligent, Jan. 23, 2002; Yuki Noguchi, *Teligent Lenders Agree to Plan To Revive Firm*, WASHINGTON POST, Jan. 24, 2002, at E-1. Former Teligent COO, Jim Continenza, plans to become the CEO of the new company. The deal still requires the approval of the bankruptcy court and the Commission. *Id.*

<sup>14</sup> *Id.*; *Lenders Give Teligent New Life*, RCR WIRELESS NEWS, Jan. 28, 2002, at 16.

<sup>15</sup> See *Sixth Report*, at 13446. Prior to its bankruptcy, Winstar served approximately 30,000 customers, 1,040,000 access lines, and 4,400 buildings on-net in 60 markets. See *Sixth Report*, at 13448.

<sup>16</sup> Hilary Smith, *IDT Gets Busy with Winstar Makeover*, RCR WIRELESS NEWS, Mar. 18, 2002, at 53; *IDT Buys Winstar*, WASHINGTON TECHNOLOGY, Jan. 7, 2002.

<sup>17</sup> Hilary Smith, *IDT Gets Busy with Winstar Makeover*, RCR WIRELESS NEWS, Mar. 18, 2002, at 53; *IDT Corporation Announces Strategic Plan for Its Winstar Communications Subsidiary*, BUSINESS WIRE, Mar. 8, 2002.

the cities where Winstar had maintained its operations after it entered bankruptcy proceedings.<sup>18</sup>

ART filed for bankruptcy in March 2001 and announced it would phase out service to its existing customers over the following month.<sup>19</sup> Most of ART's assets were purchased by First Avenue Networks Corp., which now sells fixed wireless access on a wholesale basis to other carriers.<sup>20</sup>

XO Communications, Inc. ("XO"), a wireline CLEC that also holds LMDS and 39 GHz licenses covering 95 percent of the population of the 30 largest U.S. cities, has been offering fixed wireless broadband services to businesses in 27 markets.<sup>21</sup> On June 17, 2002, XO filed for Chapter 11 bankruptcy protection and submitted a reorganization plan with two alternative scenarios for reorganizing and restructuring its balance sheet.<sup>22</sup> The company stated that it would continue to fund its operations while its bankruptcy case is pending.<sup>23</sup>

## B. Service Terminations

Among the lowerband carriers, AT&T Wireless and Sprint both announced in the fall of 2001 that they were terminating their fixed wireless operations. At the writing of the *Sixth Report*, AT&T Wireless was offering its fixed wireless voice and data service, Digital Broadband,<sup>24</sup> to residential customers in five cities.<sup>25</sup> As of January 2001, the company had sold a total of 20,000 lines to 12,000 households.<sup>26</sup> However, in October 2001, AT&T Wireless announced it was exiting the fixed wireless business and phasing out service to its 47,000 existing customers.<sup>27</sup> And Sprint, which had launched

---

<sup>18</sup> *IDT Corporation Announces Strategic Plan for Its Winstar Communications Subsidiary*, BUSINESS WIRE, Mar. 8, 2002.

<sup>19</sup> *See Sixth Report*, at 13446.

<sup>20</sup> *Lenders Give Teligent New Life*, RCR WIRELESS NEWS, Jan. 28, 2002, at 16.

<sup>21</sup> *See Sixth Report*, at 13449.

<sup>22</sup> *XO Communications Files for Chapter 11 Bankruptcy Protection*, DOW JONES BUSINESS NEWS, June 17, 2002.

<sup>23</sup> *Id.*

<sup>24</sup> For \$34.95 per month, AT&T's Digital Broadband service gave users up to four voice lines, unlimited local calling, long distance calling at five cents per minute for in-state calls and seven cents per minute for out-of-state calls, three advanced calling features, and unlimited, "always-on" Internet access for up to five computers with downstream speeds of up to 512 kbps and upstream speeds of 128 kbps. *See Sixth Report*, at 13440-13441.

<sup>25</sup> Dallas-Ft. Worth and Houston, TX; Los Angeles and San Diego, CA; and Anchorage, AK. *See Sixth Report*, at 13440. AT&T was using its broadband PCS spectrum for Digital Broadband in Dallas, Anchorage, and San Diego, and was using its WCS spectrum licenses to offer the service in Los Angeles and Houston. *Id.*

<sup>26</sup> *See Sixth Report*, at 13440.

<sup>27</sup> *AT&T Wireless Exits Fixed Wireless, Takes \$1.3 Billion Charge*, COMMUNICATIONS DAILY, Oct. 24, 2001. The company did state it would continue to hold its WCS licenses, and that it might use the tower capacity that it had deployed for the fixed wireless service to expand its mobile capacity instead. *Id.* (citing CFO Joseph McCabe). AT&T Wireless sold its fixed wireless assets, not including its licenses, to equipment

its Broadband Direct MDS-based high-speed Internet access service in 16 cities across the United States,<sup>28</sup> announced in October 2001 that it was discontinuing the deployment of Broadband Direct. The company stated at that time that it would continue to serve its 52,000 existing Broadband Direct subscribers.<sup>29</sup>

Many analysts believe that fixed wireless carriers are awaiting the availability of next-generation technologies that will not require a direct line-of-sight between subscribers' antennas and their receivers before making further deployments.<sup>30</sup> These new technologies will reportedly lower carriers' costs and increase their service options significantly.<sup>31</sup> Orthogonal Frequency Division Multiplexing ("OFDM") is a technology standard that has the potential to overcome the line-of-sight restriction and is expected to increase the speeds of wireless networks.<sup>32</sup> OFDM-based equipment is currently being developed for use in multiple wireless products, including wireless LANs, mobile

---

manufacturer Netro Corp. in January 2002. Deborah Solomon, *AT&T Wireless to Sell Fixed-Wireless Assets to Netro for \$45 Million in Cash and Stock*, WALL STREET JOURNAL, Jan. 15, 2002.

<sup>28</sup> Phoenix and Tucson, AZ; San Francisco, Oakland, San Jose, and Fresno, CA; Denver, Boulder, and Colorado Springs, CO; Melbourne, FL; Wichita, KS; Detroit, MI; Oklahoma City, OK; Houston, TX; Salt Lake City, UT; and Chicago, IL. See *Sprint Introduces New Broadband Fixed Wireless Service to Chicago's Residential and Small Business Customers*, News Release, Sprint, Mar. 26, 2001.

<sup>29</sup> Sue Marek, *Sprint Halts MMDS Rollout; Fixed Wireless Setbacks Are Sending U.S. Vendors Scrambling For Better Solutions And More Promising Markets. Analysts Say Consolidation Is Near*, WIRELESS WEEK, Oct. 29, 2001, at 40.

<sup>30</sup> Denise Pappalardo, *Worldcom Adds Wireless MMDS Area*, NETWORK WORLD, Aug. 20, 2001, at 23 (citing Lindsay Schroth, an analyst at the Yankee Group: "MMDS is not readily available because service providers are waiting for next-generation equipment to come to market."); *The Yankee Group Projects That Worldwide Market for High Frequency Fixed Wireless Solutions Will Grow to \$1.9 Billion in 2006*, BUSINESS WIRE, Nov. 8, 2001 ("[D]espite the disillusionment caused by slow growth in 2001, there is a market for high-frequency (HF) point-to-multipoint products. However, the market for HF PMP solutions is still emerging, and there are issues yet to be resolved by both vendors and carriers that use this technology").

<sup>31</sup> Michael Grebb, *Can Broadband Save MMDS?*, CABLEVISION, May 28, 2001, at 32 (citing Andy Fuertes, senior vice president of communications technology at Allied Business Intelligence: "Combining cellularization with non-line-of-sight technologies could lower the cost of providing MMDS service significantly. ... [With non-line-of-sight technology,] 'there's the potential for more self-install.... That takes the massive cost of the truck roll out of there.'" Fuertes predicts that self-installs will be commonplace in MMDS operations within two years.); *Wireless Expected To Challenge Cable, DSL For SOHO Customers*, BUSINESS COMMUNICATIONS REVIEW, June 1, 2001, at 8 (citing Allied Business Intelligence: "Technology breakthroughs that allow for non-line-of-sight applications are being introduced, boosting the prospects for multichannel multipoint distribution service (MMDS) and broadband wireless access (BWA) systems."). However, analysts believe these non-line-of-sight technologies will not be ready for full-scale deployment until at least 2003. See Sinead Carew, *Could Fixed Wireless Still Have Its Day?*, COMPUTERWIRE, Oct. 30, 2001 (citing the Yankee Group); Denise Pappalardo, *Fixed Wireless Takes Some Lumps*, NETWORK WORLD, Nov. 5, 2001, at 33 (citing Maribel Dolinov, senior analyst at Forrester Research).

<sup>32</sup> Michael Bartlett, *Fixed Wireless System To Join Broadband Access Race – Study*, NEWSBYTES, Aug. 29, 2001, at 9 (citing Lindsay Schroth, an analyst with the Yankee Group: "[L]ine-of-sight restrictions are hampering deployment of MMDS fixed wireless systems. ... [OFDM has] spectral efficiency [and] several vendors are working on next-generation technologies that address the limitations of MMDS fixed wireless systems." See *Sixth Report*, at 13435 and *Fifth Report*, at 17793.

wireless systems, and broadband fixed wireless access.<sup>33</sup>

### C. Service Availability

In contrast to the service terminations and financial distress of its fellow fixed wireless carriers, WorldCom Inc. (“WorldCom”) has continued to roll out high-speed, fixed wireless Internet access service using its MDS and WCS spectrum during the past year.<sup>34</sup> At the writing of the *Sixth Report*, WorldCom was offering commercial service in three markets and was running trials in two additional markets.<sup>35</sup> As of February 2002, the company had expanded its offering of fixed wireless broadband services to business customers to a total of 13 U.S. markets.<sup>36</sup>

Several smaller fixed wireless carriers, including hundreds of operators using unlicensed spectrum,<sup>37</sup> continue to provide high-speed Internet access service, generally in less densely populated markets across the country and often in a only a few markets apiece. Most of the companies that use unlicensed spectrum to offer Internet access are local and regional Internet service providers, also referred to as wireless ISPs, that offer the service in an average of three markets apiece.<sup>38</sup> Many of these carriers are targeting business customers, while others serve both businesses and residences. Many fixed wireless operators use lowerband spectrum to offer high-speed Internet access in rural and underserved areas. For example, Canyon Country Communications offers Internet access in Page,

---

<sup>33</sup> See *Sixth Report*, at 13435.

<sup>34</sup> WorldCom holds MDS licenses covering approximately 45 million households in 78 markets. The company also holds WCS licenses, which it is reportedly using in conjunction with MDS spectrum to offer service in Memphis, TN; Jackson, MS; and Baton Rouge, LA. See *Sixth Report*, at 13442.

<sup>35</sup> As of January 2001, the company had launched service in Memphis, TN; Baton Rouge, LA; and Jackson, MS, and was running service trials in Boston, MA and Dallas-Fort Worth, TX. See *Sixth Report*, at 13442.

<sup>36</sup> Lafayette and Baton Rouge, LA; Bakersfield, CA; Montgomery, AL; Jackson, MS; Hartford, CT; Chattanooga and Memphis, TN; Tallahassee and Pensacola, FL; Minneapolis, MN; Springfield, MA; and Kansas City, KC. *WorldCom Launches New High-Speed, Fixed Wireless Internet Service in Lafayette*, News Release, WorldCom, Feb. 21, 2002.

<sup>37</sup> Unlicensed spectrum consists of 26 megahertz in the 900 MHz band, 83.5 megahertz in the 2.4 GHz band, and 300 megahertz in the 5 GHz band. See, generally, 47 CFR Part 15. Unlicensed spectrum is used for many purposes, including short-range data transmission technologies such as Bluetooth and 802.11, cordless phones, microwave ovens, and amateur radio. The spectrum is also used for wireless LAN/WAN connections within airports, hotels, and office buildings as well as across larger areas such as corporate and college campuses. See Section II.B.3.f, Short-Range Data Transmission, *supra*. Companies using unlicensed spectrum to offer fixed wireless point-to-point broadband services primarily use the 2.4 GHz band, while some reportedly employ both the 2.4 GHz and 5 GHz bands for such services. Unlicensed fixed applications generally employ spread spectrum technology for long range transmissions in order to minimize the risk of interference with other operators. See *Sixth Report*, at 13439.

<sup>38</sup> Many of these companies offer traditional wireline dial-up Internet access as well. See *Sixth Report*, at 13444. See also, Nancy Gohring, *Wireless ISPs: Emerging from the Shadows*, BROADBAND WIRELESS BUSINESS, March/April 2002, at 1, 8. Many of the small wireless ISPs believe that by offering service and becoming profitable in only one or a few markets before expanding to other markets, they will remain financially viable. *Id.*

AZ; Planet Connect offers fixed wireless service in Bristol, Seymour, Newport, and Greeneville, TN; and DATACentric sells the service in Lufkin, Conroe, and Bryan-College Station, TX.<sup>39</sup> In fact, at least one industry analyst claims that, while fixed wireless has the potential to compete with DSL and cable modem service, the technology is best-suited for rural and underserved markets where these services may not be available.<sup>40</sup> Other analysts believe that the technology will be deployed mainly to residential, not business, customers.<sup>41</sup>

Estimates of the number of fixed wireless customers vary. One analyst estimates that there were 100,000 fixed-wireless broadband subscribers in the United States as of May 2001,<sup>42</sup> while another estimates there are were 300,000 fixed wireless subscribers, including businesses, in the United States as of October 2001.<sup>43</sup>

As mentioned in the *Sixth Report*, the Commission has begun tracking the rollout of fixed wireless services by providers using lowerband spectrum on a county-by-county basis. Based on its analysis, the Commission estimates that there are at least 222 different lowerband operators providing fixed wireless services in 466 different counties.<sup>44</sup> These counties contain 124 million people, or 43.5 percent of the U.S. population.<sup>45</sup> This analysis is based on publicly-available information, such as news articles and operators' press releases, SEC filings, and web sites. There are several caveats to note when considering this data. First, in order to be considered as "covering" a county, an operator need only be offering service in a portion of that county. Second, the POPs and square mile figures in this analysis include all of the POPs and all of the square miles in a county considered to have coverage. Third, all population figures are based on the 2000 Census. Fourth, because some lowerband carriers serve small and remote locations and because unlicensed operators provide service without a license from the Commission, it is difficult to assess precisely who is operating where. Therefore, the analysis may not include certain companies that do not make the information on their fixed wireless offerings easily obtainable or publicly available.

---

<sup>39</sup> See *Sixth Report*, at 13444.

<sup>40</sup> Sinead Carew, *Could Fixed Wireless Still Have Its Day?*, COMPUTERWIRE, Oct. 30, 2001 (citing Lindsay Schroth, an analyst at the Yankee Group, who said, "Fixed wireless is not going to be the market that people thought, but there will still be a place for it... Rather than pitching their wares against DSL or cable, operators should go after niche markets like rural areas outside of the reach of DSL.").

<sup>41</sup> *Fixed Wireless No Wipeout, Despite Recent Troubles*, NETWORK WORLD, June 4, 2001, at 38 (citing Peter Jarich of the Strategis Group: "We see the technology as being primarily residential... We're not seeing business as the right way to go. ... Business users have a range of connectivity options to choose from, and they're more concerned about quality of service and reliability than are residential users.;" and citing Chris Whitely of Insight Research: "When businesses decide to go with a fixed wireless link, it's often as a back-up connection, or for less critical traffic only.").

<sup>42</sup> Alex Salkever, *Broadband's Next Wave: Wireless?*, BUSINESS WEEK ONLINE, May 17, 2001 (citing Peter Jarich of the Strategis Group).

<sup>43</sup> Eve Tahmincioglu, *For High-Speed Access to the Web, a Dish-to-Dish Route*, NEW YORK TIMES, Oct. 11, 2001, at G9 (citing Cahners In-Stat Group).

<sup>44</sup> See Appendix E, Map 10, p. E-11.

<sup>45</sup> Many of these lowerband providers serve only business customers. Residential fixed wireless Internet access is available in at least 298 different counties. These counties contain approximately 64 million people or 23 percent of the U.S. population.

#### D. Spectrum Allocation Proceedings

As mentioned in the *Sixth Report*, the Commission was evaluating the possible use and reallocation of the 2500-2690 MHz band for advanced wireless, including 3G mobile, services.<sup>46</sup> However, due to the extensive use of that band by incumbent MDS and ITFS operators for services including high-speed fixed wireless Internet access, the Commission decided in September 2001 not to reallocate that band specifically for 3G services, but instead to permit mobile use of the spectrum by MDS licensees.<sup>47</sup> Analysts and industry players generally believe the decision has given fixed wireless carriers and equipment vendors additional flexibility, and may help to revive the industry.<sup>48</sup> In addition, in August 2001, the Commission proposed the possible reallocation of the remaining MDS spectrum, the 2150-2160/62 MHz band, for advanced wireless services, including 3G systems.<sup>49</sup> MDS licensees currently use this band primarily for the upstream links in two-way, fixed wireless broadband services.<sup>50</sup>

---

<sup>46</sup> See *Sixth Report*, at 13400.

<sup>47</sup> Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems, *First Report and Order and Memorandum Opinion and Order*, 16 FCC Rcd 17222 (2001).

<sup>48</sup> Jim Barthold, *Fixed Wireless Eyes Mobile Future*, TELEPHONY, October 1, 2001 (John Schwartz, president of the Instructional Telecommunications Foundation, stated, "We do have an evolution to make now."; Leo Cyr, president and chief operating officer of Clearwire Technologies, which serves ITFS licensees, said, "It gives you some new service possibilities, especially with portability."; Charles Riggle, vice president of marketing and business development at NextNet Wireless: "This ruling really plays into our hands ... We're uniquely positioned to take advantage."; Peter Jarich, director of Global Broadband Research for the Strategis Group: "It doesn't look like [Sprint PCS and WorldCom] are committed to fixed. ... In fact, everyone wonders if they're [both] going to stick with their MMDS fixed wireless plans or move to deploy 3G.").

