

these pricing options varied by type of application as well as by provider.²⁸⁴ Furthermore, whether or not individual applications were offered on a stand-alone basis also varied by type of application and provider. In particular, most carriers allowed customers to purchase and send text messages without purchasing other mobile data services.²⁸⁵ In contrast, whereas Verizon Wireless allowed customers to purchase and use selected applications, including ring tones, games, e-mail and photo messaging, on an *a la carte* basis through its "Get It Now" offering, several other carriers made subscribing to a monthly mobile Internet access service plan a precondition for obtaining some of the same handset applications offered by Verizon on an *a la carte* basis.²⁸⁶ As a result of this diversity in pricing options, mobile data pricing has tended to be characterized by considerable complexity as compared with mobile voice pricing.

119. During the past year the six nationwide mobile carriers have restructured their pricing of handset-based applications.²⁸⁷ As detailed below, carriers have tended to move away from pricing based on kilobytes consumed in favor of flat rate, volume discount and, to a lesser extent, unlimited use pricing.²⁸⁸ According to one analyst report, it is not surprising that mobile data pricing has been evolving given that mobile data is still a new service and "it's hard to price a service for which there is little knowledge of usage patterns or end user appetite."²⁸⁹ The report also points to rapid change in data capabilities, end user awareness and network functionality in explaining why mobile data pricing has been in flux.²⁹⁰

120. In 2003 some carriers were pricing certain applications based on kilobytes consumed, including T-Mobile for games and photo messaging, and AT&T Wireless, Cingular, and Verizon Wireless for photo messaging.²⁹¹ By March 2004, all these carriers had abandoned kilobyte-based pricing of photo messaging in favor of pricing options similar to those used for text messaging.²⁹² In particular, most of the six nationwide mobile carriers were offering two alternative pricing options for both text messaging and photo messaging: a *pay-as-you-go* option consisting of a flat rate per message sent or received, and bundled options consisting of volume discount rates for variously sized packages that afford users a lower unit price per message as compared with the flat *pay-as-you-go* rate.²⁹³ T-Mobile also abandoned kilobyte-based pricing on games and instead began to price games per download.²⁹⁴ The other nationwide mobile carriers similarly offer the option of pricing mobile games per

²⁸⁴ *Id.*, at 14843.

²⁸⁵ *Id.*

²⁸⁶ *Id.*, at 14843-14844.

²⁸⁷ *Wireless Data Prospects Brightening*, at 2 and 31.

²⁸⁸ *Id.*, at 31.

²⁸⁹ *Id.*

²⁹⁰ *Id.*

²⁹¹ *Id.*, at 33 and 34.

²⁹² *Id.*, at 31-32 and 34.

²⁹³ *Id.*, at 32 and 34.

²⁹⁴ *Id.*, at 31 and 33.

download or per session.²⁹⁵

121. In addition to moving away from kilobyte-based pricing, some carriers added, revised or discontinued unlimited use pricing on handset-based data applications in the past year. In 2003, Sprint PCS differentiated its mobile data service by offering unlimited use of a variety of handset-based applications, including SMS, MMS, ring tones, games and web browsing, for a flat monthly fee through its PCS Vision plan.²⁹⁶ In addition, Verizon Wireless offered an unlimited use pricing option for mobile games, and Nextel offered the same option for text messaging.²⁹⁷ As of March 2004, Sprint PCS continued to differentiate its data offering through unlimited use pricing, but it had restructured this option with respect to certain applications. In particular, while PCS Vision continued to include unlimited photo messaging, unlimited text messaging was only offered either as an add-on to Vision for an additional monthly fee or separately for a higher monthly fee.²⁹⁸ As an alternative to unlimited SMS, Sprint also introduced a package of text messages to compete with rival text messaging bundles, and Sprint PCS customers could also send text messages on a *pay-as-you-go* basis for a flat fee per message.²⁹⁹ T-Mobile also started to offer unlimited photo messaging through its monthly mobile Internet access service plan called T-Zones, as well as continuing to offer *pay-as-you-go* photo messaging.³⁰⁰ In addition to restructuring its unlimited SMS offerings, Sprint PCS discontinued unlimited use pricing on games and ring tones, and instead began to include monthly credits toward the download of games, ring tones, and similar applications in PCS Vision.³⁰¹ In contrast, Verizon Wireless continued to offer an unlimited use pricing option for mobile games.³⁰² Finally, Nextel discontinued its unlimited SMS offering.³⁰³

122. With respect to the other segment of the mobile data market, as of March 2004 most of the nationwide carriers continued to price mobile Internet access service packages for data-centered laptop users based primarily on the amount of megabytes consumed each month.³⁰⁴ Under this pricing scheme, the monthly rate per package increases with the amount of megabytes included in the package, but the volume discounts provided by larger packages result in a progressively lower price per megabyte. In addition, several carriers, including AT&T Wireless, Cingular, and Verizon Wireless, offered unlimited megabyte mobile Internet access service packages for a flat monthly fee alongside their megabyte-based offerings, and one carrier, T-Mobile, discontinued megabyte-based pricing in favor of its unlimited megabyte offering.³⁰⁵ On the other hand, Sprint PCS discontinued its previous unlimited megabyte plan

²⁹⁵ *Id.*, at 33.

²⁹⁶ *Id.*, at 32-34; *Eighth Report*, at 14844 and 14905-14907.

²⁹⁷ *Wireless Data Prospects Brightening*, at 32-33.

²⁹⁸ *Id.*, at 32 and 34.

²⁹⁹ *Id.*, at 32.

³⁰⁰ *Id.*, at 34.

³⁰¹ *Id.*, at 33.

³⁰² *Id.*, at 33.

³⁰³ *Id.*, at 31.

³⁰⁴ *Id.*, at 36.

while retaining its megabyte-based offerings.³⁰⁶

B. Non-Price Rivalry

123. Service providers in the mobile telecommunications market also compete on non-price characteristics such as coverage, quality of service, and ancillary services. Non-price competition is a response to consumer preferences and demand. Indicators of non-price rivalry include advertising and marketing, capital expenditures, technology deployment and upgrades, and the provision of ancillary services.

1. Technology Deployment and Upgrades

a. Overview

124. The subject of technology deployment and upgrades by U.S. mobile telecommunications carriers is properly analyzed under the heading of carrier conduct because of the Commission's market-based approach to managing spectrum for commercial mobile voice and data services. In particular, the Commission's policies allow mobile telecommunications carriers the freedom to choose among the various standards for second-generation and more advanced network technologies that are identified and described below. In contrast, the European Community mandated a single harmonized standard for second-generation mobile telecommunications services, and has also adopted a single standard for third-generation services.³⁰⁷ Thanks to the flexibility afforded by the Commission's market-based approach, different U.S. carriers have chosen a variety of different technologies and associated technology migration paths, and competition among multiple incompatible standards has emerged as an important dimension of non-price rivalry in the U.S. mobile telecommunications market and a distinctive feature of the U.S. mobile industry model. In addition, economists argue that multiple competing technological standards may have other pro-competitive advantages, including greater variety of services and greater price competition among carriers using incompatible standards.³⁰⁸

125. The following analysis of technology deployment and upgrades is divided into four parts. As background to examining the particular technological choices made by different carriers, Section IV.B.1.b provides an introduction to cellular network design and technology and identifies and describes the major digital technologies and associated migration paths. Section IV.B.1.c examines the specific technological choices made by mobile carriers that use the same spectrum bands, network design and technologies to offer both voice and data services. Section IV.B.1.d examines the impact of these choices on coverage by technology type. Finally, Section IV.B.1.e examines the technology deployment decisions of carriers with regard to data-only networks and services.

³⁰⁵ *Id.*

³⁰⁶ *Id.*

³⁰⁷ Neil Gandal, David Salant, and Leonard Waverman, *Standards in Wireless Telephone Networks*, TELECOMMUNICATIONS POLICY, Vol. 27, 2003. The authors note that, although the European Community backed away from mandating a single standard for third-generation services, the absence of a mandate has had little practical effect as all European mobile operators have opted for the same standard and migration path. *Id.*, at 330.