<sup>49</sup> Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems, *Memorandum Opinion and Order and Further Notice of Proposed Rulemaking*, 16 FCC Rcd 16043 (2001). In the 50 largest U.S. markets, the 2150-2162 MHz band is allocated to MDS, while in the rest of the country only 10 megahertz at 2150-2160 MHz is used for MDS. *Id.*

<sup>50</sup> Under an informal agreement among MDS licensees, the principal use of this spectrum is for upstream communications to hub receiving facilities. *Id.*

---

## APPENDIX B: SPECTRUM AUCTIONS

### Table of Contents

Table 1A: FCC Auctions Summary - Service Design .....	B-2
Table 1B: FCC Auctions Summary - Auction Results .....	B-4
Table 2: VHS Public Coast and LMS Auction #39 Results.....	B-5
Table 3: Paging Auction #40 Results.....	B-6
Table 4: Narrowband PCS Auction #41 Results.....	B-9
Table 5: Multiple Address Systems Spectrum Auction #42 Results .....	B-9
Table 6: Multi-Radio Service Auction #43 Results .....	B-9
Table 7: New Analog Television Stations Auction #82 Results.....	B-9



**Table 1A: FCC Auctions Summary - Service Design**

Auction Number and Name	Number of Licenses (1)	Geographic License Scheme (2)	Spectrum per license	Total Spectrum per Market	Service Description
1 Nationwide Narrowband PCS	11 (3)	Nationwide	11 blocks: 5 = 50/50 kHz, 3 = 50/12.5 kHz, 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 = 50/50 kHz, 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	493	BTA	1 block of 30 MHz or 2 blocks of 15 MHz	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 MHz	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	1479	BTA	3 blocks of 10 MHz	30 MHz	Mobile voice and data
22 Broadband PCS (8)					
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	(9)
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	986 (10)	BTA	2 blocks: 1150 MHz and 150 MHz	1300 MHz	Fixed voice, data and video
23 Distribution Service					
18/ 220 MHz	908	National, EAG, EA	13 blocks: 3 = 100 kHz, 5 = 100 kHz, 5 = 150 kHz	1.55 MHz	Voice, data, paging, fixed
24/ 43					
20/ VHF Public Coast	42	Pub. Coast Station Areas	1 block between 350 and 500 kHz	350 to 500 kHz	Fixed and mobile
39					
21/ Location and Monitoring	528	EA	3 blocks: 2 = 6 MHz, 1 = 2.25 MHz	14.25 MHz	Mobile telemetry
39/ Service					
43					
25/ "Closed" Broadcast	118	n/a	(11)	(11)	Broadcast TV and radio
27/ 28					
26/ 929 and 931 MHz Paging	2,499	MEA	49 blocks of 20 kHz: 12 in 929 Band, 37 in 931 band.	790 kHz	Paging and messaging
40 Service					
30 39 GHz	2,450	EA	14 Blocks of 100 MHz	1400 MHz	Fixed (12)
33/ 700MHz Guard Band	104	MEA	2 Blocks: 1 = 4 MHz, 1 = 2 MHz	6 MHz	(13)
38					
34/ SMR 800 MHz General	1,050	EA	6 Blocks of 1.25 MHz (14)	7.5 MHz	Mobile voice and data
43 Category					
35 PCS C & F Block (5)	422 (15)	BTA	Up to 4 blocks of 10 MHz; Up to 2 blocks of 15 MHz	10 to 40 MHz	Mobile voice and data
36 SMR 800 MHz Lower 80 Channels	2,800	EA	16 Blocks of .25 MHz	4 MHz	Mobile voice and data
40 Paging	14,000 (16)	EA	36 blocks of 20 kHz; 44 blocks of 40 kHz	2.48 MHz	Paging and messaging
41 Narrowband PCS	365	National, MTA	3 x 50/50 kHz; 3 x 50/150 kHz; 4 x 50/100 kHz; 3 x 50 kHz; 1 x 12.5/100 kHz	1.7625 MHz	Advanced paging/data
42 Multiple Address Systems Spectrum	5,104	EA	28 blocks of 25 kHz; 1 block of 100 kHz	800 kHz	Fixed and Mobile

<b>43 Multi-Radio Service (17)</b>	69	--	--	--	--
<b>80 Blanco Texas Broadcast</b>	1	n/a	1 construction permit	6 MHz	Broadcast TV
<b>82 New Analog Television Stations</b>	4	n/a	4 construction permits	6 MHz	Broadcast TV

Source: Federal Communications Commission

- (1) This is the total number of licenses initially auctioned in each service. It does not take into account any partitioning and disaggregation activity. Some of these licenses may not have 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, EAs = Economic Areas.
- (3) Includes one pioneer preference license.
- (4) Includes three pioneer preference licenses.
- (5) To date, four auctions have been completed that included C block PCS licenses (Auctions Nos. 5, 10, 22 and 35).
- (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) To date, two auctions have been completed that included DEF block PCS licenses, the original and one reauction.
- (9) 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.
- (10) Cellularvision, Inc. has been granted a pioneer preference for a portion of the 1150 MHz New York BTA, of which 850 MHz was subsequently sold to Winstar Communications, Inc.
- (11) The "Closed" Broadcast auctions included a number of different licenses used for broadcast television and radio. The types of licenses included: AM Broadcast (10 kHz per license), FM Broadcast (200 kHz per license), FM Translator (200 kHz), TV Broadcast (6 MHz per license), Low Power TV (6 MHz per license), and TV Translator (6 MHz per license).
- (12) Mobile communications are subject to the development of inter-licensee and inter-service interference criteria.
- (13) The Guard Band Manager is a new class of commercial licensee engaged solely in the business of leasing spectrum to third parties on a for-profit basis. The Guard Band Manager may subdivide its spectrum in any manner it chooses and make it available to system operators, or directly to end users for fixed or mobile communications. Entities that employ a cellular system architecture are prohibited from operating in this band.
- (14) Additionally, the Commission offered 3 EA licenses in the 800 MHz Upper Band: one 1 MHz license in Honolulu, HI (EA 172); one 3 MHz license and one 6 MHz license in Guam and Northern Mariana Islands (EA 173).
- (15) 170 licenses were available only to entrepreneurs in closed bidding. 252 licenses were available to all bidders in open bidding.
- (16) An additional 1,514 upper bands paging licenses that were unsold in Auction No. 26 were also offered.
- (17) The 220 MHz, 800 MHz SMR, and LMS spectrum licenses available in this auction were either unsold from a previous auction or were defaulted on by a winning bidder in a previous auction. The auction included 4 Phase II 220 MHz Service licenses; 23, 800 MHz SMR Service General Category licenses; and 42 LMS licenses.

**Table 1B: FCC Auctions Summary  
Auction Results**

Auction Number(s) and Name	Total Winning Bids (1)	Auction Began	Auction Ended	# Rounds	Number of Winning Bidders
1 Nationwide Narrowband PCS	\$650,306,674	7/25/94	7/29/94	47	6
2 Interactive Video and Data Service	\$213,892,375	7/28/94	7/29/94	Oral Outcry	178
3 Regional Narrowband PCS	\$392,706,797	10/26/94	11/8/94	105	9
4 A & B block Broadband PCS	\$7,721,184,171	12/5/94	3/13/95	112	18
5/ C block Broadband PCS (2)	\$10,071,708,841.50	12/18/94	5/6/96	184	89
10/	\$904,607,466.75	5	7/16/96	25	7
22	\$409,936,425.00	7/3/96	4/15/99	78	57
6 Multichannel Distribution Service	\$216,239,603	11/13/94	3/28/96	181	67
7 900 MHz Specialized Mobile Radio	\$204,267,144	12/5/95	4/15/96	168	80
8 Digital Broadcast Service	\$682,500,000	1/24/96	1/25/96	19	1
9 Digital Broadcast Service	\$52,295,000	1/25/96	1/26/96	25	1
11/ D, E, & F block Broadband PCS (3)	\$2,517,439,565	8/26/96	1/14/97	276	125
22	\$2,904,520	3/23/99	4/15/99	78	6
12 Cellular Unserved	\$1,842,533	1/13/97	1/21/97	36	10
14 Wireless Communications Service	\$13,638,940	4/15/97	4/25/97	29	17
15 Digital Audio Radio Service	\$173,234,888	4/1/97	4/2/97	25	2
16 Upper 800 MHz Specialized Mobile Radio	\$96,232,060	10/28/97	12/8/98	235	14
17/ Local Multipoint Distribution	\$578,663,029	2/18/98	3/25/98	127	104
23 Service	\$45,064,450	4/27/99	5/12/99	43	40
18/ 220 MHz	\$21,650,301	9/15/98	10/22/98	173	44
24	\$1,924,950	6/8/99	8	71	16
20/ VHF Public Coast	\$7,459,200	12/3/98	12/14/98	44	4
39	\$225,200	6/6/01	8	34	3
21/ Location and Monitoring Service	\$3,438,294	2/23/99	3/5/99	54	4
39	\$919,555	6/6/01	6/13/01	34	4
25/ "Closed" Broadcast Auction	\$57,820,350	9/28/99	10/8/99	35	91
27/	\$172,250	10/6/99	10/8/99	15	1
28	\$1,210,000	3/21/00	3/24/00	26	2
26 929 and 931 MHz Paging Service	\$4,122,500	2/24/00	3/2/00	28	78
30 39 GHz	\$410,649,085	4/12/00	5/8/00	73	29
33/ 700MHz Guard Band	\$519,892,575	9/6/00	9/21/00	66	9
38	\$20,961,500	2/13/01	2/21/01	38	3
34 SMR 800 MHz General Category	\$319,451,810	8/16/00	9/1/00	76	14
35 PCS C & F Block	\$16,857,046,150	12/12/00	1/26/01	101	35
36 SMR 800 MHz Lower 80 Channels	\$28,978,385	11/1/00	12/5/00	151	22

Auction Number(s) and Name	Total Winning Bids (1)	Auction Began	Auction Ended	# Rounds	Number of Winning Bidders
<b>40 Paging</b>	\$12,897,127	10/30/01	12/5/01	140	182
<b>41 Narrowband PCS</b>	\$8,285,036	10/3/01	10/16/01	48	5
<b>42 Multiple Address Systems Spectrum</b>	\$1,202,725	11/14/01	11/27/01	36	13
<b>43 Multi-Radio Service</b>	\$1,548,225	1/10/02	1/17/02	31	3
<b>80 Blanco Texas Broadcast</b>	\$18,798,000	7/12/00	7/14/00	16	1
<b>82 New Analog Television Stations</b>	\$5,025,250	2/5/02	2/13/02	13	3

Source: Federal Communications Commission

Notes:

- (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 three auctions. Please note that because licenses are in more than one auction, simply summing together the figures for Total Winning Bids, Bid Price, and Number of Winning Bidders will result in over counting.
- (3) DEF block broadband PCS was auctioned in two auctions. Please note that because licenses are in more than one auction, simply summing together the figures for Total Winning Bids, Bid Price, and Number of Winning Bidders will result in over counting.

**Table 2: VHS Public Coast and LMS Auction #39 Results**

Bidder Name	Total High Bids	Net High Bids (1)	POPs
PCS Partners, L.P.	32	\$528,840	36,413,087
Telesaurus Holdings GB, LLC	80	\$347,815	44,713,791
Maritel, Inc.	7	\$100,400	1,846,458
Helen Wong-Armijo	84	\$58,370	26,701,121
SMR Systems, Inc.	3	\$48,750	473,571
Scott MacIntyre	3	\$35,750	503,691
FCR, Inc.	8	\$24,830	5,712,959

Source: Federal Communications Commission

Notes: (1) As of the close of the auction.

**Table 3: Paging Auction #40 Results**

Bidder Name	Total High Bids	Net High Bids (1)	POPs
Marcus Spectrum Holdings, LLC	44	\$2,517,515	624,112,560
Jeff S Cofsky	84	\$1,216,618	230,315,004
Paging Systems, Inc.	117	\$1,042,540	692,956,816
Scott MacIntyre	149	\$497,939	358,701,230
Jamestown Manufacturing Corporation	698	\$434,100	1,549,982,780
Schuykill Mobile Fone, Inc.	221	\$432,840	876,490,423
anderson communications inc	35	\$416,060	170,524,100
MOBILE RELAY ASSOCIATES	14	\$377,775	168,910,244
Atlantic Communications, LLC	5	\$336,750	119,595,040
T&W Electronics Inc.	76	\$331,188	213,553,445
COMMUNICATIONS EQUIPMENT INC	231	\$272,246	223,655,246
Fisher Wireless Services, Inc.	77	\$219,980	100,153,042
James T. Hopper	13	\$176,150	80,350,179
X.W. LLC	6	\$163,800	56,768,874
VICTOR COMMUNICATIONS INC.	120	\$152,438	304,220,305
Thomas O'Brien Sr. L.L.C.	1	\$148,200	23,919,008
Cellplus Networks, LLC	139	\$145,145	122,757,347
Colorado CallComm, Inc.	12	\$140,140	36,373,680
TeleBEEPER of New Mexico, Inc.	261	\$140,056	352,109,285
Redi-Call Salisbury Communications Consortium	111	\$136,487	245,766,788
Morris Communications, Inc.	116	\$134,460	154,501,398
FCCA, LLC	98	\$124,980	126,828,992
Futronics Paging, Inc.	40	\$123,006	67,081,857
Central Communications Service Company	25	\$117,481	21,464,395
Mountain Communications and Electronics, Inc.	15	\$116,100	45,467,100
Communications Sales and Service, Inc.	82	\$109,954	122,245,257
Contact Communications, Inc.	30	\$109,330	82,342,398
Direct Connect USA, Inc.	14	\$109,005	96,822,040
SILKE COMMUNICATIONS INC.	85	\$108,615	125,057,456
Domer Communication, Inc.	17	\$87,893	77,599,322
AAA Mid-Atlantic	2	\$85,000	47,838,016
TELEPHONE & TWO-WAY INC.	56	\$84,500	159,273,287
Indiana Paging Network, Inc.	63	\$81,405	145,745,954
Avery Wisdom	86	\$76,544	163,667,757
RCC, Inc. d/b/a Radio Comm Company	35	\$76,401	59,324,191
Golden Arrow Paging, Inc.	22	\$59,000	48,738,861
A. V. LAUTTAMUS COMMUNICATIONS, INC.	37	\$54,119	52,422,195
Ameritech Mobile Services, Inc.	58	\$52,840	164,858,305
Arthur Nathan Sherman	43	\$52,410	61,790,669
Omnicall Corp.	21	\$50,740	44,112,873
Cook Telecom, Inc.	84	\$50,190	187,170,529
WILLIAM WAYNE DBA MR. RADIO	9	\$48,035	8,493,318
Ray's Mobile Communications, Inc.	5	\$46,150	6,393,610
AAT Paging Corporation II	4	\$45,500	33,129,176
Western Paging, LLC	44	\$43,725	140,724,540
Lemar D. Van Heuveln	54	\$42,796	20,575,220
Jim Doering DBA J Doering Communicatins	22	\$41,990	138,165,858
Minnesota Mobile Telephone Company	34	\$41,600	64,839,085
Fresno Moible Radio, Inc.	31	\$40,725	70,558,890
Saia Communications Inc.	20	\$39,754	30,235,255
Azle Communications Solutions, LLC	6	\$39,455	37,084,698
Alpha Wireless Communications Co.	56	\$39,080	58,705,114
FastAds, Inc.	49	\$37,089	49,276,462
JSM Net Link LLC	38	\$35,880	52,754,331
Baycom Inc.	36	\$32,865	29,536,226
Tri County Communications, Ltd.	51	\$32,445	30,769,213
NextBus Informations Systems. Inc	30	\$30,355	264,085,097
JPJ Electronic Communications Inc Rene Matthew Cor	36	\$29,820	53,783,143
Mobile Radio Communications, Inc.	22	\$29,460	24,792,425
Automobile Club of Southern California	19	\$28,280	18,575,633
Columbia Communications, Inc.	7	\$28,080	37,938,997
ComProducts, Inc. d/b/a B&C Communications	8	\$25,285	16,804,904
Mobilfone Service Inc	5	\$23,720	11,210,869

Joshua F.A. McCormick	8	\$23,140	42,807,970
Superior Technologies, Inc.	10	\$23,080	3,824,992
Edward V Krom	8	\$22,540	59,637,064
CENTRAL VERMONT COMMUNICATIONS, INC.	18	\$22,126	48,086,643
ROBERT J FETTERMAN	17	\$21,825	54,470,474
Communication Specialists Company of Wilmington, L	39	\$21,541	38,843,438
METROCALL USA INC	31	\$20,260	54,331,591
BADGER SPECTRUM LTD	38	\$19,955	101,417,799
California State Automobile Association	4	\$19,600	26,034,889
Range Corporation	39	\$19,409	21,213,191
Teton Communications	54	\$19,279	11,944,602
Midwest Management, Inc.	59	\$19,175	15,249,549
Kathleen Janssen	12	\$19,140	15,465,793
UHF-DE, LLC	25	\$18,590	12,180,300
FM Communications, Inc.	6	\$17,199	9,034,632
AQUIS WIRELESS COMMUNICATIONS, INC.	6	\$17,000	41,416,102
Regional Transit Service, Inc.	3	\$17,000	4,373,538
WARNER COMMUNICATIONS CORPORATION	28	\$16,848	95,278,904
Arthur R. Patrick	40	\$16,770	38,129,074
iDigi Networks, LLC	12	\$16,590	41,949,528
Alpha Communications Sites, Inc.	18	\$15,900	29,447,964
Joplin Beepers Inc	14	\$15,615	14,647,350
Lancaster Radio Paging, Inc.	2	\$15,140	7,942,319
Page Plus Incorporated	30	\$15,000	46,941,240
Lubbock Radio Paging Service, Inc.	21	\$14,520	7,560,150
Clifford E. Bade	14	\$14,209	63,905,324
Teletouch Licenses, Inc.	15	\$14,000	12,530,895
Two-Way Communications, Inc.	5	\$13,845	5,463,330
T&K Communications Systems, Inc.	16	\$13,819	25,636,757
MULTIPAGE, INC.	25	\$13,300	27,291,114
Electronic Engineering Co.	18	\$13,140	35,411,031
BAKER'S ELECTRONICS & COMMUNICATIONS, INC.	37	\$12,675	56,165,736
Robert R Rule	25	\$12,610	22,209,278
TEXAPAGE NE INC.	4	\$12,025	24,723,132
Myrtle Beach Communications, Inc.	22	\$11,570	12,956,566
ComServ Services, LLC	20	\$11,115	33,756,340
State of South Dakota, Bureau of Information & Tel	16	\$11,020	4,009,212
Davis Electronics Company Inc	22	\$11,000	31,927,080
Mid-Rivers Telephone Cooperative, Inc.	22	\$11,000	6,273,061
L & L Services, Inc. d/b/a Metro Communications	21	\$11,000	16,918,724
Centre Communications	28	\$10,322	33,616,491
Richard L Oberdorfer	5	\$9,620	5,013,956
Select Path Holding, Inc.	10	\$9,525	14,759,354
CAPITOL RADIOTELEPHONE COMPANY, INC.	12	\$9,334	16,214,547
Mobile Communication Service, Inc.	20	\$9,120	11,556,675
Buttner Holdings, LLC	21	\$8,775	35,812,643
Ozark Paging LLC	5	\$8,580	6,895,436
Michael A Phillips	10	\$8,554	12,596,360
UNITED TELEPHONE MUTUAL AID CORPORATION	16	\$8,000	2,855,048
West Wisconsin Telcom Cooperative Inc	6	\$7,170	5,701,861
TeleMaxx Communications LLC	3	\$6,630	10,990,738
Industrial Communications	12	\$6,565	19,631,976
WCS Communications Inc dba Western Communications	11	\$6,435	9,844,513
Mobile Phone of Texas, Inc.	5	\$6,225	14,339,151
Daksoft, Inc dba Mayer Radio	12	\$6,000	3,491,262
Communications Specialists, Inc.	18	\$5,850	15,219,742
TRIANGLE COMMUNICATIONS INC.	10	\$5,775	16,153,991
wharton telecom holdings, inc	5	\$5,100	26,228,739
Mobile Telephone & Paging Inc.	8	\$5,060	8,865,832
Bob Jacobson d/b/a Wavecomm	6	\$5,005	17,163,540
Virginia Channels, JV	10	\$5,000	12,476,270
RAM Technologies Inc	4	\$5,000	4,879,317
M. E. Parkinson	14	\$4,836	4,999,288
KARL A RINKER	9	\$4,667	13,367,176
Moraine Radio	6	\$4,498	12,717,342
John L Crump	11	\$4,290	31,793,449
Business Service Center, Inc.	4	\$4,275	2,191,808
Acadian Ambulance Service, Inc.	8	\$4,000	5,920,678
FONES WEST DIGITAL SYSTEMS, INC.	5	\$3,965	9,088,441