³⁰⁸ *Id.*, at 329-330.

b. Background on Network Design and Technology

126. 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.³⁰⁹ 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 increased spectral efficiency than analog technology. Competitive forces combined with increased capacity have induced 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.³¹⁰ 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, with approximately 91 percent of all wireless subscribers using digital service.³¹¹

127. The four main digital technologies used in the United States are: Code Division Multiple Access ("CDMA"), Global System for Mobile Communications ("GSM"), integrated Digital Enhanced Network ("iDEN"), and Time Division Multiple Access ("TDMA"). These four technologies are commonly referred to as Second Generation, or "2G," because they succeeded the first generation of analog cellular technology, Advanced Mobile Phone Systems ("AMPS").³¹² As discussed in the *Seventh Report*, in light of 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.³¹³

128. Beyond the 2G digital technologies, mobile telephone carriers have been deploying next-generation network technologies³¹⁴ that allow them to offer mobile data services at higher data transfer

³⁰⁹ 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 large as 20 miles across. Each cell serves as a base station for mobile users to obtain connection to the fixed network and is equipped with its own radio transmitters/receivers and associated antennas. Service regions are divided into cells so that individual radio frequencies may be reused in different cells ("frequency reuse"), in order to enhance frequency efficiency. When a person makes a call on a wireless phone, the connection is made to the nearest base station, which connects with the local wireline phone network or another wireless operator. 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 base station in the next cell. See *Sixth Report*, at 13361, note 55.

³¹⁰ See *Sixth Report*, at 13361.

³¹¹ See Section VI.B.1, Subscriber Growth, *infra*.

³¹² See note 324 for a discussion of the cellular analog requirement and its sunset.

³¹³ See *Seventh Report*, at 13011.

³¹⁴ For purposes of this report, all of the network technologies beyond 2G that carriers have deployed, as well as those that they plan to deploy in the future, are generally referred to as "next-generation network technologies." The International Telecommunication Union ("ITU") has defined 3G network technologies as those that can offer maximum data transfer speeds of 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. There is ambiguity among other industry players, however, as to which network technologies constitute 3G and which constitute interim

speeds and, in some cases, increase voice capacity. TDMA/GSM carriers are deploying General Packet Radio Service ("GPRS" or "GSM/GPRS"), a packet-based data-only network upgrade that allows for faster data rates by aggregating up to eight 14.4 kbps channels.³¹⁵ While initially it was expected that GPRS would provide data rates of up to 171.2 kbps, in practice the typical data rate experienced by users is 40-60 kbps.³¹⁶ Beyond GPRS, most U.S. TDMA/GSM carriers have begun to deploy Enhanced Data Rates for GSM Evolution ("EDGE") and eventually Wideband CDMA ("WCDMA," also known as Universal Mobile Telecommunications System, or "UMTS").³¹⁷ EDGE and WCDMA are expected to raise peak network speeds to 384 kbps and at least 2 Mbps, respectively.³¹⁸

129. Many CDMA carriers have been upgrading their networks to CDMA2000 1xRTT (also referred to as "CDMA2000 1X" or "1xRTT"), a technology that doubles voice capacity and delivers peak data rates of 307 kbps in mobile environments and typical speeds of 40-70 kbps.³¹⁹ The next step in the CDMA migration beyond 1xRTT is CDMA2000 1X EV-DO (evolution-data only, "EV-DO") or 1X EV-DV (evolution data and voice, "EV-DV"), which allow maximum data throughput speeds of 2.4 and 3.09 Mbps, respectively.³²⁰

c. Technology Choices and Upgrades of Mobile Telephony Carriers

130. Of the six nationwide mobile telephone operators, Cingular, T-Mobile, and AT&T Wireless use TDMA/GSM as their 2G digital technology, Sprint PCS and Verizon Wireless use CDMA, and Nextel uses iDEN.³²¹ All six nationwide mobile carriers, together with other U.S. mobile carriers, have continued to deploy next generation network technologies over the past year.

131. During the past year, AT&T Wireless has invested over \$2.5 billion in its

technologies, often labeled "2.5G." See *Seventh Report*, at 12990 and 13038. Therefore, this report uses a more general label to describe all of the technologies beyond 2G.

³¹⁵ See *Seventh Report*, at 12990. This upgrade is also labeled GSM/GPRS because many TDMA/GSM carriers are upgrading their TDMA markets with GSM and GPRS simultaneously.

³¹⁶ *Developments of Third-Generation Mobile Services in the OECD*, at 7.

³¹⁷ See Section IV.B.1.c, Technology Choices and Upgrades of Mobile Telephony Carriers, *infra*.

³¹⁸ *Developments of Third-Generation Mobile Services in the OECD*, at 7 and 12.

³¹⁹ See *Seventh Report*, at 12990; *Developments of Third-Generation Mobile Services in the OECD*, at 11.

³²⁰ See *Seventh Report*, at 12990; *Developments of Third-Generation Mobile Services in the OECD*, at 12. CDMA2000 1XEV-DO puts voice and data on separate channels to achieve a data rate of 2.4 Mbps, while CDMA2000 1XEV-DV provides integrated voice and simultaneous high-speed packet data services at speeds of up to 3.09 Mbps. *Id.*

³²¹ In addition, all operators using cellular spectrum must deploy AMPS, an analog technology, throughout the part of their networks using cellular spectrum. See 47 C.F.R. §§ 22.901, 22.933. In 2002, the Commission decided to eliminate the requirement after a five-year transition period. Year 2000 Biennial Regulatory Review – Amendment of Part 22 of The Commission's Rules to Modify or Eliminate Outdated Rules Affecting The Cellular Radiotelephone Service and Other Commercial Mobile Radio Services, *Report and Order*, 17 FCC Rcd 18401, 18414 (2002).

GSM/GPRS/EDGE network³²² and has reached expanded roaming agreements with other carriers, doubling GSM coverage area and improving signal strength.³²³ In November 2003, AT&T Wireless announced the deployment of its EDGE network, which, according to AT&T Wireless, offers average data speeds of 100-130 kbps.³²⁴ EDGE is currently available nationally to AT&T Wireless customers located in areas served by the AT&T Wireless GSM/GPRS Next Generation Network, which covers approximately 215 million people, 6,500 cities and towns, and areas along more than 30,000 miles of major highways.³²⁵ AT&T Wireless continues its rollout of EDGE-enabled phones from various manufacturers³²⁶ and AT&T Wireless customers inside the EDGE coverage area can use the new Sony-Ericsson GC-82 modem card to access the EDGE network with their laptops.³²⁷ In addition, following through on its commitment to offer WCDMA services in selected U.S. cities by the end of 2004,³²⁸ in July 2004 AT&T Wireless launched WCDMA services in Detroit, Phoenix, San Francisco, and Seattle, and then extended its WCDMA network coverage to Dallas and San Diego in August 2004.³²⁹

132. Cingular Wireless's GSM/GPRS operations continue to expand, with 66 percent of Cingular's minutes now using the digital network.³³⁰ Currently, more than 53 percent of Cingular's handsets are GSM capable, up from 22 percent a year ago.³³¹ At the end of the first quarter of 2004, Cingular's GSM/GPRS network was available to 94 percent of the company's POPs, up from approximately 56 percent a year earlier.³³² Cingular expects to achieve 100 percent GSM/GPRS coverage by July 2004.³³³ Cingular also continues to deploy EDGE data technology throughout its network and expects to have nearly all its markets enabled with the technology by the end of summer 2004.³³⁴ In addition to upgrading its existing GSM network, Cingular is planning to start its initial trial

³²² *AT&T Wireless Pre-Announces First Quarter Services Revenue and Subscriber Results*, Press Release, AT&T Wireless, Apr. 20, 2004, available at http://www.attwireless.com/press/releases/2004_releases/042004.jhtml.

³²³ *Id.*

³²⁴ *AT&T Wireless Takes its Customers to the EDGE*, Press Release, AT&T Wireless, Nov. 18, 2003, http://www.attwireless.com/press/releases/2003_releases/111803.jhtml.

³²⁵ *Id.*

³²⁶ *EDGE Enabled Phones*, AT&T Wireless (visited May 21, 2004) <http://www.attwireless.com/personal/products/phones.jhtml?titleNumber=14>.

³²⁷ *Id.*

³²⁸ See *Eighth Report*, at 14820; Jesse Drucker, *Cingular to Test Wireless Network*, THE WALL STREET JOURNAL, May 26, 2004.

³²⁹ Dan Meyer, *AWS Launches UMTS in Two More Markets*, RCR WIRELESS NEWS, Sept. 1, 2004.

³³⁰ *Cingular Wireless Reports First-Quarter Results: Solid Subscriber Growth, Improved Margins, Continued GSM Success*, Press Release, Cingular Wireless, Apr. 20, 2004.