## Federal Communications Commission

FCC 02-179

Afton Communications Corporation	10	\$3,750	10,383,010
NEP, LLC	7	\$3,700	11,616,403
Pro-Com Inc.	6	\$3,653	14,913,325
Com-Nav, Inc. d/b/a Radiotelephone of Maine	7	\$3,510	3,731,945
Western Communications, Inc.	6	\$3,510	1,525,570
Chicago Communication Service, Inc.	2	\$3,400	24,991,020
Space Data Spectrum Holdings, LLC	3	\$3,300	10,376,805
Spectrum Communications, Inc.	10	\$3,250	5,457,470
Gabriel Wireless LLC	2	\$3,250	10,051,212
BEEPER NETWORK INC	8	\$3,185	13,899,057
Metamora Telephone Company	7	\$3,150	4,055,807
CITY PAGE & CELLULAR SERVICES, INC. DBA CITY BEEPE	2	\$3,120	9,564,000
Hub Communications, Inc.	9	\$2,990	9,661,811
SEMA-PHOON, INC. d/b/a R.A. Communications	7	\$2,964	4,154,428
Bobier Electronics, Inc.	9	\$2,925	10,764,387
Communications Systems, Inc.	2	\$2,860	2,956,766
Joseph B McNeal	6	\$2,405	4,485,684
PROGRESSIVE COMMUNICATIONS SERVICES, INC.	7	\$2,275	5,823,297
Robert F. Ryder d/b/a Radio Paging Service	7	\$2,275	1,898,610
Starpge Inc	6	\$2,275	7,474,231
McLeodUSA Telecommunications Services, Inc.	4	\$2,100	7,605,185
Paging Source of Florida, Inc.	2	\$2,100	7,374,875
Page-All, LLC	1	\$2,000	3,945,443
Answer Fort Smith, Inc.	3	\$1,950	5,264,463
Great Eastern Communications Co. Inc.	1	\$1,885	7,454,633
Christine M. Busby	2	\$1,690	18,635,894
Pineland Telephone Cooperative, Inc.	3	\$1,500	1,773,768
VENTURES IN PAGING, LLC	3	\$1,500	2,955,208
Professional Answering Service, Inc.	3	\$1,300	5,861,648
General Tel Courier	3	\$1,170	3,324,687
MARK A. APSLEY	2	\$1,105	2,852,700
Allcom Communications, Inc.	2	\$1,000	572,068
AreaWide Communications Inc.	2	\$1,000	2,835,801
Leonard R. Putnam d/b/a Cascade Telephone Communic	2	\$1,000	2,617,632
South Shore Radio, Inc.	3	\$975	4,313,682
P & R Comunciations Service, Inc.	1	\$750	4,325,459
Atlas Mobilfone Inc	2	\$715	946,147
Courtesy Communications, Inc.	2	\$650	1,383,612
D & K Business Pagers	1	\$650	1,934,632
DATAPAGE, INC.	1	\$650	8,672,944
Westside Paging Inc	1	\$650	3,445,064
Holsum Bakers, Inc. d/b/a Caprock Communications	1	\$500	382,517
Cactus Communications Inc	1	\$390	1,741,991
Pattersonville Telephone Company	1	\$375	1,147,154
St. Louis Electronics Communications Corporation	1	\$375	3,402,818
Communications Management Co. of Indiana	1	\$325	825,644
Mobile Radio Communications Service, Inc.	1	\$325	150,155
Mobilephone of Humboldt, Inc.	1	\$325	689,659
SCP COMMUNICATIONS, LLC	1	\$325	864,201
Western Communication Services, Inc.	1	\$325	144,847

Source: Federal Communications Commission

Notes: (1) As of the close of the auction.

**Table 4: Narrowband PCS Auction #41 Results**

Bidder Name	Total High Bids	Net High Bids (1)	POPs
Space Data Spectrum Holdings, LLC	204	\$6,343,511	2,795,954,831.00
Allegheny Communications, Inc.	101	\$1,767,825	755,996,003.00
Scott C. MacIntyre	6	\$75,300	30,417,369.00
AQUIS WIRELESS COMMUNICATIONS, INC.	5	\$64,400	56,415,142.00
Paging Systems, Inc.	1	\$34,000	19,145,232.00

Source: Federal Communications Commission

Notes: (1) As of the close of the auction.

**Table 5: Multiple Address Systems Spectrum Auction #42 Results**

Bidder Name	Total High Bids	Net High Bids (1)	POPs
MilkyWay Communications, LLC	476	\$757,500	1,510,789,444
Microwave Data Systems Inc.	168	\$181,000	182,265,599
Paging Systems, Inc.	38	\$113,100	312,924,284
TeleBEEPER of New Mexico, Inc.	58	\$38,415	95,673,811
Wisconsin Electric Power Company	33	\$33,000	48,559,020
TELEPHONE & TWO-WAY INC.	40	\$26,260	138,076,054
Southern Communications Services Inc d/b/a Souther	14	\$14,000	50,185,120
Phillips Communications, Inc.	10	\$10,100	4,230,958
Kirkland Associates, Inc.	15	\$9,750	41,956,089
IBG, Inc.	8	\$6,500	73,559,336
Fiberlessnet, Inc.	10	\$6,500	27,601,346
Chicago Communication Service, Inc.	4	\$4,000	37,271,788
Petra Ramasastry	4	\$2,600	25,526,022

Source: Federal Communications Commission

Notes: (1) As of the close of the auction.

**Table 6: Multi-Radio Service Auction #43 Results**

Bidder Name	Total High Bids	Net High Bids (1)	POPs
NXTEL SPECTRUM ACQUISITION CORP.	18	\$1,282,000	15,984,384
AerWav, Inc.	4	\$182,700	99,250,444
TeleBEEPER of NEW MEXICO, INC	5	\$83,525	3,334,545

Source: Federal Communications Commission

Notes: (1) As of the close of the auction.

**Table 7: New Analog Television Stations Auction #82 Results**

Bidder Name	Total High Bids	Net High Bids (1)	POPs
Roberts Broadcasting USA, LLC	2	\$3,326,250	N/a
Venture Technologies Group, LLC	1	\$1,323,000	N/a
Equity Broadcasting Corporation	1	\$376,000	N/a

Source: Federal Communications Commission

Notes: (1) As of the close of the auction.



## APPENDIX C: MOBILE TELEPHONY

### Table of Contents

Table 1: CTIA’s Semi-Annual Mobile Telephone Industry Survey .....	C-2
Table 2: FCC’s Semi-Annual Local Telephone Competition Survey .....	C-3
Table 3: Economic Area Penetration Rates .....	C-4
Table 4: Top 25 Mobile Telephone Operators by Subscribers .....	C-8
Table 5: Estimated Mobile Telephone Rollouts by Number of Launches by County .....	C-9
Table 6: County Quartiles with Estimated Rollout by at least 3 Mobile Telephone Providers .....	C-9
Table 7: Mobile Telephone Digital Coverage.....	C-10
Table 8: Change in CPI .....	C-10
Table 9: Average Revenue Per Minute .....	C-11
Table 10: Rural vs. Urban Pricing .....	C-11
Table 11: First Cellular of Illinois Per Minute Pricing 1995-2001 .....	C-12
Table 12: Foreign Holdings of U.S. Mobile Telephone Operators.....	C-13
Table 13: International Comparisons of Mobile Pricing.....	C-15

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

Date	Estimated Subscribers	Year End over Year End Subscriber Increase	Total Six-Month Service Revenues (000s)	Roamer Services Revenues	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	248,613	\$306,197		913	2,727	\$911,167	
June 86	500,000		\$360,585		1,194	3,556	\$1,140,163	
Dec 86	681,825	341,612	\$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	549,030	\$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	838,586	\$1,073,473	\$89,331	3,209	11,400	\$3,274,105	\$98.02
June 89	2,691,793		\$1,406,463	\$121,368	3,577	13,719	\$3,675,473	\$85.52
Dec 89	3,508,944	1,439,503	\$1,934,132	\$173,199	4,169	15,927	\$4,480,141	\$83.94
June 90	4,368,686		\$2,126,362	\$192,350	4,768	18,973	\$5,211,765	\$83.94
Dec 90	5,283,055	1,774,111	\$2,422,458	\$263,660	5,616	21,382	\$6,281,596	\$80.90
June 91	6,380,053		\$2,653,505	\$302,329	6,685	25,545	\$7,429,739	\$74.56
Dec 91	7,557,148	2,274,093	\$3,055,017	\$401,325	7,847	26,327	\$8,671,544	\$72.74
June 92	8,892,535		\$3,633,285	\$436,725	8,901	30,595	\$9,276,139	\$68.51
Dec 92	11,032,753	3,475,605	\$4,189,441	\$537,146	10,307	34,348	\$11,262,070	\$68.68
June 93	13,067,318		\$4,819,259	\$587,347	11,551	36,501	\$12,775,967	\$67.31
Dec 93	16,009,461	4,976,708	\$6,072,906	\$774,266	12,805	39,775	\$13,946,406	\$61.48
June 94	19,283,306		\$6,519,030	\$778,116	14,740	45,606	\$16,107,920	\$58.65
Dec 94	24,134,421	8,124,960	\$7,710,890	\$1,052,666	17,920	53,902	\$18,938,677	\$56.21
June 95	28,154,415		\$8,740,352	\$1,120,337	19,833	60,624	\$21,709,286	\$52.45
Dec 95	33,785,661	9,651,240	\$10,331,614	\$1,422,233	22,663	68,165	\$24,080,466	\$51.00
June 96	38,195,466		\$11,194,247	\$1,314,943	24,802	73,365	\$26,707,046	\$48.84
Dec 96	44,042,992	10,257,331	\$12,440,724	\$1,465,992	30,045	84,161	\$32,573,522	\$47.70
June 97	48,705,553		\$13,134,551	\$1,392,440	38,650	97,039	\$37,454,294	\$43.86
Dec 97	55,312,293	11,269,301	\$14,351,082	\$1,581,765	51,600	109,387	\$46,057,911	\$42.78
June 98	60,831,431		\$15,286,660	\$1,584,891	57,674	113,111	\$50,178,812	\$39.88
Dec 98	69,209,321	13,897,028	\$17,846,515	\$1,915,578	65,887	134,754	\$60,542,774	\$39.43
June 99	76,284,753		\$19,368,304	\$1,922,416	74,157	141,929	\$66,782,827	\$40.24
Dec 99	86,047,003	16,837,682	\$20,650,185	\$2,163,001	81,698	155,817	\$71,264,865	\$41.24
June 00	97,035,925		\$24,645,365	\$1,971,625	95,733	159,645	\$76,652,358	\$45.15
Dec 00	109,478,031	23,431,028	\$27,820,655	\$1,911,356	104,288	184,449	\$89,624,387	\$45.27
Jun 01	118,397,734		\$30,905,721	\$1,727,058	114,059	186,317	\$99,728,965	\$45.56
Dec 01	128,374,512	18,896,481	\$34,110,163	\$2,209,387	127,540	203,580	\$105,030,101	\$47.37

Source: Cellular Telecommunications and Internet Association, *Semi-Annual Wireless Industry Survey* <<http://www.wow-com.com/industry/stats/surveys/>>.

Table 2: FCC's Semi-Annual Local Telephone Competition Survey

Mobile Wireless Telephone Subscribers (as of June 30, 2001) 1/							
State	Jun 2001 Reporting Carriers 1/	Jun 2001 Percent Resold 2/	Subscribers Dec 1999	Subscribers Jun 2000	Subscribers Dec 2000 3/	Subscribers Jun 2001	Percent Change Jun 00 - Jun 01
Alabama	12	1%	1,080,410	1,253,084	1,386,294	1,930,631	54%
Alaska	5	10%	165,221	169,892	*	218,424	29%
Arizona	13	3%	1,125,321	1,624,668	1,855,115	2,018,410	24%
Arkansas	6	2%	719,919	715,467	743,928	891,275	25%
California	12	5%	8,544,941	12,283,369	12,710,520	14,184,625	15%
Colorado	9	3%	1,552,718	1,654,989	1,856,075	1,983,405	20%
Connecticut	6	9%	1,077,089	1,136,618	1,277,123	1,418,367	25%
Delaware	5	6%	270,848	275,219	371,014	389,284	41%
District of Columbia	6	9%	910,116	4/	928,962	987,323	N.M.
Florida	9	7%	5,158,079	4,983,478	6,369,985	7,536,670	51%
Georgia	14	4%	2,538,983	2,687,238	2,754,784	4,076,119	52%
Guam	*	*	*	*	0	*	*
Hawaii	6	2%	288,425	454,364	524,291	543,283	20%
Idaho	7	3%	271,436	296,066	344,564	398,781	35%
Illinois	10	9%	3,922,482	4,309,660	5,143,767	5,621,044	30%
Indiana	9	5%	1,318,975	1,717,378	1,715,074	1,781,247	4%
Iowa	8	7%	774,773	975,629	832,106	861,382	-12%
Kansas	10	3%	669,472	724,024	801,293	901,225	24%
Kentucky	9	1%	911,700	999,544	1,026,334	1,176,756	18%
Louisiana	12	3%	1,227,106	1,294,693	1,306,457	1,677,292	30%
Maine	5	3%	187,003	283,640	359,786	399,616	41%
Maryland	8	4%	1,473,494	4/	1,982,477	2,134,125	N.M.
Massachusetts	6	4%	1,892,014	2,228,169	2,649,130	2,753,685	24%
Michigan	10	9%	3,512,813	3,423,535	3,551,719	4,071,091	19%
Minnesota	12	7%	1,550,411	1,595,560	1,851,430	2,014,317	26%
Mississippi	9	4%	673,355	509,038	786,577	993,781	95%
Missouri	9	4%	1,855,452	1,848,775	1,767,411	1,937,684	5%
Montana	*	*	*	*	*	*	*
Nebraska	5	2%	576,296	600,885	659,380	712,685	19%
Nevada	6	3%	750,335	825,163	684,752	766,581	-7%
New Hampshire	7	13%	280,508	309,263	387,264	445,181	44%
New Jersey	6	1%	2,289,181	2,750,024	3,575,130	3,896,778	42%
New Mexico	8	8%	363,827	395,111	443,343	619,582	57%
New York	9	11%	4,833,816	5,016,524	5,918,136	6,749,096	35%
North Carolina	11	4%	2,536,068	2,730,178	3,105,811	3,377,331	24%
North Dakota	*	*	*	*	*	*	*
Ohio	12	6%	3,237,786	3,278,960	4,150,498	4,255,934	30%
Oklahoma	12	3%	826,637	979,513	1,124,214	1,200,234	23%
Oregon	8	3%	914,848	1,082,425	1,201,207	1,268,909	17%
Pennsylvania	12	5%	2,767,474	3,850,372	4,129,186	4,378,216	14%
Puerto Rico	5	21%	*	1,090,005	757,613	1,374,747	26%
Rhode Island	6	5%	279,304	313,550	355,889	401,805	28%
South Carolina	8	9%	1,137,232	1,236,338	1,392,586	1,502,345	22%
South Dakota	*	*	*	*	*	*	*
Tennessee	11	1%	1,529,054	1,876,444	1,985,851	2,251,208	20%
Texas	16	5%	5,792,453	6,705,423	7,548,537	8,294,338	24%
Utah	10	3%	643,824	692,006	750,244	833,492	20%
Vermont	*	*	*	*	*	*	*
Virgin Islands	*	*	*	0	0	*	*
Virginia	11	4%	1,860,262	4/	2,450,289	2,767,247	N.M.
Washington	9	4%	1,873,475	2,144,767	2,286,082	2,493,214	16%
West Virginia	9	6%	241,265	347,916	392,384	452,036	30%
Wisconsin	10	7%	1,525,818	1,342,908	1,698,520	2,008,679	50%
Wyoming	4	3%	127,634	*	*	173,939	*
Nationwide	72	5%	79,696,083	90,643,058	101,043,219	114,028,928	26%

N.M. - Not meaningful.

---

\* Data withheld to maintain firm confidentiality.

1/ Carriers with under 10,000 subscribers in a state were not required to report for that state.

2/ Percentage of mobile wireless subscribers receiving their service from a mobile wireless reseller

3/ Data for December 2000 have been revised.

4/ At the end of June 2000, the District of Columbia, Maryland, and Virginia had a total of 4.8 million subscribers. The state-by-state totals for these individual states were inconsistently reported at the end of June 2000 compared to the other filing periods.

Source: *Local Telephone Competition: Status as of June 30, 2001*, Federal Communications Commission, Feb. 2002 (Table 10: Mobile Wireless Telephone Subscribers).