³³¹ *Id.*

³³² *Id.*

³³³ *Id.*

³³⁴ *Id.*

of WCDMA technology in its hometown of Atlanta during the summer of 2004.³³⁵

133. Verizon Wireless's 1xRTT is now generally deployed across its entire network.³³⁶ In the past year, Verizon began rolling out its national BroadbandAccess network based upon 1xEV-DO technology.³³⁷ Currently, only Verizon subscribers in Washington, DC and San Diego, California³³⁸ have access to that technology, but when subscribers in those cities travel in other parts of the country, they can seamlessly access Verizon's next-generation data network based upon 1xRTT technology because the more advanced technologies on the CDMA migration path are backwards compatible.³³⁹ Verizon plans to expand subscriber access to one-third of the Verizon network by the end of 2004 to reach over 75 million users.³⁴⁰ Verizon indicates that BroadbandAccess delivers average user speeds of 300-500 kbps.³⁴¹

134. At the writing of the *Eighth Report*, Sprint PCS had already deployed 1xRTT across its entire network footprint, but reportedly planned to wait until 1xEV-DV is available for commercial deployment instead of building out 1xEV-DO.³⁴² Some analysts had speculated that the increased spending by Verizon Wireless on EV-DO deployment might put pressure on rivals such as Sprint to increase their capital spending on similar network upgrades or risk losing share in the nascent wireless data market.³⁴³ Nevertheless, as of March 2004 Sprint PCS continued to look at deploying CDMA 1xEV-DV for its next mobile data network upgrade, while not ruling out EV-DO deployment should enough customers demand the service.³⁴⁴ By mid-2004 Sprint had evidently decided that customers' demands for faster wireless data speeds warranted a change of plans. In June 2004, Sprint announced plans to deploy EV-DO in the majority of top metropolitan markets in 2005, with initial service available in select markets in the second half of 2004.³⁴⁵ Sprint's change in strategy with regard to deployment of

³³⁵ Jesse Drucker, *Cingular to Test Wireless Network*, THE WALL STREET JOURNAL, May 26, 2004

³³⁶ Verizon Wireless, SEC Form 10-K, Mar. 15, 2004, at 5.

³³⁷ *Verizon Wireless Makes Strides with Planned BroadbandAccess 3G Network Expansion*, Press Release, Verizon Wireless, Mar. 22, 2004, available at <<http://news.vzw.com/news/2004/03/pr2004-03-22c.html>>.

³³⁸ *Id.*

³³⁹ *Id.*

³⁴⁰ *Id.*

³⁴¹ *Id.*

³⁴² *See Eighth Report*, at 14820-14821.

³⁴³ Jesse Drucker, *Cingular to Test Wireless Network*, THE WALL STREET JOURNAL, May 26, 2004.

³⁴⁴ Dan O'Shea, *Sprint unmoved by EV-DO movement . . . so far*, TelephonyOnline.com, Mar. 23, 2004 <http://telephonyonline.com/ar/telecom_sprint_unmoved_evdo/>. Most industry analysts believe that the EV-DV market will not be viable until late 2005 or 2006, when new handsets become broadly available. Sprint was reported to like EV-DV because it is more spectrum efficient than EV-DO, allowing for voice and data transmission on the same channel. *Id.*

³⁴⁵ *Sprint Announces Plans to Extend its Wireless Data Leadership with Launch of High-Speed Wireless Data Technology*, Press Release, Sprint, June 22, 2004; Nick Baker, *Sprint Announces Plans For Wireless Broadband*, THE WALL STREET JOURNAL, June 22, 2004.

technologies on the CDMA migration path can be seen as a competitive response to Verizon's EV-DO offering, and thus provides a clear-cut example of non-price rivalry.

135. In February 2004, Nextel launched a trial wireless broadband service in the Raleigh-Durham, N.C. market.³⁴⁶ The service uses OFDM (orthogonal frequency division multiplexing) technology to achieve average download speeds of 1.5 mbps with burst rates of up to 3.0 mbps.³⁴⁷ According to Flarion Technologies, developer of Nextel's OFDM system, OFDM combines attributes of CDMA and TDMA by using IP (Internet protocol) packet technology to achieve data rates that are five to ten times faster than competing 3G standards.³⁴⁸ Nextel Wireless Broadband service will ultimately offer turn-key bundled ISP services such as multiple e-mail accounts (up to seven), online disk storage (up to 70 megabytes), and website traffic (up to 300 megabytes/month).³⁴⁹

d. Coverage by Technology Type

136. To date, 283 million people, or 99 percent of the total U.S. population, live in counties where operators offer digital mobile telephone service, using CDMA, TDMA/GSM, or iDEN (including their respective next generation technologies), or some combination of the three.³⁵⁰ These counties make up 83 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, we have prepared maps of each technology, which combine the network coverage of all of the relevant operators.³⁵¹ We have also prepared maps showing the extent of next generation network technology deployment.³⁵²

137. CDMA has been launched in at least some portion of counties containing 276 million people, or roughly 97 percent of the U.S. population, while TDMA/GSM has been launched in at least some portion of counties containing 273 million people, or 96 percent of the U.S. population.³⁵³ To date, digital SMR operators have launched iDEN-based service in at least some portion of counties containing

³⁴⁶ *Nextel Testing Wireless Broadband Service; Market Trial in Raleigh-Durham, N.C. to Evaluate Flarion's FLASH-OFDM Technology, Service Offering and Market Demand*, Press Release, Nextel Communications Inc., Feb. 6, 2004, available at <<http://phx.corporate-ir.net/phoenix.zhtml?c=63347&p=irol-newsArticle&t=Regular&id=492688&>>.

³⁴⁷ *Id.*

³⁴⁸ See Flarion Technologies, *Products and Technology – Introduction* (visited May 18, 2004) <<http://www.flarion.com/products/default.asp>>; Flarion Technologies, *FLASH-OFDM Technology* (visited May 18, 2004) <http://www.flarion.com/products/flash_ofdm.asp>.

³⁴⁹ *Nextel Expands Successful Broadband Trial to Include Paying Customers and Larger Coverage Area*, Press Release, Nextel Communications Inc., Apr. 14, 2004, available at <<http://phx.corporate-ir.net/phoenix.zhtml?c=63347&p=irol-newsArticle&t=Regular&id=514459&>>.

³⁵⁰ Broadband PCS-based and digital SMR-based coverage are estimated using counties, and cellular-based coverage is estimated using CMAs. The caveats mentioned in Section II.B, Sources of Information, and in Section II.C.1, Number of Mobile Telephone Competitors, *supra*, apply to this analysis as well.

³⁵¹ See Appendix B, Maps 5-8, at B-6 – B-9.

³⁵² See Appendix B, Map 9, at B-10.

³⁵³ See Appendix A, Table 7, at A-10.

over 261 million people, or approximately 92 percent of the U.S. population.³⁵⁴

138. CDMA 1xRTT and/or 1xEVDO has been launched in at least some portion of counties containing 273 million people, or roughly 96 percent of the U.S. population, while GPRS has been launched in at least some portion of counties containing 264 million people, or about 93 percent of the U.S. population.³⁵⁵

e. Data-Only Networks and Technology Deployment

139. In addition to the networks discussed above, which mobile telephone carriers use to offer both voice and data services, mobile carriers operate a number of other types of networks in order to provide data-only commercial mobile services. First, carriers use paging spectrum to operate networks in order to offer traditional one-way paging services.³⁵⁶ Some paging carriers also operate data networks using narrowband PCS spectrum, which allow them to offer two-way messaging services. Narrowband PCS carriers use the ReFLEX technology protocol, which can transmit data at speeds ranging from 3.2 to 25 kbps.³⁵⁷ Metrocall, for example, acquired WebLink Wireless's extensive PCS narrowband (two-way) wireless data network in 2003,³⁵⁸ which is based on ReFLEX25 technology developed by Motorola. The network covers 90 percent of the U.S. population and has been extended to Canada and Mexico.³⁵⁹ As previously mentioned, in March 2004 Metrocall and Arch Wireless announced a merger that, if approved, would make the combined company the largest paging carrier in the nation.³⁶⁰ The new company would provide paging services on traditional paging spectrum as well as narrowband PCS spectrum.³⁶¹

140. In addition, several mobile telephone carriers, including AT&T Wireless and Verizon Wireless, have operated Cellular Digital Packet Data ("CDPD") networks on top of their existing mobile telephone networks, which they use to provide mobile Internet access services at speeds of around 19.2

³⁵⁴ *Id.*

³⁵⁵ *Id.*

³⁵⁶ See Section III.A, Services and Product Market Definition, and Section III.B.3, Data-Only Providers, *supra*, for a discussion of traditional paging services and paging carriers

³⁵⁷ WebLink Wireless, *ReFLEX Wireless Data Technology*, 2000, at 18-19, <<http://www.weblinkwireless.com/aboutweblinkwireless/whitepapers/ReFLEX2.PDF>>.

³⁵⁸ Metrocall, Inc., *Metrocall Reports Operating Results of Fourth Quarter and Fiscal 2003*, Press Release, Mar. 15, 2004, available at <<http://storefront.metrocall.com/pressreleases/03152004.asp?mscssid=LBHRC8SMN7HT8ML62XVEP9KRQX5KDNF8>>.

³⁵⁹ WebLink Wireless, *Overview of WebLink Wireless* (visited May 21, 2004) <<http://www.pagemart.com/aboutweblinkwireless/overview/index.html>>.