**Table 3: Economic Area Penetration Rates**

EA	EA Name	Subscribers	2000 Census	EA penetration rate	EA density
34	Tampa-St. Petersburg-Clearwater, FL	920,170	2,395,997	38%	938.0
10	New York-No. New Jer.-Long Island, NY-NJ-CT-PA-MA-VT	12,184,293	25,712,577	47%	924.2
12	Philadelphia-Wilmington-Atl. City, PA-NJ-DE-MD	3,542,947	7,309,792	48%	802.1
161	San Diego, CA	1,396,336	2,813,833	50%	669.2
64	Chicago-Gary-Kenosha, IL-IN-WI	5,051,676	10,328,854	49%	561.2
31	Miami-Fort Lauderdale, FL	2,971,444	5,602,222	53%	532.7
3	Boston-Worcester-Lawrence-Lowell-Brockton, MA-NH-RI-VT	3,735,291	7,954,554	47%	437.4
55	Cleveland-Akron, OH-PA	2,022,255	4,692,460	43%	432.9
13	Washington-Baltimore, DC-MD-VA-WV-PA	4,441,033	8,403,130	53%	413.8
63	Milwaukee-Racine, WI	951,740	2,255,183	42%	377.7
57	Detroit-Ann Arbor-Flint, MI	3,559,074	6,963,637	51%	368.9
50	Dayton-Springfield, OH	515,403	1,133,004	45%	319.5
20	Norfolk-Virginia Beach-Newport News, VA-NC	805,041	1,722,764	47%	312.3
49	Cincinnati-Hamilton, OH-KY-IN	968,489	2,184,860	44%	297.7
11	Harrisburg-Lebanon-Carlisle, PA	436,066	1,125,265	39%	295.6
30	Orlando, FL	1,653,770	3,642,540	45%	295.0
33	Sarasota-Bradenton, FL	237,085	763,795	31%	288.9
160	Los Angeles-Riverside-Orange County, CA-AZ	8,196,656	18,003,420	46%	288.8
53	Pittsburgh, PA-WV	1,228,944	2,971,829	41%	286.9
163	San Francisco-Oakland-San Jose, CA	4,505,279	9,111,806	49%	275.0
40	Atlanta, GA-AL-NC	3,101,196	5,471,412	57%	250.2
32	Fort Myers-Cape Coral, FL	265,565	692,265	38%	244.7
23	Charlotte-Gastonia-Rock Hill, NC-SC	1,036,091	2,031,519	51%	244.3
133	McAllen-Edinburg-Mission, TX	285,964	978,369	29%	227.8
83	New Orleans, LA-MS	815,144	1,725,338	47%	215.4
8	Buffalo-Niagara Falls, NY-PA	481,033	1,507,759	32%	214.4
62	Grand Rapids-Muskegon-Holland, MI	745,452	1,881,991	40%	210.9
170	Seattle-Tacoma-Bremerton, WA	2,076,766	4,135,291	50%	196.3
164	Sacramento-Yolo, CA	1,089,950	2,311,567	47%	192.9
51	Columbus, OH	1,043,728	2,349,060	44%	191.5
19	Raleigh-Durham-Chapel Hill, NC	921,246	1,831,510	50%	191.3
18	Greensboro-Winston-Salem-High Point, NC-VA	846,321	1,854,853	46%	190.8
65	Elkhart-Goshen, IN-MI	302,732	936,245	32%	188.7
172	Honolulu, HI	678,441	1,211,537	56%	188.6
41	Greenville-Spartanburg-Anderson, SC-NC	547,336	1,248,824	44%	188.5
70	Louisville, KY-IN	624,418	1,416,914	44%	183.1
131	Houston-Galveston-Brazoria, TX	2,821,174	5,632,853	50%	175.0
67	Indianapolis, IN-IL	1,263,358	3,066,469	41%	172.4
44	Knoxville, TN	433,719	983,329	44%	172.0
7	Rochester, NY-PA	440,545	1,493,518	30%	170.4
81	Pensacola, FL	236,009	623,252	38%	169.7
22	Fayetteville, NC	218,585	528,224	41%	165.7
56	Toledo, OH	528,791	1,294,395	41%	165.6
26	Charleston-North Charleston, SC	283,141	587,297	48%	161.0
66	Fort Wayne, IN	237,456	725,847	33%	159.8

130	Austin-San Marcos, TX	708,185	1,349,267	52%	158.5
60	Appleton-Oshkosh-Neenah, WI	169,589	433,250	39%	156.1
43	Chattanooga, TN-GA	301,360	720,375	42%	148.9
84	Baton Rouge, LA-MS	337,171	739,673	46%	146.6
82	Biloxi-Gulfport-Pascagoula, MS	180,317	396,754	45%	146.5
45	Johnson City-Kingsport-Bristol, TN-VA	218,673	576,081	38%	146.2
78	Birmingham, AL	774,217	1,578,903	49%	139.3
5	Albany-Schenectady-Troy, NY	398,011	1,171,669	34%	139.0
46	Hickory-Morganton, NC-TN	176,375	519,208	34%	133.2
14	Salisbury, MD-DE-VA	116,455	363,970	32%	131.1
24	Columbia, SC	424,353	932,115	46%	130.9
42	Asheville, NC	192,505	444,594	43%	129.6
96	St. Louis, MO-IL	1,602,321	3,558,651	45%	129.0
15	Richmond-Petersburg, VA	690,032	1,446,123	48%	127.1
52	Wheeling, WV-OH	99,604	327,645	30%	125.8
74	Huntsville, AL-TN	443,660	997,824	44%	123.5
127	Dallas-Fort Worth, TX-AR-OK	3,492,819	7,645,530	46%	121.6
54	Erie, PA	146,901	519,348	28%	117.9
29	Jacksonville, FL-GA	948,062	1,885,190	50%	117.4
102	Davenport-Moline-Rock Island, IA-IL	222,511	558,913	40%	110.3
25	Wilmington, NC-SC	387,544	878,267	44%	109.8
6	Syracuse, NY-PA	559,353	1,902,640	29%	107.9
85	Lafayette, LA	252,426	601,654	42%	107.1
71	Nashville, TN-KY	1,073,972	2,444,643	44%	106.7
73	Memphis, TN-AR-MS-KY	844,860	1,882,332	45%	106.0
2	Portland, ME	263,474	748,817	35%	104.8
103	Cedar Rapids, IA	182,916	384,577	48%	101.8
162	Fresno, CA	466,213	1,419,998	33%	99.2
17	Roanoke, VA-NC-WV	342,689	826,284	41%	98.7
21	Greenville, NC	333,540	823,517	41%	96.7
28	Savannah, GA-SC	309,941	668,214	46%	95.8
158	Phoenix-Mesa, AZ-NM	1,660,151	3,407,197	49%	94.1
9	State College, PA	239,859	809,979	30%	92.8
101	Peoria-Pekin, IL	208,753	528,671	39%	92.4
87	Beaumont-Port Arthur, TX	186,769	456,637	41%	92.3
27	Augusta-Aiken, GA-SC	261,341	604,799	43%	91.4
92	Fayetteville-Springdale-Rogers, AR-MO-OK	153,503	405,160	38%	90.3
99	Kansas City, MO-KS	1,337,213	2,469,340	54%	89.7
107	Minneapolis-St. Paul, MN-WI-IA	2,029,379	4,498,286	45%	87.4
48	Charleston, WV-KY-OH	381,295	1,199,373	32%	86.0
39	Columbus, GA-AL	245,678	496,538	49%	85.6
134	San Antonio, TX	875,662	2,141,060	41%	83.6
47	Lexington, KY-TN-VA-WV	564,282	1,851,367	30%	80.9
167	Portland-Salem, OR-WA	1,274,658	2,883,737	44%	77.1
69	Evansville-Henderson, IN-KY-IL	329,160	854,714	39%	76.4
80	Mobile, AL	256,953	676,258	38%	76.3
93	Joplin, MO-KS-OK	92,188	263,904	35%	75.1
124	Tulsa, OK-KS	612,351	1,384,426	44%	74.5
72	Paducah, KY-IL	42,471	226,586	19%	74.1
68	Champaign-Urbana, IL	231,754	630,898	37%	73.8

104	Madison, WI-IL-IA	352,588	933,823	38%	72.9
79	Montgomery, AL	249,504	481,137	52%	67.7
35	Tallahassee, FL-GA	326,031	720,434	45%	65.9
125	Oklahoma City, OK	682,522	1,698,197	40%	65.8
37	Albany, GA	174,001	468,178	37%	63.8
38	Macon, GA	303,464	768,701	39%	63.5
118	Omaha, NE-IA-MO	460,250	1,044,156	44%	62.7
4	Burlington, VT-NY	145,021	605,393	24%	61.0
88	Shreveport-Bossier City, LA-AR	213,734	573,616	37%	60.3
159	Tucson, AZ	454,852	999,882	45%	60.3
97	Springfield, IL-MO	215,021	517,462	42%	58.8
98	Columbia, MO	146,327	369,014	40%	58.7
89	Monroe, LA	131,988	333,519	40%	57.3
106	Rochester, MN-IA-WI	140,121	318,374	44%	56.2
86	Lake Charles, LA	201,460	536,758	38%	55.3
105	La Crosse, WI-MN	61,293	241,903	25%	54.6
36	Dothan, AL-FL-GA	121,219	332,409	36%	54.6
61	Traverse City, MI	111,359	286,745	39%	52.4
141	Denver-Boulder-Greeley, CO-KS-NE	2,158,548	3,984,105	54%	52.1
95	Jonesboro, AR-MO	97,821	303,852	32%	51.8
16	Staunton, VA-WV	172,853	334,087	52%	51.1
77	Jackson, MS-AL-LA	582,434	1,432,518	41%	50.5
119	Lincoln, NE	168,876	379,321	45%	50.4
75	Tupelo, MS-AL-TN	212,847	625,002	34%	50.4
94	Springfield, MO	331,637	859,559	39%	48.7
132	Corpus Christi, TX	215,353	549,012	39%	47.7
91	Fort Smith, AR-OK	109,451	329,136	33%	47.7
100	Des Moines, IA-IL-MO	726,705	1,683,257	43%	47.6
90	Little Rock-North Little Rock, AR	673,941	1,614,850	42%	47.2
166	Eugene-Springfield, OR-CA	314,490	791,776	40%	43.4
76	Greenville, MS	54,753	252,280	22%	42.3
117	Sioux City, IA-NE-SD	78,391	252,656	31%	39.6
152	Salt Lake City-Ogden, UT-ID	934,897	2,088,974	45%	37.1
123	Topeka, KS	172,136	454,539	38%	36.0
108	Wausau, WI	153,868	487,723	32%	35.2
59	Green Bay, WI-MI	255,114	671,225	38%	35.0
157	El Paso, TX-NM	314,942	955,602	33%	33.1
58	Northern Michigan, MI	52,371	269,986	19%	29.9
169	Richland-Kennewick-Pasco, WA	241,690	677,674	36%	28.1
137	Lubbock, TX	152,257	374,626	41%	27.2
147	Spokane, WA-ID	314,010	829,735	38%	23.9
153	Las Vegas, NV-AZ-UT	764,938	1,709,797	45%	23.9
1	Bangor, ME	*	526,106	*	22.2
156	Albuquerque, NM-AZ	401,336	921,086	44%	20.9
122	Wichita, KS-OK	436,681	1,175,577	37%	20.6
128	Abilene, TX	69,134	222,147	31%	20.4
109	Duluth-Superior, MN-WI	138,626	350,059	40%	19.8
113	Fargo-Moorhead, ND-MN	142,755	371,691	38%	16.9
155	Farmington, NM-CO	67,869	193,872	35%	16.1
116	Sioux Falls, SD-IA-MN-NE	216,957	519,143	42%	15.4

165	Redding, CA-OR	115,277	336,820	34%	14.7
149	Twin Falls, ID	60,399	162,397	37%	14.1
150	Boise City, ID-OR	239,554	574,876	42%	13.8
139	Santa Fe, NM	98,201	258,790	38%	13.1
126	Western Oklahoma, OK	53,392	139,761	38%	12.1
138	Amarillo, TX-NM	181,305	481,633	38%	11.8
120	Grand Island, NE	115,829	288,047	40%	11.6
136	Hobbs, NM-TX	56,693	190,340	30%	11.2
148	Idaho Falls, ID-WY	117,667	306,120	38%	11.0
146	Missoula, MT	125,030	399,183	31%	10.9
110	Grand Forks, ND-MN	79,630	230,253	35%	10.5
135	Odessa-Midland, TX	150,112	388,007	39%	10.1
129	San Angelo, TX	66,580	202,679	33%	10.1
140	Pueblo, CO-NM	86,666	279,600	31%	8.7
168	Pendleton, OR-WA	60,071	200,681	30%	8.7
154	Flagstaff, AZ-UT	111,854	401,766	28%	8.3
142	Scottsbluff, NE-WY	34,775	92,360	38%	7.8
151	Reno, NV-CA	272,535	670,013	41%	7.6
111	Minot, ND	*	111,195	*	7.2
112	Bismarck, ND-MT-SD	64,536	175,427	37%	6.4
114	Aberdeen, SD	*	82,608	*	5.5
143	Casper, WY-ID-UT	184,959	408,708	45%	5.2
115	Rapid City, SD-MT-NE-ND	66,457	213,696	31%	5.1
121	North Platte, NE-CO	*	61,758	*	5.0
144	Billings, MT-WY	139,481	404,902	34%	4.9
145	Great Falls, MT	48,795	166,564	29%	4.3
171	Anchorage, AK	257,411	626,932	41%	1.1

\* Data withheld to maintain firm confidentiality.

Source: Federal Communications Commission internal analysis based on preliminary year-end 2001 filings for Numbering Resource Utilization in the United States. Density is persons per square mile.



**Table 4: Top 25 Mobile Telephone Operators by Subscribers  
(in thousands)**

Year-End 2000			Year-End 2001	
Operator	Total	Operator	Total	
1 Verizon Wireless	27,505	Verizon Wireless	29,398	
2 Cingular	19,681	Cingular	21,596	
3 AT&T	15,163	AT&T	18,047	
4 Sprint PCS	9,543	Sprint PCS	13,555	
5 Nextel	6,678	Nextel	8,667	
6 ALLTEL	6,300	VoiceStream	6,993	
7 VoiceStream	3,879	ALLTEL	6,683	
8 US Cellular	3,061	US Cellular	3,461	
9 Western Wireless	1,050	Western Wireless	1,177	
10 Powertel	908	Leap Wireless	1,119	
11 Qwest	805	Qwest	1,114	
12 CenturyTel	751	Telecorp (1)	1,018	
13 TeleCorp	666	Centennial	827	
14 Dobson Comm.	654	CenturyTel	797	
15 Rural Cellular	552	Dobson Comm.	700	
16 Price Comm	528	Triton PCS	686	
17 Centennial	665	American Cell.	657	
18 Triton PCS	446	Rural Cellular	647	
19 Cincinnati Bell	339	Price Wireless (2)	570	
20 PR Tel. Co.	335	Nextel Partners	516	
21 Nextel Partners	227	Alamosa PCS	503	
22 Midwest Wireless	208	Broadwing	462	
23 Cellcom	190	Airgate	453	
24 Leap Wireless	190	PrimeCo (3)	385	
25 Ntelos	168	PR. Tel. Co.	327	

Sources: For 2000, *see Sixth Report*, at 13464. For 2001, publicly available company documents such as operators' news releases and filings made with the Securities and Exchange Commission. PrimeCo estimate from Paul Wuh *et al.*, *United States Cellular Corp. to Acquire PrimeCo in Chicago, Becomes 7<sup>th</sup> Carrier in Market*, Global Equity Research, Goldman Sachs, May 13, 2002, at 2.

Notes

- (1) AT&T Wireless acquired TeleCorp in February 2002.
- (2) Verizon Wireless has announced plans to acquire Price Wireless.
- (3) U.S. Cellular has announced plans to acquire PrimeCo.

**Table 5: Estimated Mobile Telephone Rollouts  
by Number of Launches by County**

Total Number of Providers in a County	Number of Counties	POPs Contained in Those Counties (1)	% of Total US POPs	Square Miles Contained in Those Counties	% of Total US Square Miles
3 or More	2164	268,270,582	94.1%	1,746,786	49.6%
4 or More	1615	252,857,505	88.7%	1,193,833	33.9%
5 or More	1125	229,432,579	80.4%	839,939	23.9%
6 or More	670	151,497,042	53.1%	504,777	14.3%
7 or More	217	60,507,951	21.2%	172,286	4.9%

**Table 6: County Quartiles with Estimated Rollout by at least 3 Mobile Telephone Providers**

County Quartile Based on Population	Total Number of Counties (2)	Number of Counties with at least 3 Providers	Percent of Counties in Quartile with at least 3 Providers	Total POPs in Quartile (1)	POPs in Counties with at least 3 Providers	Percent of POPs with at least 3 Providers
1st Quartile	805	775	96.3%	234,640,253	231,961,749	98.9%
2nd Quartile	805	632	78.5%	31,425,466	25,249,594	80.4%
3rd Quartile	805	509	63.2%	14,146,698	9,189,879	65.0%
4th Quartile	804	248	30.9%	5,018,099	1,869,360	37.3%

Source: Federal Communications Commission estimates based on publicly available information.

Notes:

- (1) POPs from the 2000 Census.
- (2) United States and Puerto Rico

**Table 7: Mobile Telephone Digital Coverage**

Technology	POPs in Those Areas (1)	% of Total POPs (2)	Square Miles Contained in Those Counties	% of Total Square Miles
CDMA	256,427,449	89.9%	1,761,669.9	50.0%
TDMA / GSM	265,019,589	92.9%	1,857,545.3	52.8%
iDEN	245,068,095	85.9%	1,217,212.7	34.6%
Total Digital	276,799,296	97.0%	2,487,809.1	70.7%

Source: Federal Communications Commission estimates based on publicly available information.

Notes:

- (1) Broadband PCS and digital SMR licensees are analyzed by county; cellular licensees are analyzed by cellular market areas ("CMAs").
- (2) POPs from the 2000 Census.

**Table 8: Change in CPI**

	CPI		Cellular CPI		All Telephone CPI		Local Telephone CPI		Long Distance Telephone CPI	
	Index Value	Annual Change	Index Value	Annual Change	Index Value	Annual Change	Index Value	Annual Change	Index Value	Annual Change
Dec-97	100		100		100		100		100	
Dec-98	101.6	1.6%	91.7	-8.3%	100.3	0.3%	101.3	1.3%	99.9	-0.1%
Dec-99	104.3	2.7%	81.1	-11.6%	100.7	0.4%	104.2	2.8%	98.6	-1.3%
Dec-00	107.9	3.4%	71.1	-12.3%	98.4	-2.3%	110.0	5.5%	89.5	-9.2%
Dec-01	109.5	1.6%	67.2	-5.5%	99.7	1.3%	114.9	4.5%	87.9	-1.8%
Dec-97 to Dec-01	100	9.5%	100	-32.8%	100	-0.3%	100	14.9%	100	-12.1%

Source: Bureau of Labor Statistics.

**Table 9: Average Revenue Per Minute**

	Average Local Monthly Bill	Minutes of Use Per Month	Average Revenue Per Minute	Annual Change
1993	\$61.49	140	\$0.44	
1994	\$56.21	119	\$0.47	8%
1995	\$51.00	119	\$0.43	-9%
1996	\$47.70	125	\$0.38	-11%
1997	\$42.78	117	\$0.37	-4%
1998	\$39.43	136	\$0.29	-21%
1999	\$41.24	185	\$0.22	-23%
2000	\$45.27	255	\$0.18	-20%
2001	\$47.37	385	\$0.12	-31%

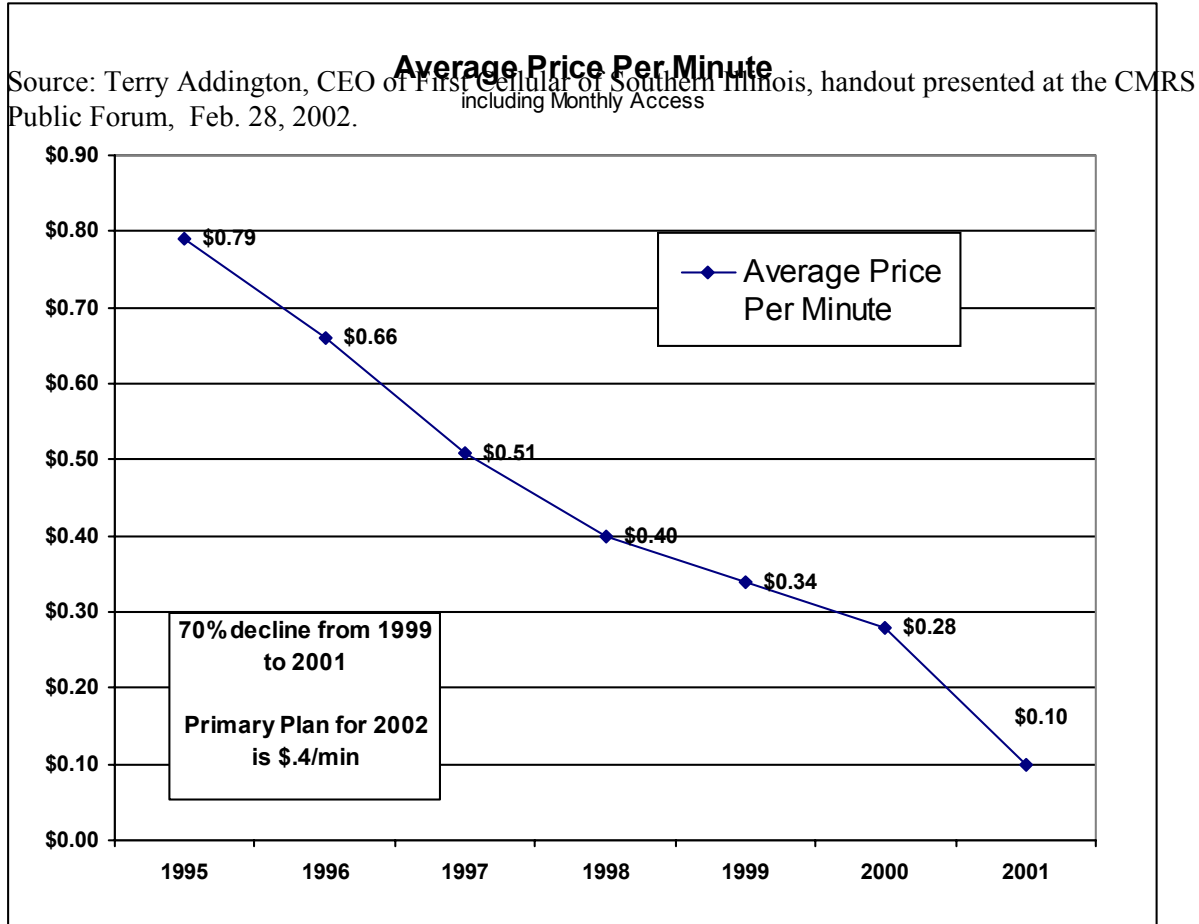
Source: CTIA, *Semi-Annual Mobile Telephone Industry Survey* <<http://www.wow-com.com/wirelessurvey/>> (average local monthly bill); *June 2001 CTIA Survey* (results through 2000), at 168-169 (minutes of use); Todd Rethemeier *et al*, *Talk is Cheaper, Demand is Steeper*, Bear Sterns, Equity Research, May 21, 2002, at 1 (citing CTIA 2001 minutes of use).

**Table 10: Rural vs. Urban Pricing**

Average Monthly Charge for Wireless Service Comparison Across Market Groups Surveyed October 2001						
	October 2001 70 % Peak					
	Minutes of Usage Per Month					
	30	150	300	600	Average	
	(Dollars Per Month)					
Top 25 Markets	\$23.46	\$34.69	\$39.79	\$51.61	\$37.39	
"Rural" Markets	\$23.52	\$31.09	\$36.34	\$54.39	\$36.34	
Large-Market Premium	-\$0.07	\$3.60	\$3.45	-\$2.78	\$1.05	
% Difference	-0.3%	11.6%	9.5%	-5.1%	2.9%	

Source: Charles R. Mahla, *Public Forum For the 7th Annual CMRS Competition Report*, Presentation, Econ One Research, Inc., Feb. 28, 2002, at slide 12 (*available at* <http://wireless.fcc.gov/services/cmrs/presentations/>).

**Table 11: First Cellular Of Illinois Per Minute Pricing  
1995-2001**



**Table 12: U.S. Mobile Telephone Operators'  
Holdings in Foreign Mobile Operators**

Operator	Country	Subscribers (Brand name)	Venture	Ownership (%)
SBC	France	11.646 million	Cegetel (owns 80% of cellular company Societe Francaise de Radiotelephone)	15 (through JV with Vivendi)
	Denmark	1.918 million	Tele Danmark	41.6
	Belgium	4.098 million (Proximus)	Belgacom	17.5 (controls 24.36% through investment in Tele Danmark, which owns 16.5% of Belgacom)
	South Africa	5.919 million (Vodacom)	Telkom SA(owns 50% of Vodacom)	18
	Canada	2.789 million (Bell Mobility)	Bell Canada	20
	Mexico	16.103 million	America Movil	8
BellSouth	Uruguay	138,000 (Movicom)	Abiatar	46
	Guatemala	75,000	BellSouth Guatemala	60
	Nicaragua	157,000	Nicacell	89
	Ecuador	344,000	Otecel	89.4
	Panama	293,000	BellSouth Panama	43.7
	Brazil (Sao Paulo)	1.781 million	BCP	45.4
	Brazil (northeast)	942,000	BCP	47.1
	Venezuela	3.106 million	Telcel	78.2
	Argentina	1.588 million	Movicom/ BellSouth	65
	Chile	860,000	BellSouth Chile	100
	Columbia	1.126 million	Celumovil	66
	Peru	404,000	Tele 2000	97.4
	Denmark	810,251	Sonafon	46.5
Israel	1,856,488	Cellcom	34.7	
AT&T	Canada	3 million	Rogers Wireless	34.4
	India	176,800	Birla-AT&T-Tata	33
	Taiwan	3.211 million	FarEasTone	22.7
	Czech Republic	2.11 million	EuroTel Praha	24.5
	Slovakia	493,030	EuroTel Bratislava	24.5
	India	606,200 (BPL Mobile)	BPL Cellular	49
Verizon	Italy	>17 million	Omnitel Pronto Italia	23.1
	Mexico	1.9 million	Iusacell	39.4
	Czech Republic	2.11 million	EuroTel Praha	24.5
	Slovakia	493,030	EuroTel Bratislava	24.5
	Greece	1.645 million	STET Hellas	17.5
	Indonesia	765,000	Excelcomindo	23.1
	Japan	3.84 million	Tu-Ka	2.7-5
	New Zealand	1.2 million	Telecom New Zealand	21.5
	Philippines	26,000 (Extelcom)	BayanTel (owns 46.6% stake in wireless provider Extelcom)	19.4
	Argentina	1.1 million (CTI Movil)	CTI Holdings	65.3
	Canada	2.5 million	TELUS Corporation	23.7
Venezuela	2.5 million	CANTV	28.5	

	Taiwan	6.6 million		Taiwan Cellular Corporation	13
	Dominican Republic	550,000		CODETEL	100
Western Wireless International	Ireland	802,000 for all foreign ventures	Launched 2/01	Meteor	78
	Iceland		55,000	TAL	57.3
	Austria		200,000	tele.ring	100
	Slovenia		Licensed 11/00	Western Wireless	100
	Croatia		470,000	VIPnet	19
	Georgia		NA	MagtiCom	14.5
	Ghana		NA	Western Telesystems	56.7
	Cote d'Ivoire		Launched 9/00	CORA de Comstar	40
	Bolivia		Launched 11/00	NuevaTel	67
	Haiti		NA	COMCEL	51
Nextel International	Canada	2.156 million		TELUS Corp.	4.8
	Japan	49,000		NEXNET Co.	32
	Argentina	134,000		Nextel Communications Argentina	100
	Brazil	322,000		Nextel Telecomunicacoes	100
	Mexico	218,000		Nextel De Mexico	100
	Peru	68,000		Nextel del Peru	100
	Philippines	42,000		Nextel Communications Philippines, Inc.	51

Sources: Publicly available information such as operators' news releases, web sites, filings with the Securities and Exchange Commission, and the web site of the European Radiocommunications Office.

**Table 13: International Comparisons of Mobile Pricing**

Country	Business Mobile Basket	Residential Mobile Basket	Revenue Per Minute
Australia	\$759	\$172	\$0.18
Japan	\$907	\$347	\$0.33
New Zealand	\$1659	\$368	\$0.15
South Korea	\$1039	\$357	\$0.19
<b>Asia-Pacific Average</b>	<b>\$1091</b>	<b>\$311</b>	<b>\$0.21</b>
Austria	\$736	\$387	
Belgium	\$860	\$266	
Denmark	\$945	\$183	
Finland	\$1074	\$152	
France-Orange, Forfait 2H	\$1063	\$406	\$0.20
France-Orange, Forfait 5H	\$790	\$683	
Germany	\$1124	\$299	\$0.20
Greece	\$1262	\$308	\$0.28
Iceland	\$815	\$167	
Ireland	\$1157	\$257	
Italy	\$1556	\$345	\$0.21
Luxembourg	\$690	\$184	
Netherlands	\$790	\$269	
Norway	\$717	\$214	
Portugal	\$1252	\$388	\$0.21
Spain	\$1618	\$323	\$0.23
Sweden	\$1257	\$206	
Switzerland	\$1046	\$284	
U.K.-BT	\$1006	\$339	\$0.21
U.K.-Vodafone	\$1047	\$331	
<b>West European Average</b>	<b>\$1040</b>	<b>\$299</b>	<b>\$0.22</b>
Canada	\$1026	\$422	\$0.13
U.S.A.-Qwest	\$772	\$415	\$0.16
U.S.A.-Sprint	\$692	\$479	

Sources: The mobile baskets are from *Teligen T-Basket – Mobile (GSM/PCS) Basket*, Teligen Limited, Feb. 2002; the Revenue Per Minute estimates are from Adam Quinton et al, *Wireless Matrix – 3Q01*, Global Equity Research, Merrill Lynch, Jan. 2002, at 3.



**APPENDIX D:  
MOBILE DATA**

**Table of Contents**

Table 1: 3G Spectrum Licensing Abroad ..... D-2

Table 2: Mobile Internet Access Services..... D-5

Table 3: Bluetooth-Enabled Devices ..... D-8

Table 4: Telemetry Services ..... D-9

**Table 1: 3G Licensing Abroad**

<b>Country (status)</b>	<b>Spectrum (MHz)</b>	<b>Number of Licenses</b>	<b>Assignment Method</b>	<b>Auction Revenue Or License Fee (US Dollars)</b>
Austria  (Awarded November 2000)	145	4-6 (6 awarded)	Auction	\$618m
Australia  (Awarded March 2001)	140 in capital cities 110 in Canberra 40 in regional areas	4 or more (6 awarded) 3 or more (5 awarded) 2 or more (3 awarded)	Auction	\$580m
Belgium  (Awarded March 2001)	140  (105 sold)	4 (3 awarded)	Auction	\$413m
Denmark  (Awarded September 2001)	140	4	Auction	\$472m
Finland  (Awarded March 1999)	140	4	Beauty contest	Annual spectrum fee of \$890 per 25 KHz (licenses awarded free of charge)
France  (Awarded May 2001)	140	4 (2 bids received)	Beauty contest	\$535m per license + 1% of annual revenue
Germany  (Awarded August 2000)	145	4-6 (6 awarded)	Auction	\$46.11bn
Greece  (Awarded July 2001)	140	4 (3 awarded)	Auction	\$414.1m
Hong Kong  (Awarded September 2001)	140	4	Combination (prequalifica tion followed by auction <sup>1</sup> )	5% of 3G revenue over 15 years, with minimum of \$6.4m per year in first 5 years

Italy (Awarded October 2000)	145 <sup>2</sup>	5	Combination (prequalification on beauty contest followed by auction)	\$10.04bn
Ireland (Expected June 2002)	140	4	Beauty contest	\$43.6m (A license) or \$98.3m (B licenses) + \$1.91m annual fee
Japan (Awarded July 2000)	120	3	Beauty contest	No fees
Netherlands (Awarded July 2000)	145	5	Auction	\$2.5bn
New Zealand (Awarded January 2001)	105	4	Auction	\$51.4m
Norway (Awarded November 2000)	140	4 <sup>3</sup>	Beauty contest	\$92m + annual fee of \$2.2m per license
Portugal (Awarded November 2000)	140	4	Beauty contest	\$342.4m + annual fee
Singapore (Awarded April 2001)	140	4 (3 awarded)	Auction <sup>4</sup>	\$173.4m
South Korea (Awarded December 2000 and August 2001)	Not available	3	Beauty contest	\$3.3bn
Spain (Awarded March 2000)	140	4	Beauty contest	\$446.5m + annual fee
Sweden (Awarded December 2000)	140	4	Beauty contest	\$107,000 + 0.15% of annual revenues

Switzerland (Awarded December 2000)	140	4	Auction	\$120m
Taiwan (Awarded Feb. 2002)	170	5	Auction	\$1.4bn
UK (Awarded April 2000)	140	5	Auction	\$35.361bn

Sources: Publicly available information such as web sites of national regulatory authorities, the EU Commission, and the ITU.

**Table 2: Mobile Internet Access Services**

Provider	Service Name	Device(s)	Price (\$ per month)	Messaging	Web	E-mail	Notes		
ALLTEL	Web-Unwired	Mobile handsets	\$5.95, free for the first month		•	•	Users can customize their wireless web home pages to include pertinent information and tools, such as a list of bookmarks.		
AOL	Mobile Communicator	RIM 2-way messaging device	\$29.95	•		•	Users can access AOL IM and e-mail messages from an AOL account.		
Arch Wireless	Webster 100	Motorola T900	\$9.95-\$59.95 for 10,000 characters to unlimited messaging	•		•	Users can have messages from existing e-mail accounts forwarded to the device, exchange IMs, and receive information updates.		
AT&T Wireless	2-Way Text Messaging/ AIM	Mobile handsets	10¢ per sent message or AIM command 25¢ per message when roaming	•			Receive unlimited messages with both pricing plans. Send text messages to any digital network.		
			\$4.99 for 100 sent messages, 10¢ thereafter or per AIM command	•					
	PocketNet	Mobile handsets	\$0-\$14.99		•	•	Basic free service includes access to over 80 web sites. Plus and Premium plans include access to all web sites, email, calendar, contact list, and other features.		
	Mobile Internet (GSM/GPRS Network)	Mobile handsets, wireless modem card	\$29.99 for up to 5MB + .7¢ per extra KB		•	•	GSM/GPRS network with speeds bursting up to 144 kbps.		
			\$39.99 and up – Bundled voice and data plans that include 1 MB + voice minutes		•	•			
Cingular Wireless	2-Way Text Messaging/ MSN Messenger	Mobile handsets	\$2.99 for 100 messages \$5.99 for 250 messages \$9.99 for 500 messages 10¢ per additional message	•			Send and receive up to 150 characters on any carrier's network.		
			Wireless Internet	Mobile handsets	\$6.99-\$13.99, includes 100 to 500 messages	•	•	•	Provides content such as movie listings, stock quotes, news, weather and yellow pages.
			Wireless Internet Express	Mobile handsets	\$14.99-\$21.99 for 500 KB + 100 to 500 messages	•	•	•	Provides content via GPRS network.
EarthLink	EarthLink Wireless Service	various PDAs, Motorola 2-way pager	\$39.99 (most PDAs) RIM: \$9.95 beyond BlackBerry Compaq: \$59.99 Motorola: \$24.95		•	•	Prices are slightly lower with an annual prepaid service contract.		
GoAmerica	Go.Web	various PDAs, laptops	\$49.95 unlimited RIM: \$24.95 beyond BlackBerry		•	•	Users can access existing POP3 e-mail accounts.		
Metrocall	My2Way	Motorola T900, P935	\$19.95-\$49.95 for 1000-3500 messages	•		•			

	My eLink	RIM 850	\$49.95 unlimited	•		•	
Motient	eLink	RIM 850, RIM 857, Palm V with wireless modem	\$49.99 unlimited \$19.99 for 150,000 characters + \$0.20 per addl KB		•	•	Forwards messages from an existing POP or IMAP e-mail account to the device; web browsing from Go.Web
Nextel	Nextel Online	Mobile handsets	\$5.00, free with national plans			•	Access to wireless-enabled websites and Microsoft Hotmail account. Plan includes 300 text messages per month.
	Nextel Online Plus	Mobile handsets	\$10.00			•	Access to wireless-enabled websites, email, calendar, and contact list. Plan includes 300 text messages per month.
	Two-way Messaging	Mobile handsets	\$5.00, unlimited usage	•			Send and receive email, text, and numeric messages.
Palm	Palm.net	Palm i705 Palm VII	\$9.99 50 KB \$24.99 150 KB \$44.99 unlimited	•	•	•	Service on Palm i705 includes access to AIM.
RIM	BlackBerry	RIM PDAs	\$39.99			•	Allows integration with existing e-mail accounts.
SkyTel	eChat	Motorola T900	\$14.95 - \$29.98 for 500 - 2000 messages	•		•	Individual messages have a 500-character limit.
	Mobile Mail	RIM 850, RIM 857	\$49.95 unlimited			•	E-mail messages can be up to 2,000 characters long.
	BlackBerry by SkyTel	RIM 850, RIM 857	\$49.99 unlimited	•		•	Allows integration with existing e-mail accounts. Two-way messaging with other SkyTel and RIM users included.
Sprint PCS	Wireless Web Option	Mobile handsets	From \$9.99 with Sprint PCS calling plan			•	Calling plan minutes can be used for either calls or Internet. Includes 50 wireless web updates.
	Wireless Web Connection	Laptops and handhelds	39¢ per minute			•	Uses Sprint PCS phone and connection kit to wirelessly connect laptops and handhelds to the Internet.
	Wireless Web Short Mail	WAP-enabled Mobile handsets	From \$5.00 with Sprint PCS calling plan or 39¢ per minute	•			Calling plan minutes can be used for either calls or Short Mail messages. Messages are sent via email.
Verizon Wireless	2-Way Text Messaging	Mobile handset	2¢ send/10¢ receive \$2.99 for 100 messages \$7.99 for 600 messages	•			120 character text messaging on the Verizon Wireless network.
	Mobile Web	Mobile handset	\$6.95 to \$12.95 for web access and 100 to 600 alerts.			•	Allows users to customize content, either with a handset or through a wired PC at MyVZW.com, Verizon's portal.
	Mobile Web Plus	Kyocera QCP-6035 smartphone	\$9.95			•	Service for Smartphones. Allows access to up to 6 POP3 email accounts.
	Express Network	1XRIT mobile handset, wireless modem card	Plans start at \$35 for 10 MB or \$30 for unlimited downloads when purchased with a voice plan.			•	Using the CDMA2000 1xRTT network, average data rates are 40-60 kbps. Verizon Wireless claims speeds up to 144 kbps.

VoiceStream	iStream	Smartphone, PDA, and laptop	\$2.99 for Smartphones \$19.99 for PDAs \$39.99 for laptops	•	•	•	Prices and conditions vary by device. Each plan includes an allotment of MB, and the option to use more MB for an additional fee. Each plan also includes 300 Ping Pong text messages.
	AOL Instant Messenger	Mobile handset	\$2.99 for 500 messages	•			Customers keep in touch with “buddies” using AIM.
WebLink Wireless	2-Way Messaging	Motorola T900	\$14.95-\$29.95 for 500-3000 messages	•			
	Remote E-mail Manager	Motorola T900	\$2 in addition to 2-way messaging plan, free for “Deluxe” 2-Way subscribers			•	Users can have e-mail messages from existing accounts forwarded to the T900.

Sources: The information provided above is illustrative of Internet access services provided by mobile telephone operators in 2000 and should not be considered an exhaustive list. Information is based on publicly available company documents such as news releases, company web sites, SEC filings, and newspaper and periodical articles.