³⁶⁰ Metrocall, Inc., *Metrocall and Arch Wireless to Merge*, Press Release, Mar. 29, 2004, available at <<http://storefront.metrocall.com/pressreleases/03292004.asp?mscssid=LBHRC8SMN7HT8ML62XVEP9KRQX5KDNF8>>.

³⁶¹ *Id.*

kbps.³⁶² However, as documented above in Section IV.B.1.c, AT&T Wireless and Verizon Wireless are now upgrading their mobile telephone networks with next generation technologies and shall soon be terminating their transitional CDPD service.³⁶³

141. Two other carriers, Cingular Wireless and Motient Corp. ("Motient"), operate two-way data networks using the 900 MHz SMR and 800 MHz SMR spectrum bands, respectively. These networks have provided a variety of mobile data services to personal digital assistants ("PDAs") and laptops. Cingular Wireless's network, known as the Mobitex, is a packet-switched radio technology that provides always-on, instant two-way messaging and data delivery.³⁶⁴ It covers 93 percent of the urban business population in the U.S.³⁶⁵ The Motient (formerly ARDIS) network is the nation's largest two-way wireless data network.³⁶⁶ With more than 2,200 base stations, the network provides in-building and on-street coverage to all the nation's MSAs and extends service to the 520 most populated U.S. cities.³⁶⁷ More than 100 million messages are transmitted via the network each month.³⁶⁸

142. Space Data is using narrowband PCS spectrum in the 900 MHz band and balloon-borne platforms, called SkySites™, to roll out a commercial telemetry service.³⁶⁹ Although national weather services have been using balloon systems to transmit atmospheric data to ground-based weather stations for decades, Space Data is the first to make commercial use of this platform.³⁷⁰ Space Data developed, and has been granted a patent on, the technology to create an entire constellation of SkySites™ to provide ubiquitous wireless service.

2. Capital Expenditures

143. Capital expenditures, alternatively called "capital spending" or abbreviated to "capex," are funds spent during a particular period to acquire or improve long-term assets such as property, plant, or equipment.³⁷¹ In the mobile telephone industry, capex consists primarily of spending to expand and

³⁶² See *Seventh Report*, at 13046.

³⁶³ AT&T intends to terminate its CDPD service in June 2004. See *Early Data Models Drain Finances*.

³⁶⁴ *Our Technology*, Cingular Wireless (visited May 20, 2004).
<http://www.cingular.com/about/our_technology>.

³⁶⁵ *Id.*

³⁶⁶ Motient Corp., *Network Coverage Overview* (visited May 21, 2004)
<<http://www.motient.com/Content/NetworkCoverage/networkoverview.htm>>.

³⁶⁷ *Id.*

³⁶⁸ Motient Corp., *Network Facts* (visited May 21, 2004)
<<http://www.motient.com/content/NetworkCoverage/NetworkFacts/networkfacts.htm>>.

³⁶⁹ *Space Data Corporation Captures 262.5 kHz of New Spectrum*, Press Release, Space Data Corporation, Nov. 19, 2003; *Space Data Corporation Receives Patent for Airborne Constellation*, Press Release, Space Data Corporation, Feb. 2, 2004. See also Section III.B.3, Data-Only Providers, *supra*.

³⁷⁰ *Id.*

³⁷¹ CNNMoney, *Money 101 Glossary* (visited Mar. 20, 2003)
<<http://money.cnn.com/services/glossary/c.html>>. There are differing opinions on what constitutes capital spending versus non-capital spending.

improve the geographic coverage of networks, increase the capacity of existing networks so they can serve more customers, and improve the capabilities of networks (by allowing higher data transmission speeds, for example).³⁷² One analyst estimated that the wireless industry spent roughly \$21 billion on capex in 2003, a decline of 16 percent from the \$25 billion spent in 2002, on top of a 6 percent drop from 2001.³⁷³ One analyst argued that capex spent to expand coverage is now mostly over and that future capex will be spent largely on technological upgrades and capacity needs.³⁷⁴ We also note that wireless capex is rapidly approaching the level of wireline capex.³⁷⁵

3. Roaming

144. All mobile calling plans specify a calling area – such as a particular metropolitan area, a state, a region, the carrier’s entire network, or the entire United States – within which the subscriber can make a call without incurring 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 sometimes the charges are used to pay a carrier other than the subscriber’s, on whose network the subscriber was roaming.³⁷⁶ This source of revenue is particularly important to many rural and smaller carriers.³⁷⁷

145. CTIA reported that roaming revenues for the mobile telephony industry declined over the past year, from \$3.9 billion in 2002 to \$3.8 billion in 2003.³⁷⁸ Roaming revenues as a percentage of total service revenue also continued to decline, from 6.1 percent reported in 2001 to 5.1 percent in 2002 followed by 4.3 percent in 2003.³⁷⁹ One analyst attributes the decline in roaming revenues to “larger operators negotiating lower roaming rates, as well as national carriers expanding their footprints through buildout, acquisition, and joint buildout/roaming agreements.”³⁸⁰

4. Advertising and Marketing

146. Firms may engage in advertising and marketing either to inform consumers of available products or services or to increase sales by changing consumer preferences. Mobile telecommunications

³⁷² *Eighth Report*, at 14818.

³⁷³ Luiz Carvalho *et al.*, *Wireless Capex Conference Supports Thesis*, Morgan Stanley, Equity Research, Feb. 4, 2004, at 2.

³⁷⁴ *Wireless 411*, at 90 (citing carrier’s SEC filings).

³⁷⁵ See Goldman Sachs, *Telecom Services Equity Research*, Feb. 19, 2004, at 6 (Exhibit 4: Capex by Telecom Segment).

³⁷⁶ 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.

³⁷⁷ See *Wireless 411*, at 50 (Table 21: Roaming Revenues as a Percentage of Total Service Revenues).

³⁷⁸ See Appendix A, Table 1, at A-2.

³⁷⁹ *Id.*

³⁸⁰ *Wireless 411*, at 44.

service is an "experience good,"³⁸² and in general, advertising for an experience good tends to be persuasive rather than informational in nature.

147. As a group, the six nationwide operators spent a total of \$3.7 billion on advertising in 2003, up 19 percent from 2002, and up more than 50 percent from 2001.³⁸³ Advertising expenditures - including television, radio, newspaper, magazine, and outdoor spending - are now almost 5 percent of wireless service revenues.³⁸⁴ Verizon Wireless spent nearly \$1 billion on advertising in 2003, including \$246 million on network TV advertising, making it the number two advertiser on television after McDonald's.³⁸⁵ Advertising expenditures per subscriber have been rising since 2001, and increased for every nationwide carrier except T-Mobile in 2003.³⁸⁶ As one analyst wrote, "faced with intense competition, carriers are spending money to differentiate themselves."³⁸⁷

5. Quality of Service

148. Section IV.B.1 above of this report, as well as similar sections in previous reports, detail the digital and next-generation upgrades that carriers have been making to improve the quality and increase the capacity of their networks, while Section IV.B.2 provides an estimate of total spending by wireless carriers on network expansion and improvements.³⁸⁸ By increasing network coverage and call handling capacity and improving network performance and capabilities, carriers' investments in network deployment and upgrades have the potential to result in service quality improvements that are perceptible to consumers, such as better voice quality, higher call-completion rates, additional calling features, more rapid data transmission, and advanced data applications. For example, one analyst report cites Cingular as indicating that it plans to add thousands of cell sites over the next several years largely to enhance voice coverage and quality.³⁸⁹

149. In addition to investing in their networks, certain carriers continue to pursue marketing

³⁸² An experience good is a product or service that the customer must consume before determining its quality. See Dennis W. Carlton and Jeffrey M. Perloff, *Modern Industrial Organization* (3rd ed., Addison, Wellsley, Longman, Inc., 1999), at 484.

³⁸³ Michael Russell *et al.*, *Wireless Ad Spend Disappoints Almost Everyone*, Morgan Stanley, Equity Research, Mar. 31, 2004, at 1.

³⁸⁴ *Id.*, at 7.

³⁸⁵ *Id.*, at 6.

³⁸⁶ *Id.*, at 7.

³⁸⁷ Simon Flannery *et al.*, *1Q04 Preview: The Fast and The Furious*, Morgan Stanley, Equity Research, Apr. 16, 2004, at 7.

³⁸⁸ See *Eighth Report*, at 14824.

³⁸⁹ *Wireless Data Prospects Brightening*, at 23.

strategies designed to differentiate their service from rival offerings with regard to consumer perceptions of service quality. The *Eighth Report* cited Verizon Wireless's "Can You Hear Me Now?" advertising campaign as an example of an attempt at such brand differentiation based on superior network coverage, reliability and voice quality.³⁹⁰ In recent reports analysts consistently single out Verizon Wireless for continuing to distinguish its brand and maintain its reputation by highlighting the quality of its network.³⁹¹ As indicated in the *Eighth Report*, analysts view brand differentiation as working in tandem with network investment to create a competitive advantage in attracting and retaining subscribers.³⁹² In this regard, one analyst report posits that Verizon Wireless is trying to further leverage customer perception of a quality advantage by implementing the high-speed EV-DO data service.³⁹³

150. Consumer satisfaction surveys afford one means of gauging the effects of network investment and brand differentiation on customer perceptions of service quality. The results of one such survey are summarized below in the section on mobile telecommunications market performance.

6. Provision of Ancillary Services and Promotional Offers.

151. Mobile telecommunications providers offer ancillary services and promotions such as caller ID, voice mail, call forwarding, long distance, push-to-talk ("PTT"), free or reduced priced handsets, and free night and weekend minutes. The cost of these services is either included in the monthly charge or billed separately. Carriers use ancillary services and promotional offers to differentiate their products from those of their competitors. They compete not only in terms of the monthly charge, but also with the price and scope of ancillary services and promotions.

152. Nextel has offered PTT as a fundamental part of its product offering since it launched its wireless service in 1993. Recently, a number of mobile wireless operators have begun to offer competing PTT services. Verizon Wireless began offering "Push to Talk" in August, 2003, quickly followed by Sprint PCS's "Ready Link" in November 2003,³⁹⁴ and ALLTEL's "Touch2Talk" in January 2004.³⁹⁵ These three carriers each price their service around \$15-\$20 per month for unlimited use.³⁹⁶ Some

³⁹⁰ See *Eighth Report*, at 14825.

³⁹¹ David Janazzo, Wendy Liu, and Linda Mutschler, *The Next Generation VIII*, Merrill Lynch, Global Securities Research & Economics Group, Mar. 15, 2004 at 43, ("Nextgen VIII"); Colette M. Fleming, Mark Kinamey, and Rise A. Barron, *As If You Were There – Recap of the Wireless Service Providers*, UBS Warburg, Equity Research, Nov. 21, 2003, at 8; *Wireless Data Prospects Brightening*, at 29.

³⁹² See *Eighth Report*, at 14824-14825.

³⁹³ *NextGen VIII*, at 43.

³⁹⁴ In May 2004, Sprint PCS said 275,000 customers, or 1 percent of its subscribers, were using its PTT service. COMMUNICATIONS DAILY, May 25, 2004, at 6.

³⁹⁵ Simon Flannery *et al.*, *Wireless CTOs Unplugged: A Wireless Preview*, Morgan Stanley, Equity Research, Feb. 8, 2004, at 6, ("*Wireless CTOs Unplugged*"). Morgan Stanley reports the Ready Link launch in December, but Sprint announced the service in November. See *Sprint Launches Nationwide Two-Way Walkie-Talkie Style Service to Provide Customers with a Quick Way to Communicate One-on-One or in Groups*, News Release, Sprint, Nov. 17, 2003.

³⁹⁶ *Wireless CTOs Unplugged*, at 6.

analysts believe that the longer latency³⁹⁷ of these competitors' products make them somewhat less desirable than Nextel's "Direct Connect" service.³⁹⁸ However, in Sprint PCS's case, the company has stated that it is not attempting to compete directly for Nextel's core business users, but instead is trying to attract the consumer who might not mind some latency.³⁹⁹ Nevertheless, one analyst claims that the launch of these competing services "will pressure Nextel to improve its offerings in ways that are important to users outside its traditional government and enterprise niche, the most notable being wireless data services."⁴⁰⁰

7. Mobile Data Services and Applications

153. As documented in the *Eighth Report* and previous reports, in recent years the major mobile telephone carriers and other mobile data providers have introduced a wide variety of mobile data services and applications, including text messaging, information alerts, e-mail, web browsing, multimedia messaging services such as photo messaging, and entertainment applications such as ring tones and games.⁴⁰¹ Typically, one of the six nationwide mobile telephone carriers is the first to introduce a particular data application, and the availability of the new application quickly spreads as the remaining nationwide carriers together with their affiliates and some smaller regional carriers progressively match the innovator with similar rival service offerings.⁴⁰² Currently, all six nationwide mobile carriers and some smaller regional carriers such as ALLTEL offer a variety of handset-based applications as add-ons to mobile voice service, such as text messaging, photo messaging, ring tones and games.⁴⁰³ In addition, the six nationwide mobile carriers and certain other mobile data providers also offer monthly mobile Internet access service packages targeted at data-centered laptop users.⁴⁰⁴

154. In the past year carriers have continued to take steps to expand and enhance their mobile data offerings. For example, in November 2003 Sprint PCS became the first U.S. mobile carrier to introduce a live video service when it began offering MobiTV, a service that makes live audio and video images available from 15 cable news, sports, and entertainment channels, including College Sports Television

³⁹⁷ Latency refers to the delays in setting up a PTT call and the pushes between conversation breaks.

³⁹⁸ See Ric Prentis and Tanya Nelson, *Nextel Communications, Inc.*, Raymond James, Equity Research, Feb. 9, 2004, at 10; and COMMUNICATIONS DAILY, Nov. 26, 2004, at 7 (citing Moody's outlook on Nextel).

³⁹⁹ Colette M. Fleming *et al.*, *Global Communications Conference*, UBS Warburg, Equity Research, Nov. 21, 2003, at 2.

⁴⁰⁰ Frank J. Governali *et al.*, *PCS: Ready Link Enhance Service Offering*, Raymond James, Equity Research, Nov. 18, 2003, at 1.

⁴⁰¹ See *Eighth Report*, at 14843-14856.

⁴⁰² For example, the introduction and diffusion of text messaging followed this pattern, as documented in the *Seventh Report*, at 13051-13052.

⁴⁰³ See *Eighth Report*, at 14846-14855. It is not necessarily the case that each of the six nationwide operators offers the full range of handset-based based applications. For example, as of March 2004 Nextel had not introduced photo messaging. See *Wireless Data Prospects Brightening*, at 34.

⁴⁰⁴ *Eighth Report*, at 14844-14845; *Wireless Data Prospects Brightening*, at 36.

and Fox Sports.⁴⁰⁵ In May 2004, it was announced that a Major League Baseball highlights channel and an audio channel carrying broadcasts of all New York Yankees games would be added to Sprint PCS's existing MobiTV package, and that an additional package of 30 game-audio channels, each playing the home broadcasts for a single team, would be offered.⁴⁰⁶ Both the MobiTV package and the baseball game-audio package are available only as add-ons for an additional fee to Sprint PCS subscribers who have signed up for the Sprint PCS data package called PCS Vision, which for a flat monthly fee affords them unlimited use of certain applications such as web browsing and e-mail.⁴⁰⁷ Some of the other nationwide carriers are reported to be interested in offering similar video services, with Verizon Wireless expected to launch one, among other broadcast applications, by the end of 2004.⁴⁰⁸ At present these video services are characterized as being more like slideshows than streaming video due to the slow speeds offered by existing wireless networks and handsets, but quality is expected to improve as network upgrades result in faster data rates and as handset prices drop.⁴⁰⁹

155. While the mobile data offerings of all six nationwide mobile carriers are broadly similar in terms of the types of services and applications available to subscribers, the carriers vary in terms of their degree of emphasis on implementing and promoting mobile data services. For example, both Sprint PCS and Verizon Wireless are characterized in one analyst report as being very focused on mobile data, while other carriers such as Cingular and Nextel are described in the same report as having had less mass market data focus so far.⁴¹⁰ The same report argues that AT&T Wireless began promoting its more advanced network capabilities more aggressively after launching its EDGE data network, including the offering of free EDGE PC cards to encourage use of the network, while T-Mobile is viewed as more aggressively promoting its Wi-Fi offering rather than mobile data.⁴¹¹ As a result of its data focus, Sprint PCS has taken an early lead in consumer wireless data as measured by the percentage of mobile service revenues from data services.⁴¹² At five percent of service revenues in the fourth quarter of 2003, Sprint generates the highest level of mobile data usage among the nationwide carriers, whose mobile data revenues during the same period range from 2 to 3.5 percent of service revenues.⁴¹³

156. Early differences in the nationwide carriers' mobile data strategies may in part reflect their divergent choices with regard to the migration path from second-generation to next-generation technologies. Thus, the same analyst report argues that Sprint PCS has differentiated its mobile data service from rival offerings by leveraging its 1xRTT network and more advanced devices, and that Verizon Wireless is positioning itself to become the market leader in mobile data through its 1XEV-DO

⁴⁰⁵ Carl Bialik, *Watching Sports on Cellphones May be Small-Time Broadcasts*, THE WALL STREET JOURNAL, Dec. 11, 2003.