**Table 3: Bluetooth-Enabled Devices**

<u>Company</u>	<u>Product Name</u>	<u>Product Type</u>
ATO Technology Ltd.	ATO Bluetooth Headset	Mobile phone accessory
Compaq	iPAQ Pocket PC	Mobile computer
Epson	Print Adapter	Office equipment
Ericsson	Mobile Telephone T68i	Mobile phone
	Bluetooth Headset HGH-20	Mobile phone accessory
Fujitsu	Modem Access Point	Computer accessory
	Data Access Point	Office equipment
INVENTEL SYSTEMES	BlueDSL and EtherBlue	Computer accessory
Motorola	Handsfree Car Kit	Mobile phone accessory
	Timeport 270	Mobile phone
	Phone Module and Phone Module II	Mobile phone accessory
	Clip-on Accessory	Mobile phone accessory
Nokia	Models 6310 and 6310i	Mobile phone
	Connectivity Battery	Mobile phone accessory
Samsung	Samsung Bluetooth PCS Phone	Mobile phone
Sony	Digital Video Camera Recorder	Cameras and video
Toshiba	Ubiquitous Headset	Accessory
	Refrigerator-freezer	Home environment equipment

Sources: The information provided above is illustrative of the qualified Bluetooth-enabled devices available from equipment manufacturers and should not be considered an exhaustive list. Information is based on the Bluetooth Qualification web site:

<<http://qualweb.opengroup.org/Template2.cfm?LinkQualified=QualifiedProducts>>.



**Table 4: Telemetry Services**

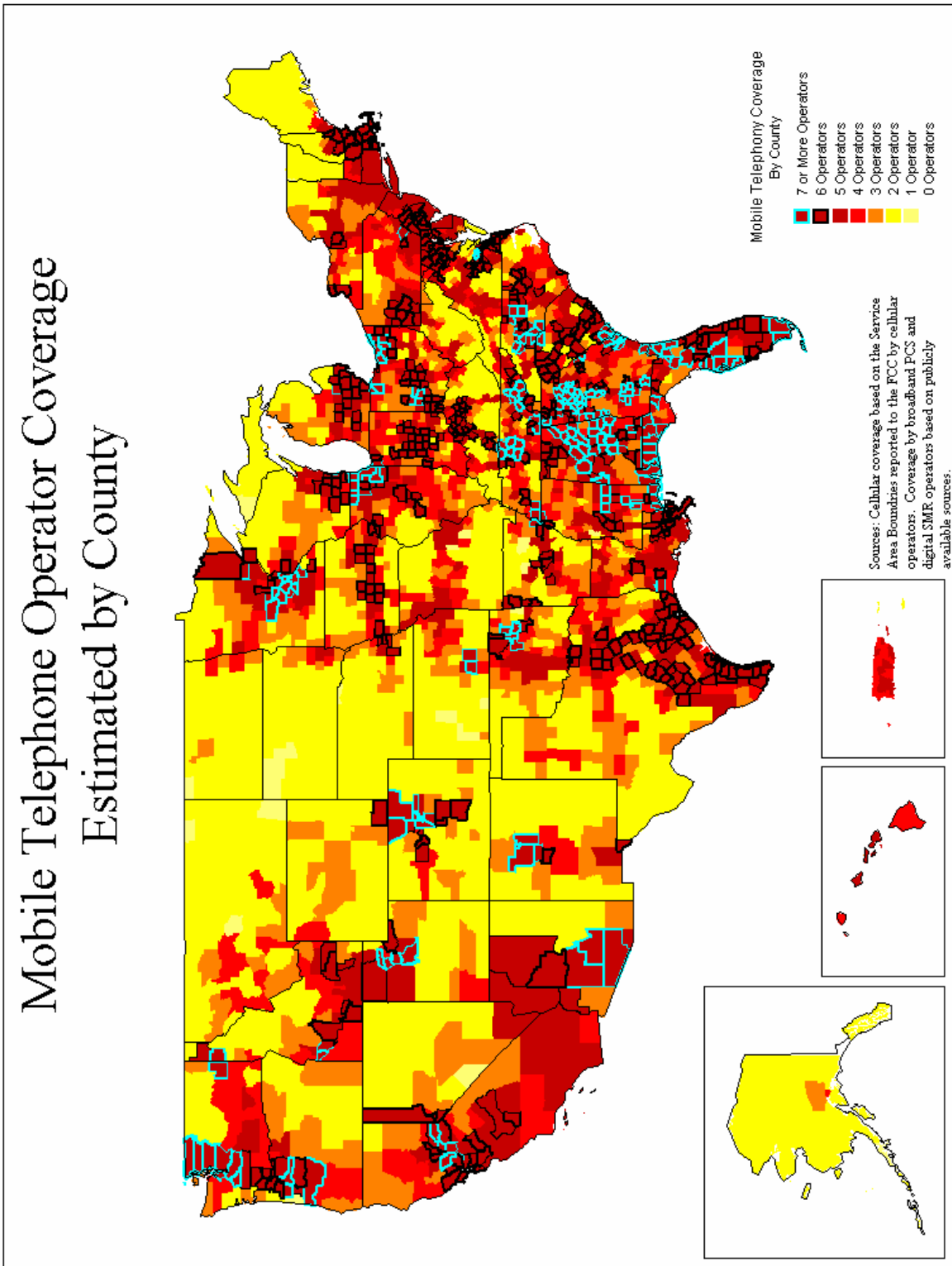
<b><u>Company</u></b>	<b><u>Status</u></b>
Schlumberger	5 million wireless telemetry customers in North America connected as of February 2001.
Itron	Offers AMR exclusively; had connected 17.6 million AMR units at YE 2001 to over 625 utilities in North America.
Aeris's MicroBurst	Leases the control channel of cellular networks from cellular carriers covering all of North America. During 2001, Aeris signed the following agreements with telemetry providers: American Innovations Team to monitor 2 million miles of gas and oil pipelines; Notifact to allow Invensys Energy Systems to remotely control and monitor lighting systems at Albertson's 250 supermarket locations in California; Beacon Wireless Solutions to provide monitoring and security services for boats.
NumereX's Cellemetry Data Service	Leases capacity from cellular carriers covering 99 percent of U.S. cellular markets. Provides two-way, wireless data connectivity for a variety of machine-to-machine communications that remotely monitor, measure, or track fixed and mobile assets. Numerex has signed agreements with Vermeer Manufacturing allowing Vermeer to provide a fleet management system in order to track and monitor its equipment, and with InterTrak to provide security and tracking support in the deployment of InterTrack's GPS Satellite Tracking System.
WebLink Wireless	Its telemetry business unit, Wireless Control Systems, sells the use of its narrowband PCS spectrum for remote monitoring services; has contracts to deploy security alarm monitoring and HVAC control systems.
Motient	Offers telemetry services such as AMR, asset tracking, and vending machine monitoring.
Cingular Wireless	Resells Mobitex network to telemetry providers, such as alarm, billboard sign, and vending machine monitoring companies.
SkyTel ReFLEX Telemetry Services	Offers telemetry services for nearly any type of machine measurement system, including utility meters, vending machines, vehicles, and health care devices. Uses narrowband PCS spectrum, satellite backhaul, and CreaLink2 XT wireless data transceiver devices to monitor and transmit remote data for its customers.

Sources: Information is based on publicly available documents such as news releases, newspaper and periodical articles, company web pages, and SEC filings.

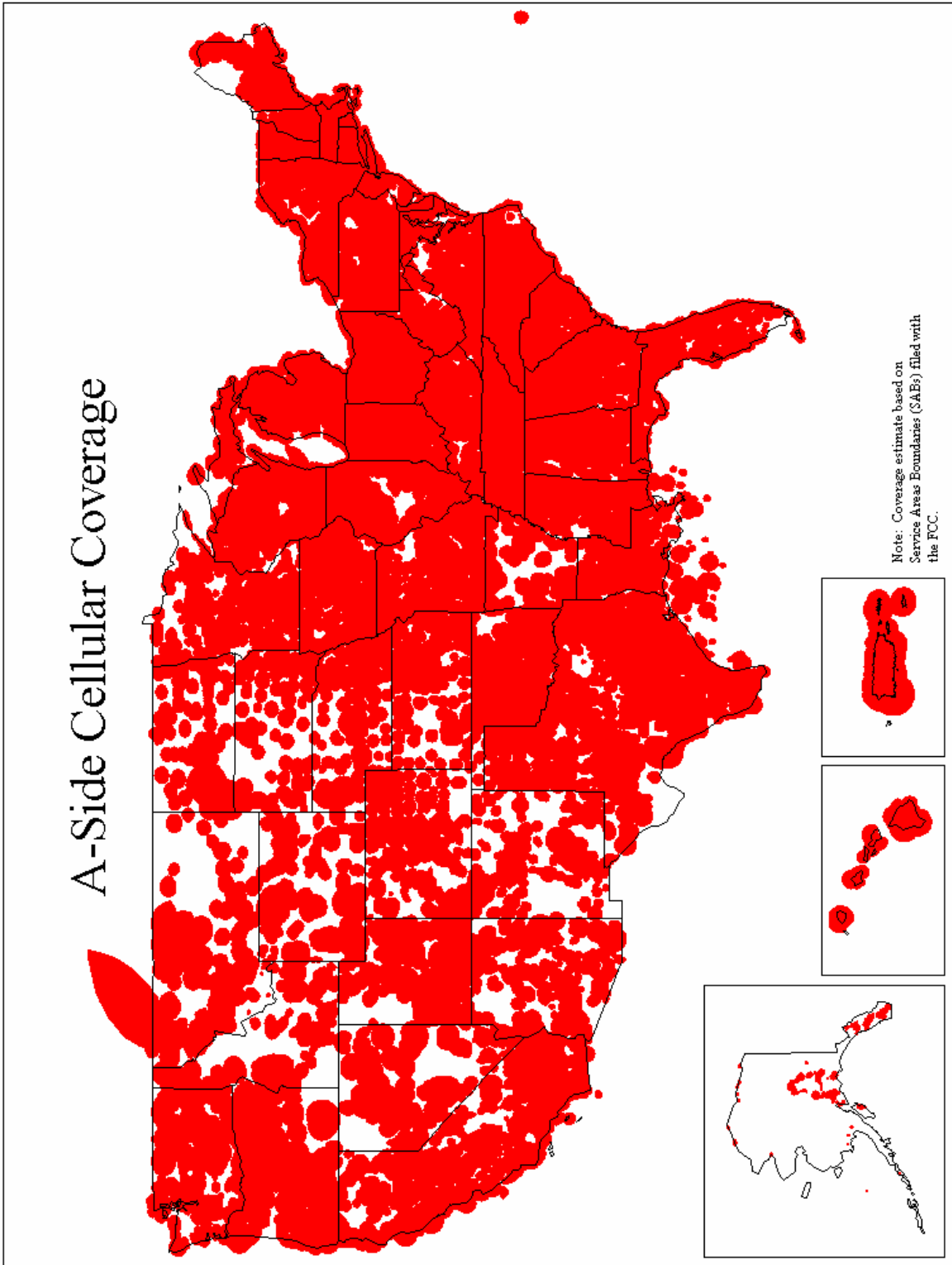
**APPENDIX E:  
MAPS****Table of Contents**

Map 1: Mobile Telephone Operator Coverage Estimated by County .....	E-2
Map 2: A-Side Cellular Coverage .....	E-3
Map 3: B-Side Cellular Coverage .....	E-4
Map 4: Mobile Telephony Penetration Estimated by Economic Area .....	E-5
Map 5: Estimated Rollout with Any Digital Coverage.....	E-6
Map 6: Estimated Rollout with CDMA-Based Coverage.....	E-7
Map 7: Estimated Rollout with TDMA/GSM-Based Coverage .....	E-8
Map 8: Estimated Rollout with iDEN-Based Coverage .....	E-9
Map 9: Estimated Rollout of GPRS and cdma2000 1xRTT Networks.....	E-10
Map 10: Lowerband Fixed Wireless Internet Access Rollout Estimated by County.....	E-11
Table 1: Geographic Licensing Schemes.....	E-12
Map 11: Basic Trading Areas. ....	E-13
Map 12: Major Trading Areas. ....	E-14
Map 13: Cellular Market Areas. ....	E-15
Map 14: Economic Areas.....	E-16