⁴⁰⁶ Carl Bialik, *Major League Baseball, Sprint in Cellphone Deal*, THE WALL STREET JOURNAL, May 6, 2004.

⁴⁰⁷ *Id.*

⁴⁰⁸ *Id.*

⁴⁰⁹ *Id.*

⁴¹⁰ *Wireless Data Prospects Brightening*, at 24.

⁴¹¹ *Id.*, at 20 and 24.

⁴¹² *Id.*, at 28.

⁴¹³ *Global Wireless Matrix 4Q03* at 87.

upgrade.⁴¹⁴ More generally, some analysts believe that CDMA carriers Verizon Wireless and Sprint PCS have a network advantage over GSM carriers Cingular, AT&T Wireless and T-Mobile, as well as iDEN carrier Nextel, for two reasons.⁴¹⁵ First, it is easier and less expensive for CDMA carriers to extend broadband data coverage across the entire network footprint because the upgrade on the CDMA migration path is software based. Second, because the more advanced technologies on the CDMA migration path are backward compatible, devices will be able to function on earlier technologies such as 1xRTT.

157. The adoption of differing and incompatible technology standards has affected carrier conduct in the mobile data market in another important way. Until a few years ago, U.S. mobile subscribers could not send an SMS to subscribers on another mobile carrier's network.⁴¹⁶ As documented in the *Seventh Report*, following the introduction of cross-carrier network SMS capabilities by AT&T Wireless in December 2001, U.S. mobile carriers progressively implemented inter-carrier interoperability of SMS in early 2002, thereby enabling subscribers to exchange text messages with other carriers' customers.⁴¹⁷ In contrast, SMS interoperability has never been an issue in Europe because all incumbent European mobile operators have long deployed GSM in accordance with the previously mentioned decision of the European Community to mandate a single harmonized standard for second-generation mobile telecommunications services.⁴¹⁸ Thus, SMS interoperability in the U.S. mobile market was achieved as the result of a proactive competitive strategy on the part of the major U.S. mobile carriers. As noted in the *Eighth Report*, many carriers and analysts have credited the introduction of inter-carrier interoperability with stimulating the subsequent growth in text messaging.⁴¹⁹

V. CONSUMER BEHAVIOR IN THE MOBILE TELECOMMUNICATIONS MARKET

158. A mobile carrier can exercise market power only to the extent that mobile subscribers do not respond to price increases or other adverse competitive effects. If, to the contrary, enough consumers are sufficiently well-informed to take prices and other non-price factors into account when choosing their service provider, and likewise, if enough consumers have the ability and propensity to switch service providers in response to an increase in price or other harmful conduct, then the carrier will have an incentive to compete on price and non-price factors. Consumer behavior will be more effective in constraining market power when the transaction costs subscribers incur in choosing and switching carriers are low. Transaction costs depend on, among other factors, subscribers' access to and ability to use information, and costs and barriers to switching carriers.

A. Access to Information on Mobile Telecommunications Services

159. It is apparent that wireless consumers are demanding more information on the availability

⁴¹⁴ *Wireless Data Prospects Brightening*, at 25 and 28-29.

⁴¹⁵ *Id.*, at 2 and 6.

⁴¹⁶ *Id.*, at 13.

⁴¹⁷ See *Seventh Report*, at 13052.

⁴¹⁸ *Wireless Data Prospects Brightening*, at 13.

⁴¹⁹ See *Eighth Report*, at 14847.

and quality of mobile telecommunications services, and that numerous third parties have been responding to this demand by compiling and reporting such information. The *Eighth Report* enumerated the considerable sources of information available to consumers, including publications such as *Consumer Reports*, trade associations, marketing and consulting firms, and several web sites dedicated to giving consumers an overview and comparison of the mobile telephone services available in their area.⁴²⁰ These sources continue to update consumers on the wireless service options available to them. For example, the February 2004 issue of *Consumer Reports* magazine published the results of a new customer satisfaction survey on mobile telephone service.⁴²¹

160. In addition, within the past year the wireless industry itself launched a new initiative designed to educate consumers and help them make informed choices when purchasing wireless services. On September 9, 2003, the Cellular Telecommunications and Internet Association ("CTIA") held a press conference to unveil its voluntary "10-Point Consumer Code" ("Code").⁴²² The Code enumerates ten principles, disclosures and practices to be adopted by wireless carriers on a voluntary basis: (1) provide every new consumer a minimum 14-day trial period for new service; (2) provide coverage maps, illustrating where service is generally available; (3) in every advertisement that mentions pricing, specifically disclose the rates and terms; (4) for every rate plan or contract, provide consumers specific disclosures regarding rates and terms of service; (5) on billing statements carriers will not label cost recovery fees or charges as taxes, and will separately identify carrier charges from taxes; (6) when initiating or changing service, carriers will clearly state contract terms to customers and confirm changes in service; (7) provide customers the right to terminate service for significant changes to contract terms; (8) provide ready access to customer service; (9) promptly respond to consumer inquiries and complaints received from government agencies; and (10) abide by policies for protection of customer privacy. To date, all of the six major nationwide carriers, as well as many regional carriers, have committed to adhere to the ten principles set forth in the Code.⁴²³

B. Consumer Ability to Switch Service Providers

1. Churn

161. 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 approximately 24 percent of its customers in a single year.⁴²⁴ Most carriers report churn rates between 1.5 percent and 3.5 percent per month.⁴²⁵ One

⁴²⁰ See *Eighth Report*, at 14826.

⁴²¹ Carl Bialik, *Verizon Wireless Leads Customer-Satisfaction Survey*, THE WALL STREET JOURNAL, Jan. 7, 2004 ("Customer-Satisfaction Survey").

⁴²² See *Wireless Industry Unveils 10-Point Consumer Code*, News Release, CTIA, Sept. 9, 2003.

⁴²³ *Id.*

⁴²⁴ This assumes that each churned customer is a unique individual and that the same customers do not churn multiple times.

⁴²⁵ *Wireless 411*, at 39.

September 2003 study found that 26 percent of wireless subscribers said that they had switched providers at least once in the past 12 months.⁴²⁶ While average monthly churn rates for mobile telephone service have remained fairly constant over the past three years,⁴²⁷ it is not yet clear how the introduction of wireless local number portability (see below) will affect churn rates, if at all. Consistent with findings in previous reports,⁴²⁸ customers indicated cost and network quality as the main reasons for changing providers.⁴²⁹

2. Local Number Portability

162. Local number portability (LNP) refers to the ability of users of telecommunications services to retain, at the same location, existing telecommunications numbers when switching from one telecommunications carrier to another.⁴³⁰ Although the Act requires only local exchange carriers (LECs) to provide LNP, the Commission extended number portability requirements to CMRS providers, requiring them to provide for porting both to other CMRS carriers and to LECs.⁴³¹ The Commission concluded that enabling wireless subscribers to keep their phone numbers when changing carriers would enhance competition between wireless carriers as well as promote competition between wireless and wireline carriers.⁴³²

163. Under the Commission's rules and orders, covered CMRS carriers operating in the 100 largest Metropolitan Statistical Areas (MSAs) were required to begin providing number portability by November 24, 2003.⁴³³ Most LECs in the top 100 MSAs were required to be capable of wireline-to-wireless porting by the same date.⁴³⁴ CMRS carriers outside of the top 100 MSAs were not required to be LNP-capable until May 24, 2004.⁴³⁵ Similarly, LECs outside of the top 100 MSAs were not required

⁴²⁶ *Customer Loyalty Becoming a More Critical Issue in the Wireless Industry*, News Release, J.D. Powers and Associates, Sept. 30, 2003, ("*Customer Loyalty Becoming a more Critical Issue*").

⁴²⁷ See *NextGen VIII*, at 28.

⁴²⁸ See *Sixth Report*, at 13372-73; *Seventh Report*, at 13007; *Eighth Report*, at 14817.

⁴²⁹ See, e.g., *Wireless CTOs Unplugged*, at 3; and *Customer Loyalty Becoming a More Critical Issue*.

⁴³⁰ 47 C.F.R. § 52.21(i).

⁴³¹ 47 U.S.C. § 251(b); *Telephone Number Portability*, CC Docket No. 95-116, First Report and Order and Further Notice of Proposed Rulemaking, 11 FCC Rcd 8352, 8431-8442, paras. 152-170 (1996) ("*LNP First Report and Order*").

⁴³² *LNP First Report and Order*, 11 FCC Rcd at 8434-36, paras. 157-160.

⁴³³ 47 C.F.R. § 52.31(a); Verizon Wireless's Petition for Partial Forbearance From Commercial Mobile Radio Services Number Portability Obligation and Telephone Number Portability, WT Docket No. 01-184, Telephone Number Portability, CC Docket No. 95-116, Memorandum Opinion and Order, 17 FCC Rcd 14972, 14986, para. 31 (2002) ("*Verizon Wireless LNP Order*").