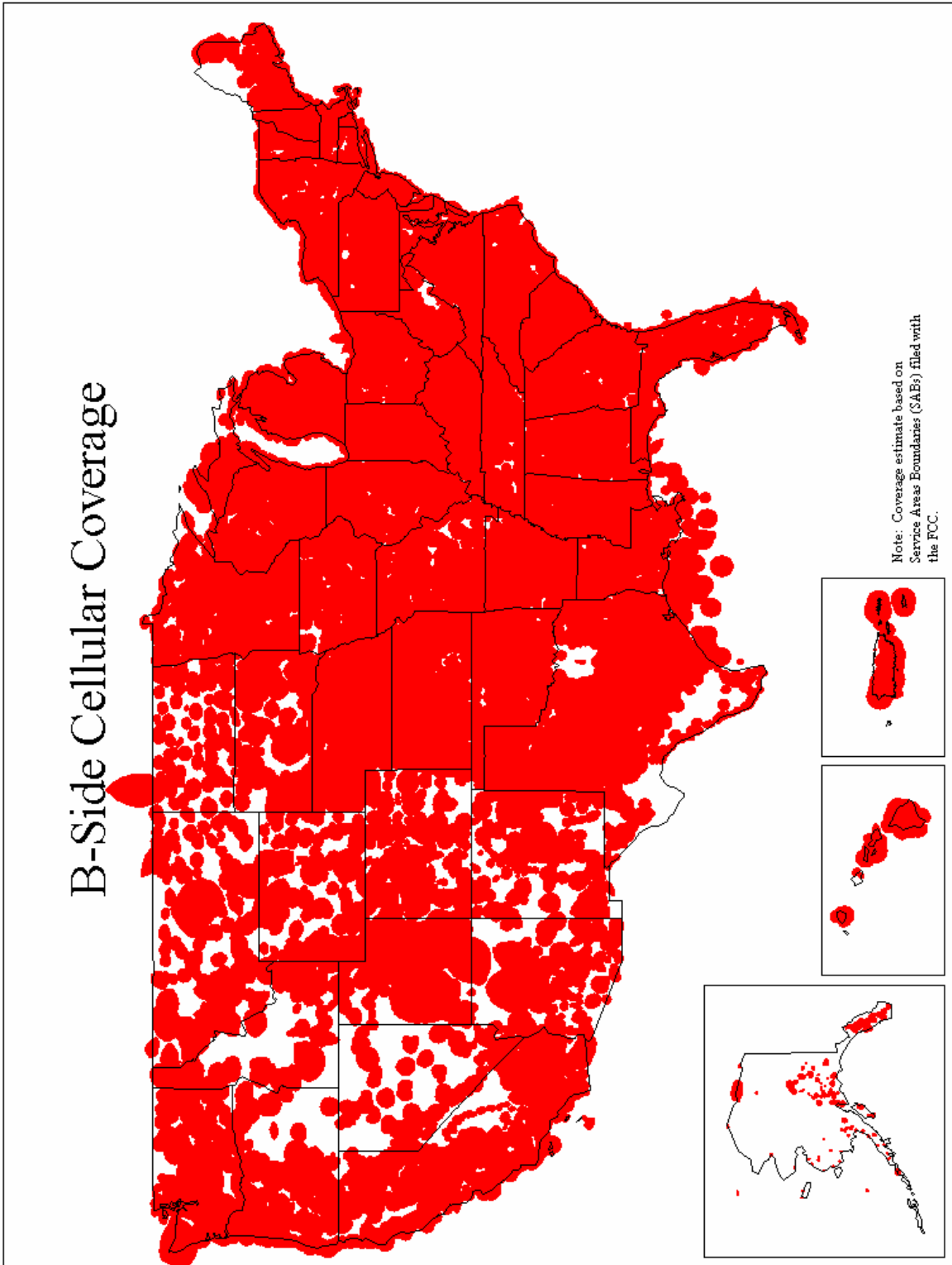
Map 1



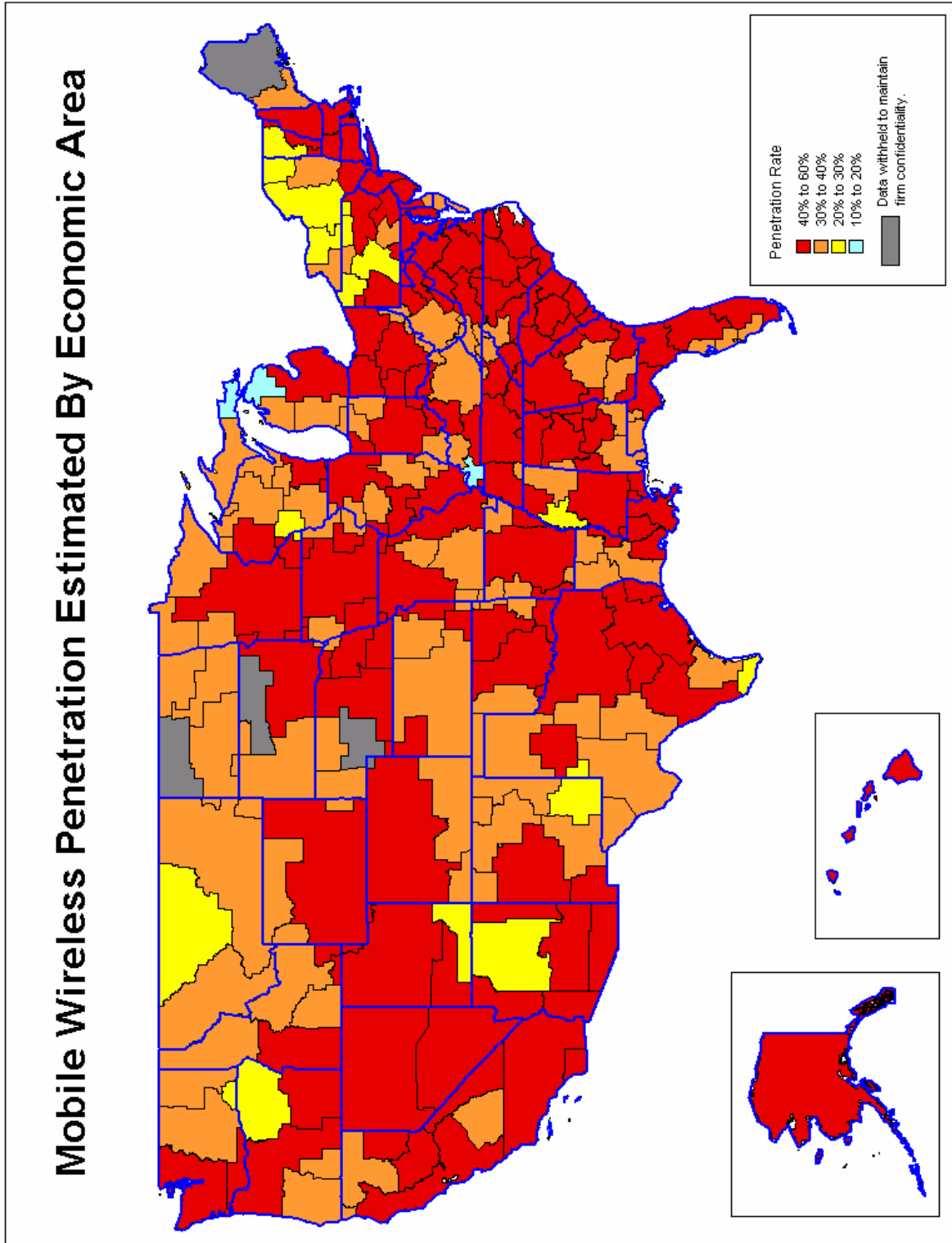
Map 2



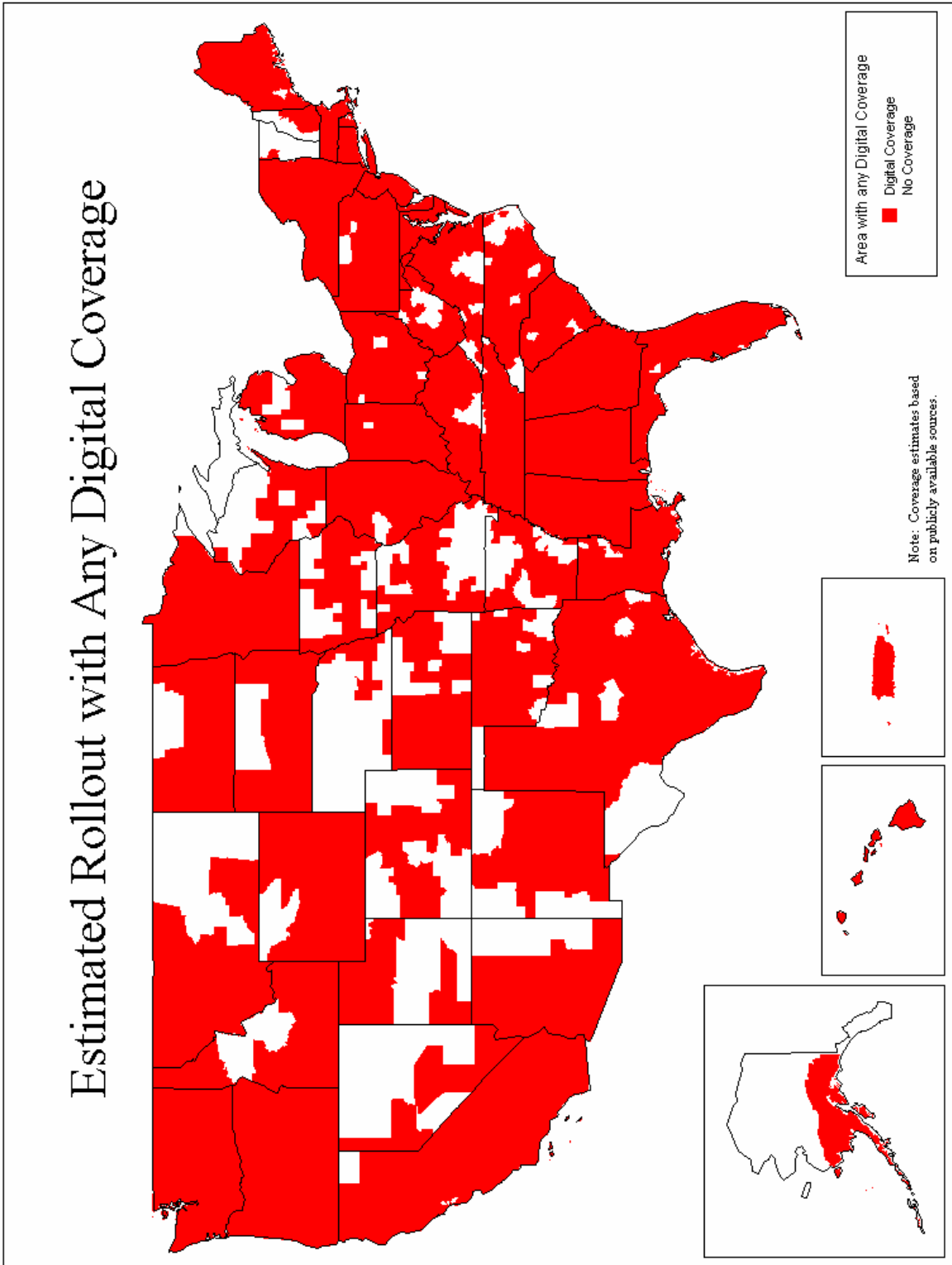
Map 3



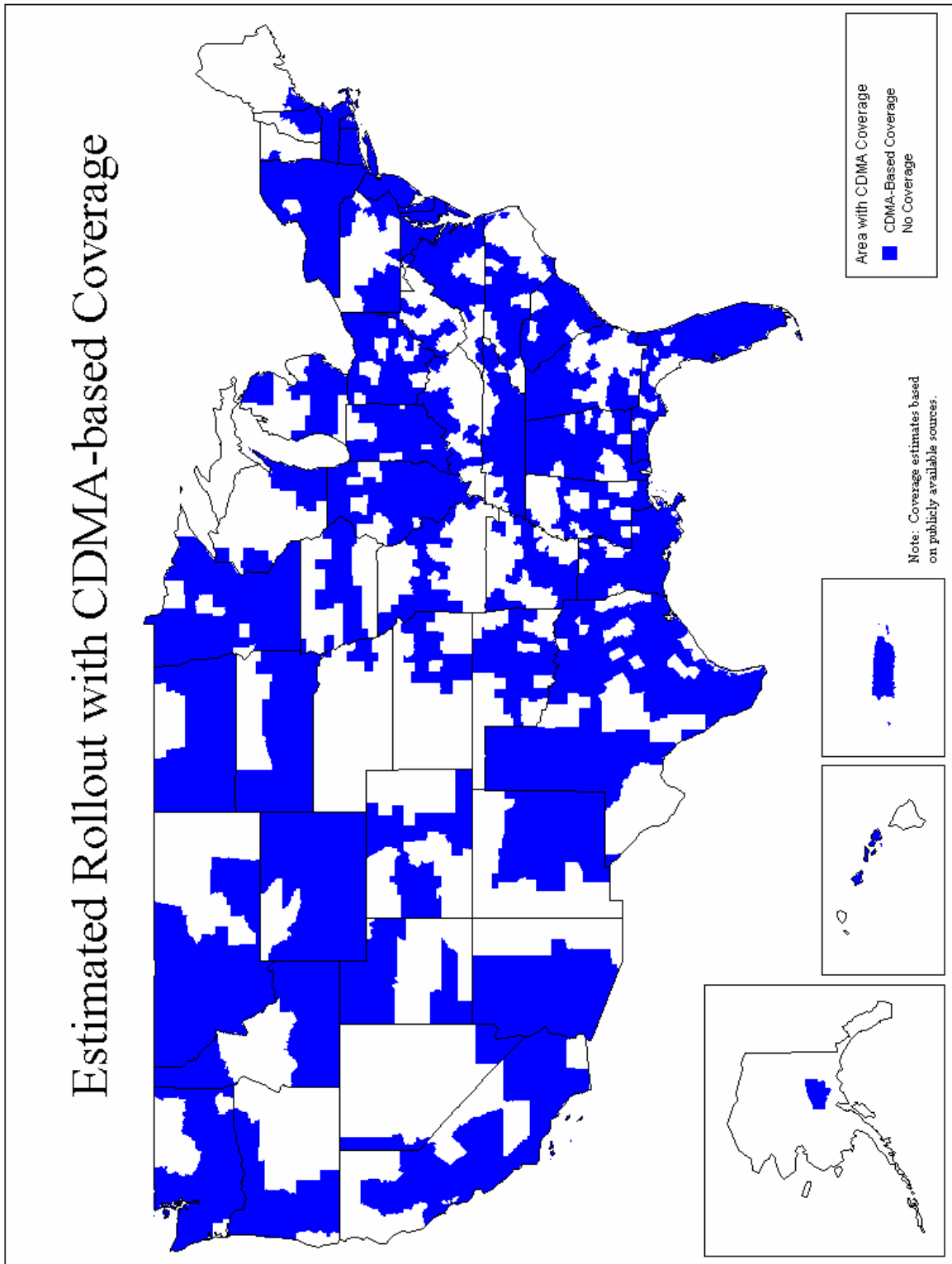
Map 4



Map 5

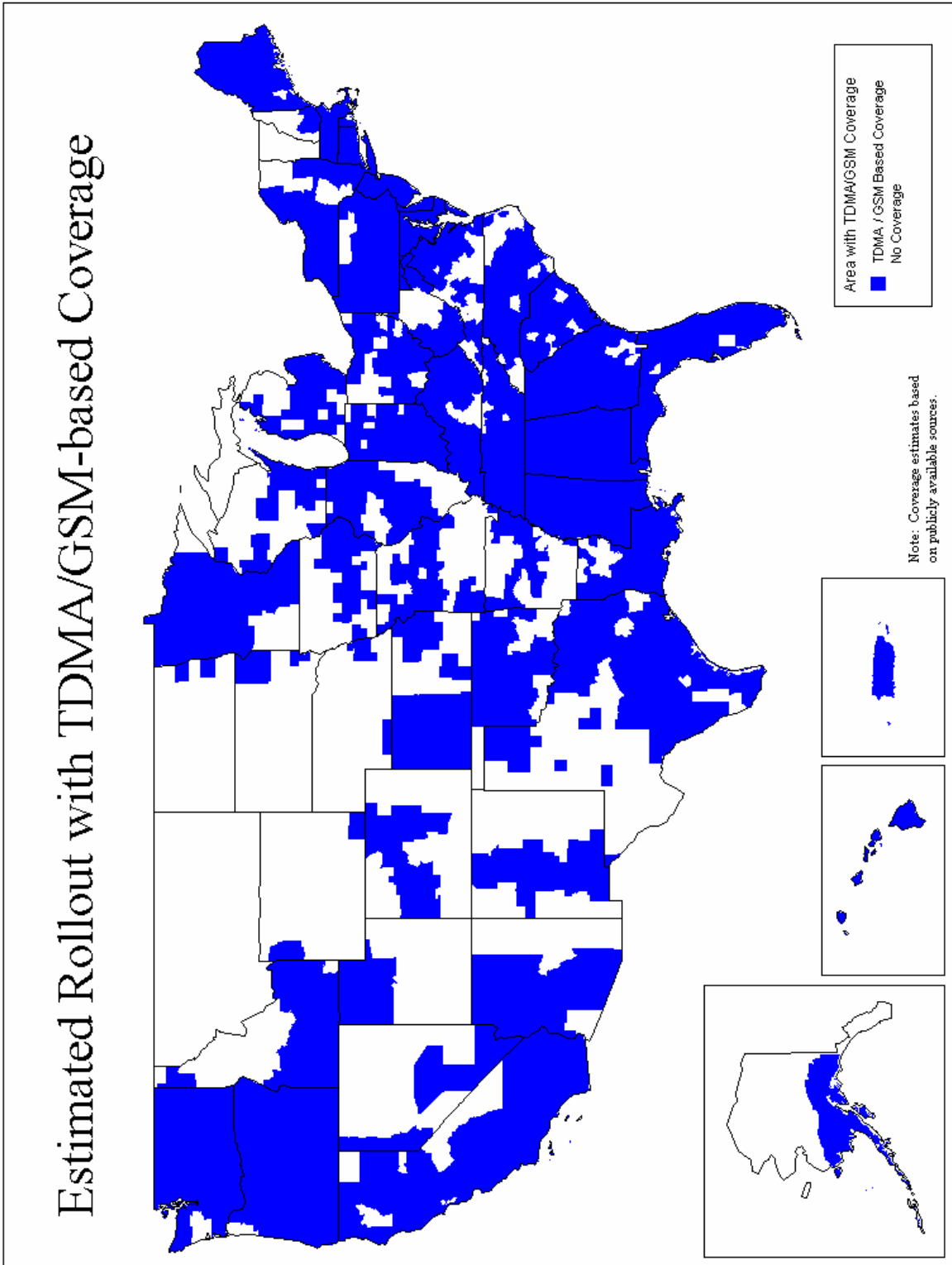


Map 6

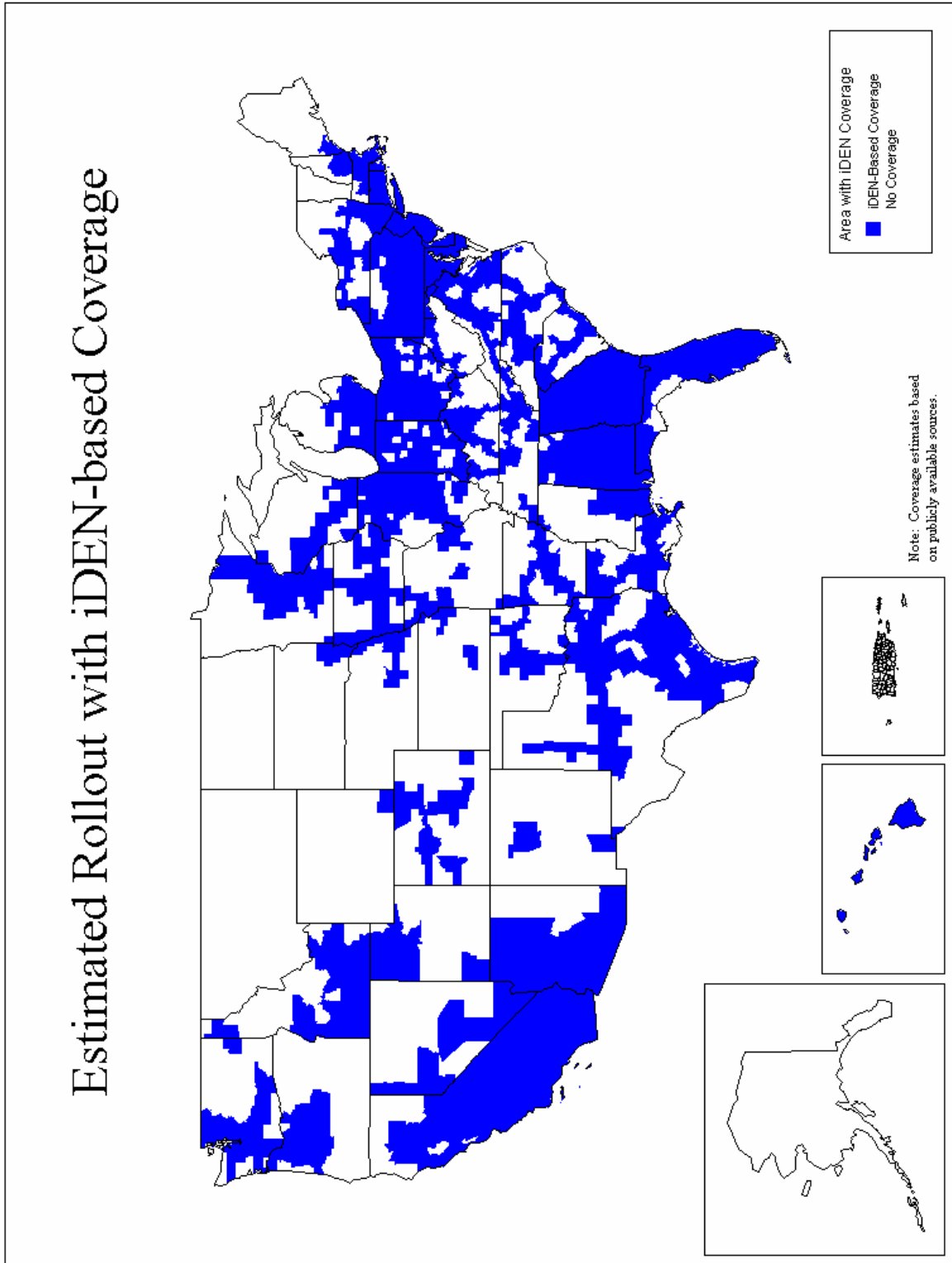




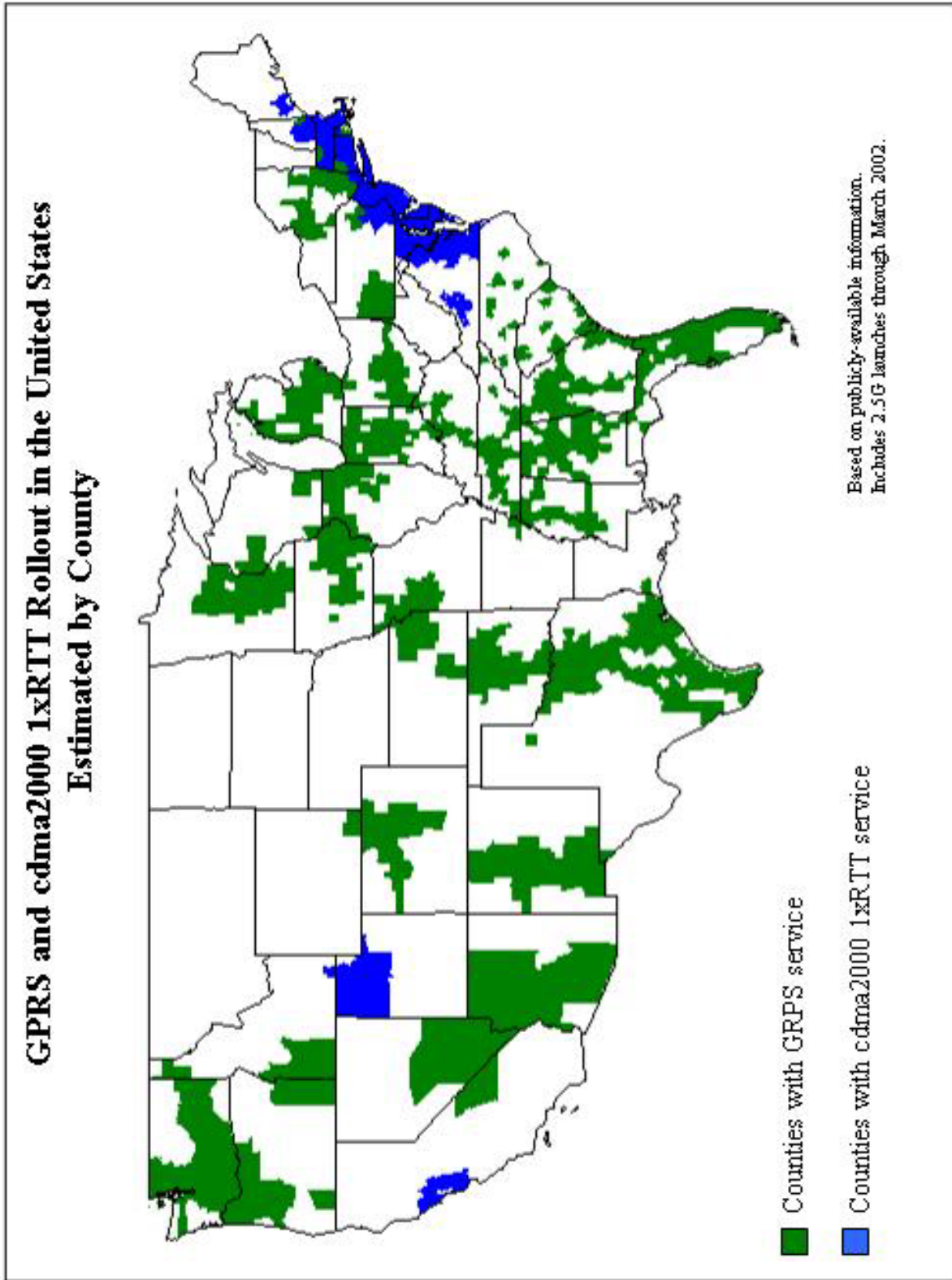
Map 7



Map 8



Map 9



Map 10

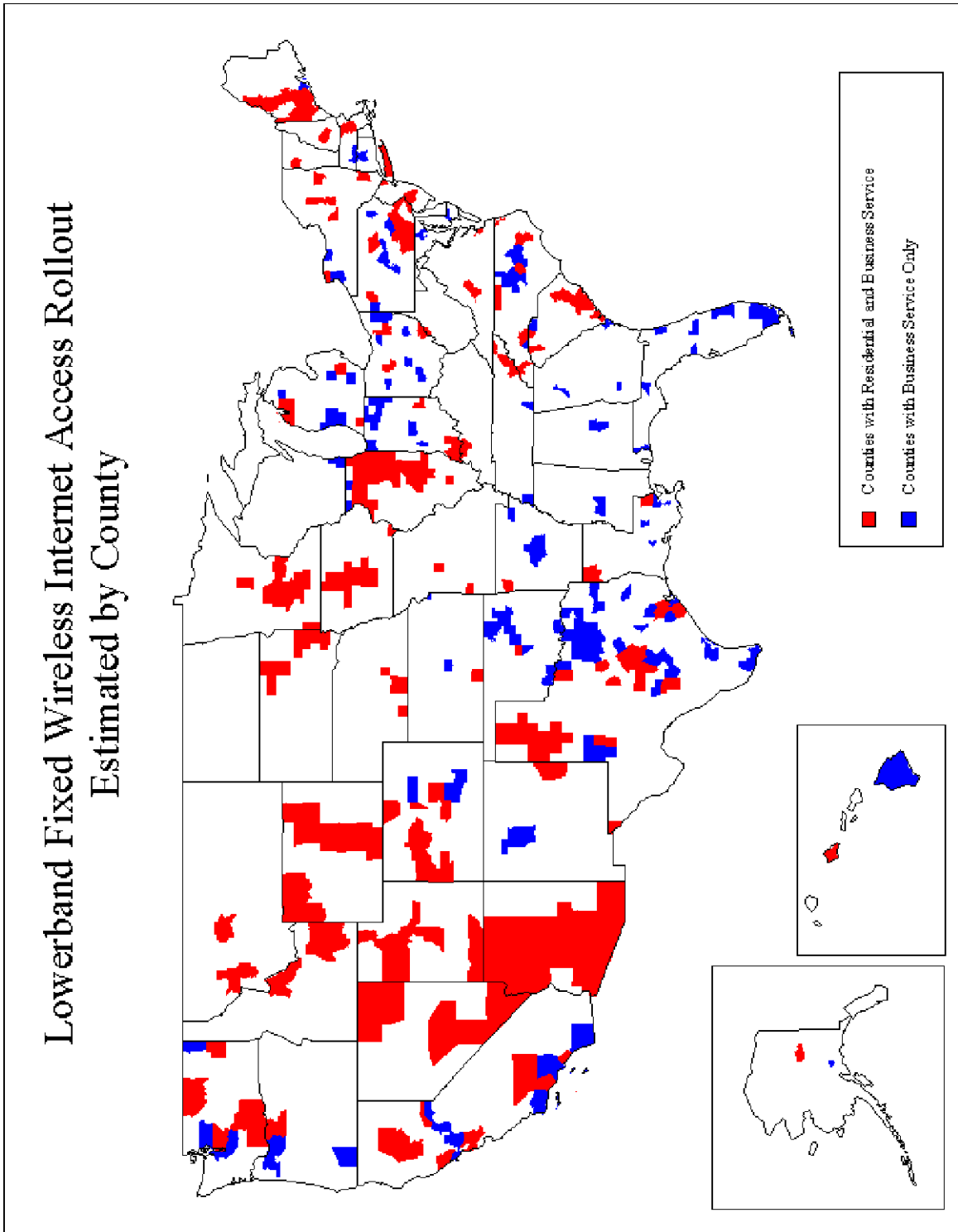
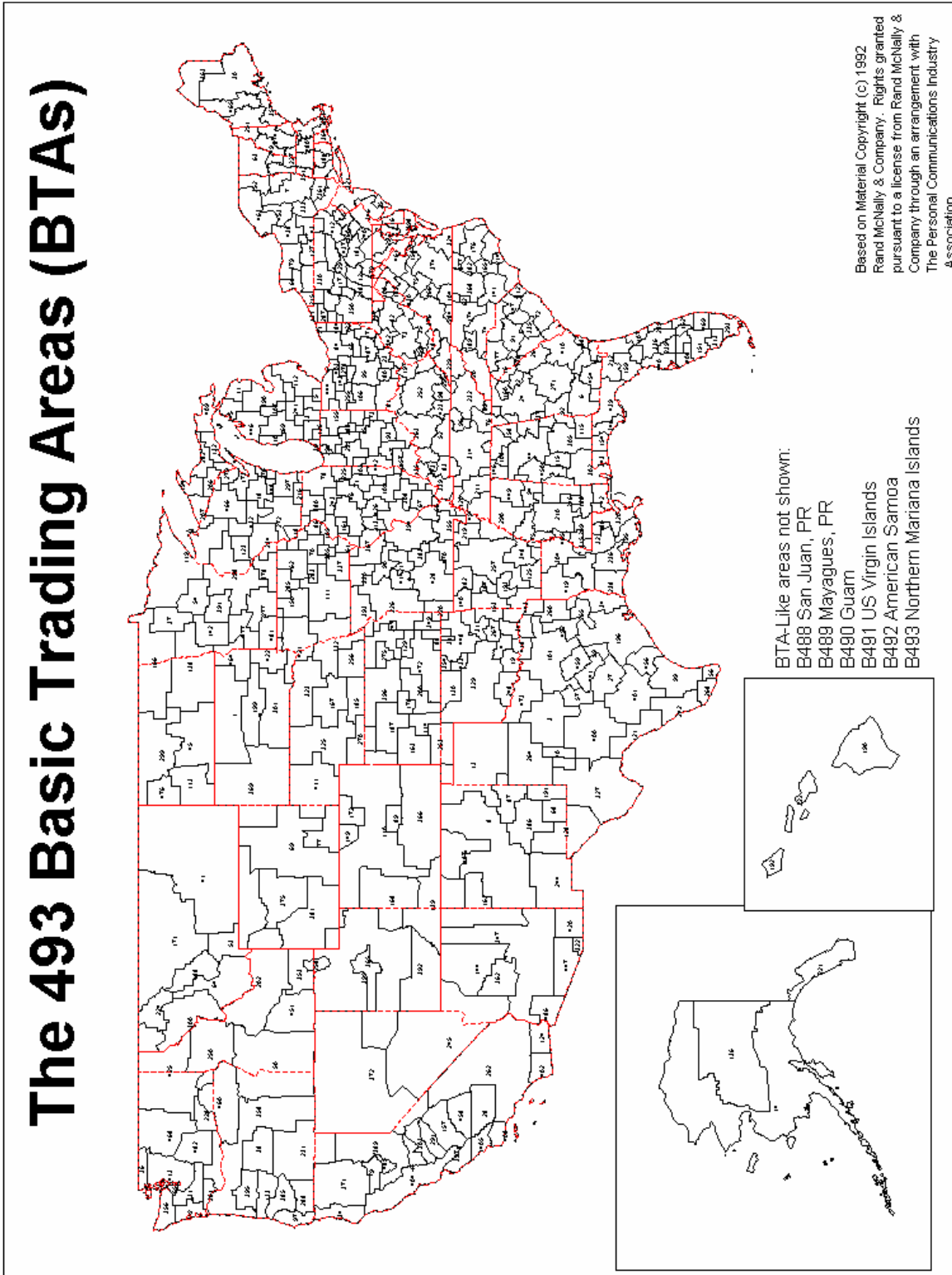


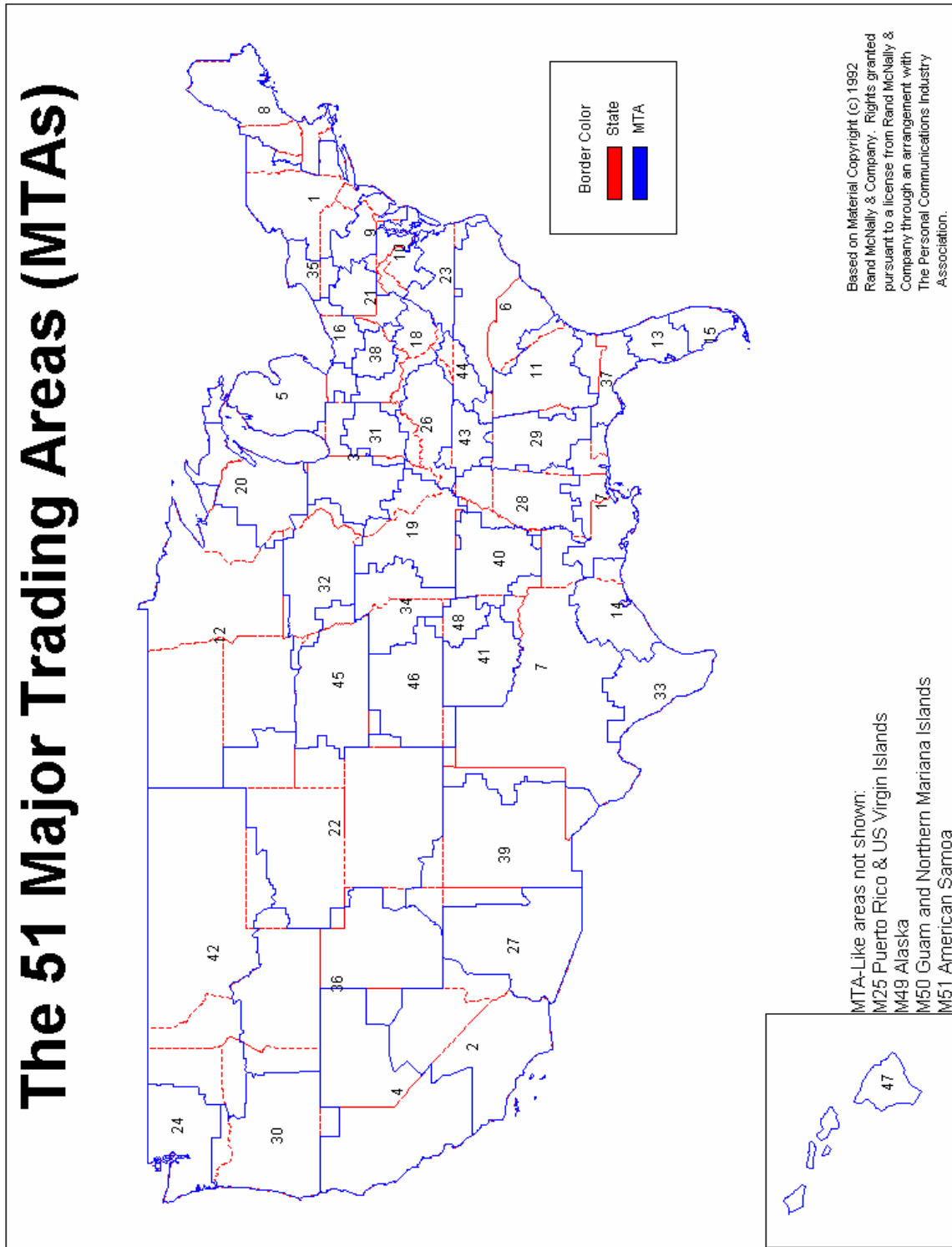
Table 1: Geographic Licensing Schemes

<b>Geographic Licensing Schemes</b>	<b>Number of Market Areas</b>	<b>Note</b>
Basic Trading Areas (BTAs)	493	BTAs make up MTAs
Major Trading Areas (MTAs)	51	
Cellular Market Areas (CMAs)	734	Also known as MSAs and RSAs
Economic Areas (EAs)	175	

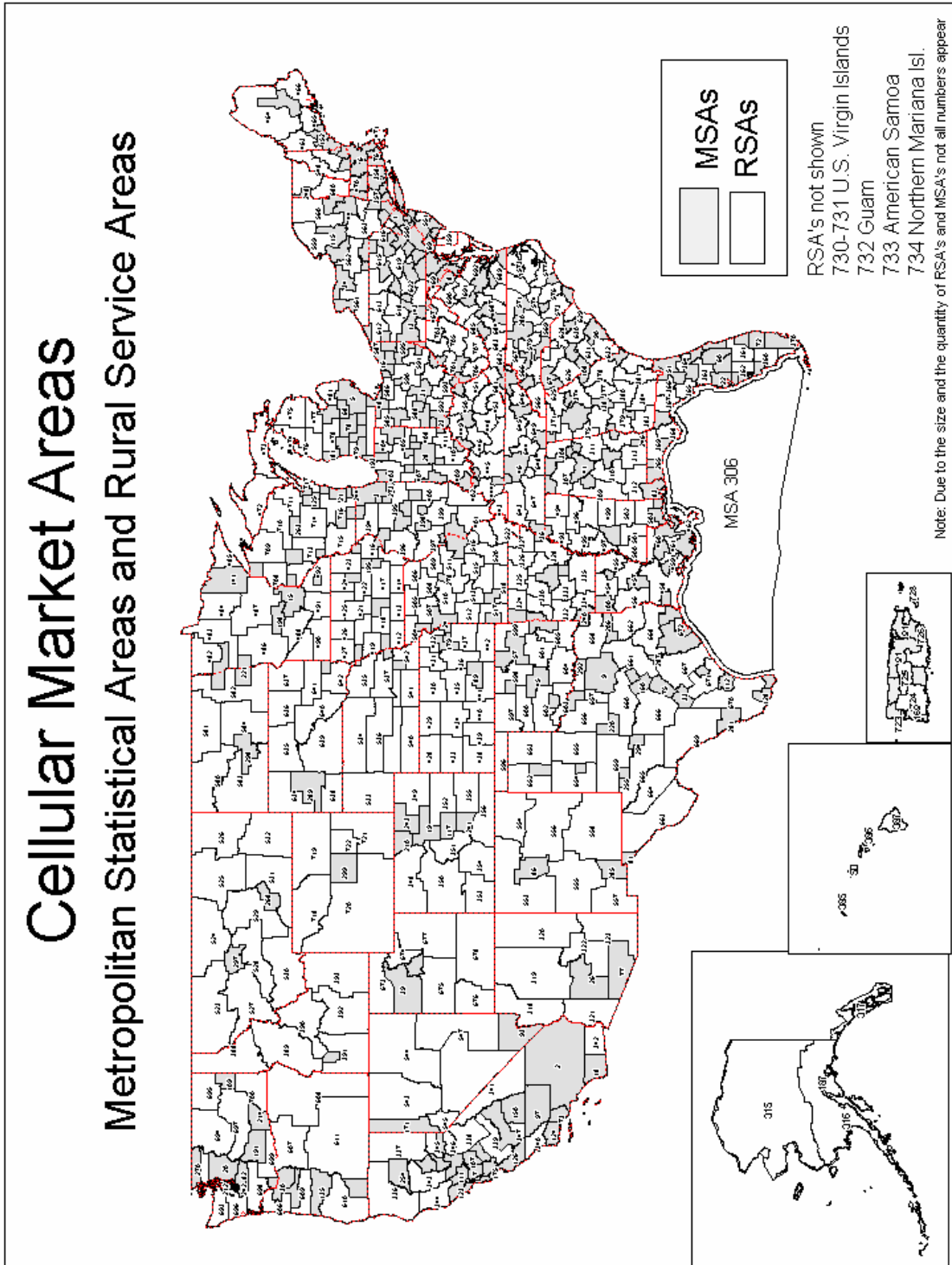
Map11



Map 12



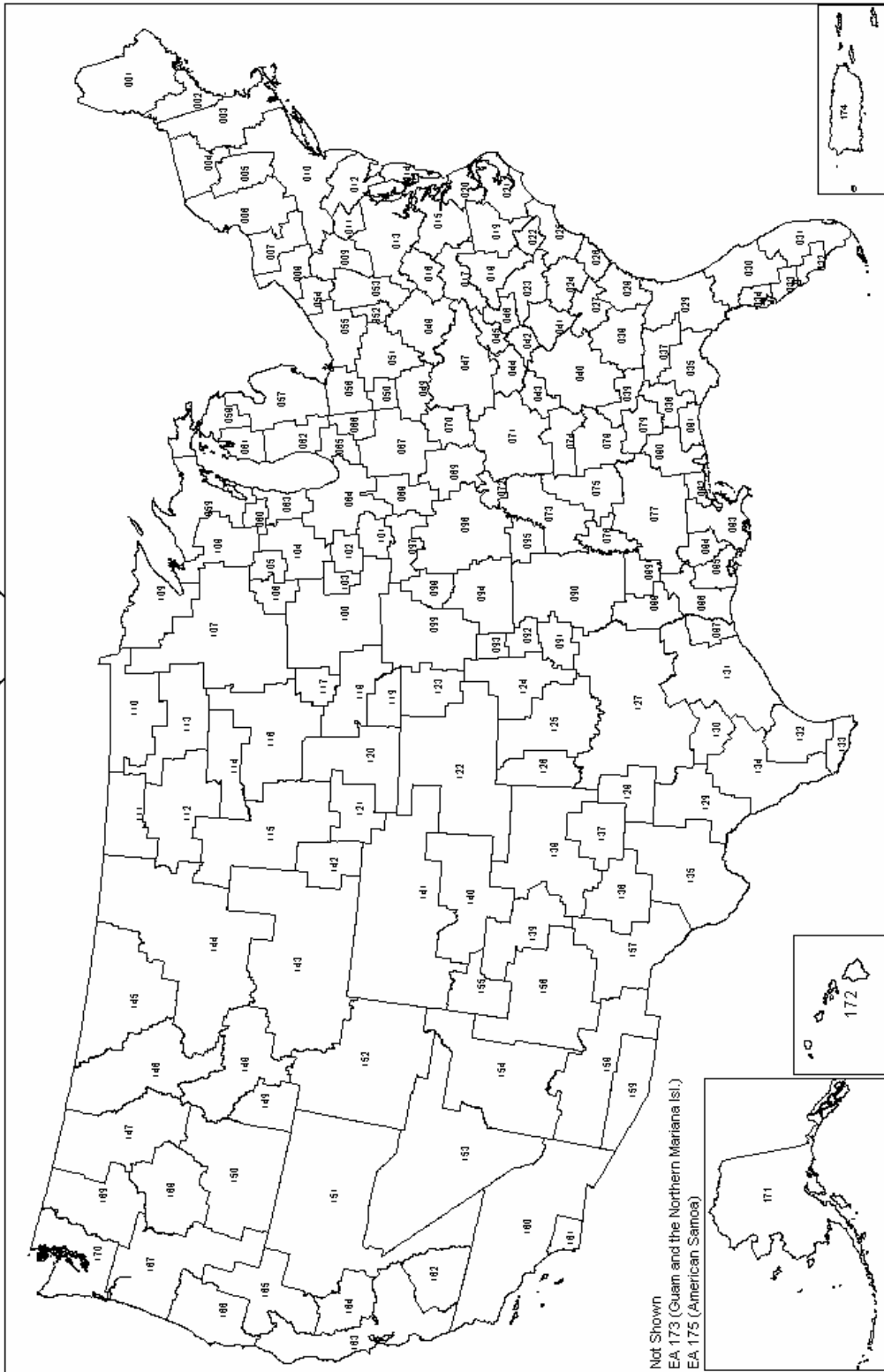
Map 13





Map 14

Economic Areas (EAs)



EAs delineated by the Regional Economic Analysis Division  
Bureau of Economic Analysis, U.S. Department of Commerce  
January 1995