⁴³⁴ *Telephone Number Portability*, CC Docket No. 95-116, 19 FCC Rcd 875, 876, para. 3 (2004) ("*Two-Percent Carriers LNP Order*"). LECs that operate in the top 100 MSAs and have fewer than two percent of the nation's subscriber lines in the aggregate nationwide were not required to provide wireline-to-wireless porting until May 24, 2004. *Id.* at 875, para. 1.

⁴³⁵ *Verizon Wireless LNP Order*, 17 FCC Rcd at 14986, para. 31.

to provide intermodal porting until May 24, 2004.⁴³⁶

164. Since CMRS carriers began providing LNP on November 24, 2003 in the largest 100 markets, wireless-to-wireless porting volume has been significant.⁴³⁷ The number of wireless-to-wireless ports was 713,272 in January, 2004, and remained above 500,000 in February, March, and April.⁴³⁸ Wireline-to-wireless porting volume reached a peak of 79,080 in March, 2004.⁴³⁹ Overall, since November 2003, there have been more than 2 million ports involving wireless carriers.

165. Porting activity did not lead to a significant increase in wireless churn towards the end of 2003, although analysts predict increases in the churn rate through 2004.⁴⁴⁰ LNP does appear to have had an impact on CMRS competition, however. Aggressive customer retention efforts have been launched by wireless carriers acting in anticipation of wireless LNP.⁴⁴¹ As one analyst reports, "In the past, it was common for wireless operators to offer significantly better deals to new activations than to existing subscribers (i.e., upgrades). This practice moderated ahead of the implementation of wireless local number portability. Essentially, operators have been forced to increase resources with regard to keeping existing subscribers since it is now easier for them to leave."⁴⁴²

166. Thus, the advent of wireless LNP has indeed increased competitive pressures on CMRS carriers with regard to existing customers, with the result that such customers are receiving improved service. This competitive effect of LNP is likely to continue.⁴⁴³ We also note, however, the assertions of some commenters that the costs of regulatory mandates such as LNP and enhanced 911 are imposing disproportionate burdens on small carriers because the costs must be recovered from a smaller customer base, threatening their ability to compete with the larger carriers.⁴⁴⁴ Commenters allege that such costs

⁴³⁶ *Telephone Number Portability*, CC Docket No. 95-116, Memorandum Opinion and Order and Further Notice of Proposed Rulemaking, 18 FCC Rcd 23697, 23709, para. 29 (2003).

⁴³⁷ Porting volume data was obtained from Neustar.

⁴³⁸ Specifically, wireless-to-wireless porting volumes per month from December, 2003 were: 713,272 in January; 591,326 in February; 631,680 in March; and 612,534 in April.

⁴³⁹ Wireline-to-wireless porting volumes per month were: 24,068 in January; 64,608 in February; 79,080 in March; and 48,555 in April.

⁴⁴⁰ *Wireless 411*, at 2, 39 (finding that average monthly churn for the six major carriers was 2.4% in both the 3rd and 4th quarters of 2003); David Janazzo, *et al.*, *US Wireless Store Visits*, Merrill Lynch, Global Securities Research & Economics Group, Apr. 6, 2004 ("U.S. Wireless Store Visits"), at 2 (estimating churn during 1st quarter of 2004 for six national carriers to be 2.55%, compared with weighted average churn rates of 2.45% for the 4th quarter of 2003 and 2.43% during the first quarter of 2003); In-State MDR Market Alert, *Wireless Churn Rates Headed Up*, Apr. 13, 2004, <<http://www.instat.com/newmk.asp?ID=934>> (concluding that with earlier technical problems solved and more customers switching as their current service contracts expire, "churn will definitely be on the rise over the course of the year."); *CTIA Comments*, at 35.

⁴⁴¹ *Wireless 411*, at 1; *U.S. Wireless Store Visits*, at 3 ("the price for better than expected churn in a WLNP environment includes increasing retention expenses and increasing capital expenditures.").

⁴⁴² *NextGen VIII*, at 20; *see also Wireless 411*, at 80 (noting that in the 4th quarter of 2003, carriers "spent aggressively on customer care and retention").

⁴⁴³ *NextGen VIII*, at 20.

have in some cases hindered competition and forced some small CMRS carriers to delay for years planned cell site additions and network upgrades for the provision of broadband data services.⁴⁴⁵

VI. MOBILE TELECOMMUNICATIONS MARKET PERFORMANCE

167. The structural and behavioral characteristics of a competitive market are desirable not as ends in themselves, but rather as a means of bringing tangible benefits to consumers such as lower prices, higher quality and greater choice of services. Such consumer outcomes are the ultimate test of effective competition. To determine if these goals are met and whether there is still effective competition in the market, in this section we analyze various metrics including pricing levels and trends, subscriber growth and penetration, minutes of use ("MOU"), innovation and diffusion of services, and quality of service.

A. Pricing Levels and Trends

1. Pricing Trends.

168. Equity analysts and other industry observers continue to describe wireless price competition in the United States as "intense."⁴⁴⁶ However, wide variations in the non-price terms and features of wireless service plans make it difficult to characterize the price of mobile telephony service, and consequently it is difficult to identify sources of information that track mobile telephone prices in a comprehensive manner.⁴⁴⁷ As documented in previous reports, there is ample evidence of a sharp decline in mobile telephone prices in the period since the launch of PCS service. Although one study of mobile telephone pricing shows a slight increase in the cost of mobile telephone services in 2003, two other indicators of mobile telephony pricing show that the long-term decline in the cost of mobile telephone services continued through 2003.⁴⁴⁸

169. According to one economic research and consulting firm, Econ One, mobile telephone prices in the 25 largest U.S. cities increased 2.1 percent in 2003.⁴⁴⁹ The average cost of monthly service⁴⁵⁰ – which was calculated across four typical usage plans (50, 200, 500 and 800 minutes) – increased from

⁴⁴⁴ *Blooston Rural Carriers Comments*, at 1,4; *CTIA Comments*, at 9; *Rural Cellular Association Comments*, at 5; *Rural Telecommunications Group Reply*, at 2.

⁴⁴⁵ *Blooston Rural Carriers Comments*, at 5; *CTIA Comments*, at 10-11.

⁴⁴⁶ See, e.g., Michel Morin, et al., *Global Telecom Services*, Merrill Lynch, Equity Research, Jan. 16, 2004, at 8, ("Global Telecom Services"), ("the competitive intensity in wireless shows no sign of abating").

⁴⁴⁷ See *Fourth Report*, at 10164-10165. Pricing analysis is further complicated by the addition on bills of recurring monthly line items charged by wireless carriers, separated from the advertised month rates. See also National Association of State Utility Consumer Advocates Petition for Declaratory Ruling Regarding Truth-in-Billing, CC Docket No. 98-170, CG Docket No. 04-208, filed Mar. 30, 2004.

⁴⁴⁸ Fees for actual service is only one element of cost that consumers face. One analyst estimates that the average price a consumer pays for a wireless handset has fallen from \$128 in 1999 to \$88 in 2003, a decline of 31 percent. J.D. Powers and Associates, *Likelihood Of Purchasing New Cell Phone Is On The Rise*, News Release, Oct. 23, 2003.

⁴⁴⁹ *Econ One Wireless Survey: Costs Nudge Down in December*, News Release, Econ One, Jan. 12, 2004. The survey is based on an analysis of pricing plan data collected from carriers' websites. *Transcript*, at 78.

⁴⁵⁰ This does not include any additional costs for roaming or long distance.

\$35.70 in December 2002 to \$36.46 in December 2003.⁴⁵¹ Costs increased the most in Phoenix (+7.4 percent), while they decreased most rapidly in Sacramento (-2.4 percent).⁴⁵²

170. 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").⁴⁵³ Cellular CPI data is published on a national basis only.⁴⁵⁴ From 2002 to 2003, the annual Cellular CPI decreased by about 1.0 percent while the overall CPI increased by 2.3 percent. The Cellular CPI has declined 33 percent since 1997 when BLS began tracking it.

171. As a third pricing indicator, some analysts believe average revenue per minute ("RPM") is a good proxy for mobile pricing.⁴⁵⁵ This is calculated by dividing a carrier's estimate of ARPU by its estimate of MOUs, yielding the revenue per minute that the carrier is receiving.⁴⁵⁶ Using its estimates of industry-wide ARPU and MOUs, CTIA's survey indicates that RPM fell 13 percent between December 2002 and December 2003. Since 1994, RPM has fallen from \$0.47 in December 1994 to \$0.10 in December 2002, a decline of 79 percent.⁴⁵⁷

2. Average Revenue Per Unit

172. One financial metric widely used in analyzing the mobile telephone sector is average

⁴⁵¹ *Econ One Wireless Survey: Costs Nudge Down in December*, News Release, Econ One, Jan. 12, 2004. The analysis assumes a 70 percent peak/30 percent off-peak split in the kind of minutes used.

⁴⁵² *Id.*

⁴⁵³ See Appendix A, Table 8, at A-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 1997, 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.

⁴⁵⁴ *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>>.

⁴⁵⁵ See *US Wireless Matrix 4Q03*, at 42.

⁴⁵⁶ 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 459, *supra*.

⁴⁵⁷ See Appendix A, Table 9, at A-11.

monthly revenue per subscriber (often referred to as average revenue per unit, or "ARPU").⁴⁵⁸ CTIA's estimate of ARPU decreased almost continuously between December 1988 and December 1998, when it reached a low of \$39.43.⁴⁵⁹ However, since 1999, ARPU has been increasing, rising to \$49.91 in December 2003, a 27 percent increase from the low of five years ago, but only a 3 percent rise from \$48.40 in December 2002. This trend is evident even though per-minute prices declined throughout this period.⁴⁶⁰ 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.⁴⁶¹ Rising ARPU may also be due to increase use of data services by wireless subscribers. In the fourth quarter of 2003, data revenues accounted for 5 percent of Sprint PCS's ARPU, 3.5 percent of T-Mobile's ARPU, and 3 percent of Verizon Wireless's ARPU.⁴⁶²

B. Quantity of Services Purchased

1. Subscriber Growth

a. Mobile Telephony

173. Since the *Seventh Report*, in an effort to improve the accuracy of its estimate of U.S. mobile telephone subscribership, the Commission began analyzing information filed directly with the FCC. This information, the NRUF data,⁴⁶³ tracks phone number usage information for the United States.⁴⁶⁴ All

⁴⁵⁸ Some analysts argue that average margin per user, or "AMPU," is a better gauge of the financial well-being of wireless operators. Brad Smith, *ARPU: What Lies Ahead*, WIRELESS WEEK, July 15, 2003. See also, *Prepaid to Reach 1.35 Billion by 2009*, CELLULAR-NEWS.COM, Mar. 17, 2004

⁴⁵⁹ See Appendix A, Table 1, at A-2. There are different ways of calculating ARPU. The measure used here, CTIA's "average local monthly bill," does not include toll or roaming revenues (CTIA calls it "the equivalent of 'local ARPU'"). *Dec 2003 CTIA Survey*, at 191. CTIA defines an alternative measure of ARPU, which includes roaming revenues but not toll revenue. For a comparison between these two measures, see *Dec 2003 CTIA Survey*, at 192.

⁴⁶⁰ See Section VI.A.1, Pricing Trends, *supra*.

⁴⁶¹ Regardless of whether customers use the large bundles of minutes included with such plans, the higher monthly access fees increase operators' ARPU figures.

⁴⁶² *NextGen VIII*, at 4.

⁴⁶³ Carriers began reporting NRUF data biannually beginning with the period ending June 2000. In addition, the Commission's local competition and broadband data gathering program, adopted in March 2000, provides more data on mobile subscribership. The FCC requires mobile wireless carriers with over 10,000 facility-based subscribers in a state to report the number of their subscribers in those states twice a year to the Commission. In their December 31, 2003 filings, operators reported that they served 157 million subscribers. See Appendix A, Table 2, at A-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).

⁴⁶⁴ 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 exhaustion of area codes imposes significant costs on consumers, the Commission has taken a

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 of subscribership.⁴⁶⁵ In previous years, for purposes of this report, the Commission had relied on national subscribership data from a highly-respected survey conducted by CTIA.⁴⁶⁶ While the Commission, for purposes of this report, now uses NRUF data as the basis for its estimate of mobile telephone subscribership, we continue to report the CTIA data as well for comparison.⁴⁶⁷

174. As of December 2003, we estimate that there were 160.6 million mobile telephone subscribers,⁴⁶⁸ up from 141.8 million at the end of 2002, which translates into a nationwide penetration rate of 54 percent.⁴⁶⁹ This addition of 18.8 million subscribers was an almost 40 percent increase from the 13.3 million added in 2002, a reversal of declining subscriber trends that we reported in the *Seventh* and *Eighth Reports*.⁴⁷⁰

175. CTIA's estimate for year-end 2003 was 158.7 million subscribers, a 13 percent increase over

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.*

⁴⁶⁵ 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. *Id.*, 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. *Id.*

⁴⁶⁶ See *Dec 2003 CTIA Survey*. The CTIA effort is a voluntary survey of both its member and non-member facilities-based providers of wireless service. CTIA asks majority owners of corporations to report information for the entire corporation, which helps eliminate double counting. To encourage honest reporting, the surveys are tabulated by an independent accounting firm under terms of confidentiality and are later destroyed. CTIA receives only the aggregate, national totals. Not all wireless carriers submit surveys, however. In order to develop an estimate of total U.S. wireless subscribership, CTIA identifies the markets which are not represented in the survey responses. Then, CTIA uses third-party estimates or extrapolates from surrogate and/or historical data to create an estimate of subscribership for those markets. See *Eighth Report*, at 14813, note 211.

⁴⁶⁷ The advantages of NRUF data over CTIA's survey are discussed in the *Seventh Report*, at 13004.

⁴⁶⁸ Craig Stroup and John Vu, *Numbering Resource Utilization in the United States as of December 31, 2003*, Federal Communications Commission, May 2004, at 12 (Table 1: Number Utilization by Carrier Type as of December 31, 2003). The number of subscribers refers to the number of separate wireless accounts. A particular individual may have more than one wireless account.

⁴⁶⁹ 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, 2003 was estimated to be 294.7 million. See U.S. Census Bureau, *Population Estimates: Annual Population Estimates 2000 to 2003* (visited May. 13, 2004) <<http://eire.census.gov/popest/data/states/tables/NST-EST2003-01.xls>>.

⁴⁷⁰ See *Seventh Report*, at 13005; *Eighth Report*, at 14813-14814.

its estimate of 140.8 million subscribers as of year-end 2002.⁴⁷¹ These additions show a similar reversal of declining subscriber trends, and the survey's absolute increase of 18 million is the third largest increase in its history.⁴⁷² One analyst argues that the turnaround in subscriber growth may be due to three factors: 1) wireless is economically sensitive and with the improving economy the industry is experiencing improved growth; 2) around the current penetration rate, a network effect⁴⁷³ takes over that promotes increased subscriber growth; and 3) the increased availability of data applications increases the desirability and utility of a cell phone.⁴⁷⁴ Another analyst attributed the increased growth to a different set of factors: 1) the take up of family plans; 2) the take up of prepaid plans and hybrid plans for prepaid credit customers; 3) continuing fixed-to-mobile substitution trends; and 4) the fall in certain equipment prices.⁴⁷⁵

176. Digital subscribers made up approximately 91 percent of all wireless subscribers at the end of 2003, up from 88 percent at the end of 2002.⁴⁷⁶ During 2003, the number of customers subscribing to digital services climbed 17 percent, from approximately 125 million to 146 million.⁴⁷⁷ Approximately 14 million analog-only mobile telephone subscribers remain.⁴⁷⁸

b. Mobile Data

177. Using NRUF data, we estimate there were 11.2 million paging units in service as of the end of 2003, down 21 percent from 14.1 million units at the end of 2002.⁴⁷⁹

178. While subscriber numbers for paging continue to drop, the number of mobile data users

⁴⁷¹ See Appendix A, Table 1, at A-2.

⁴⁷² *Id.*

⁴⁷³ "For many information technologies, consumers benefit from using a popular format or system. When the value of a product to one user depends on how many other users there are, economists say that this product exhibits *network externalities*, or *network effects*." Carl Shapiro and Hal R. Varian, *INFORMATION RULES*, at 13 (Harvard Business School Press, 1999).

⁴⁷⁴ Frank J. Governali, *et al.*, *Global Telecom Weekly*, Goldman Sachs, Equity Research, May 14, 2004, at 1-2.

⁴⁷⁵ *NextGen VIII*, at 27. A number of analysts have attributed the increased subscriber growth to the appeal of family plans. See Yukar Iwatani, *Family Wireless Plans Pull In Kids, Spur Growth*, REUTERS, Oct. 7, 2003 (citing Craig Mallitz of Legg Mason, Jeff Kagan, and Thomas Lee of J.P. Morgan); and Blake Bath, *Wireless Services Industry Update*, Lehman Bros., Equity Research, Sept. 22, 2003, at 2-3.

⁴⁷⁶ See *US Wireless Matrix*, at 18. CTIA found a similar rate: More than 92 percent of subscribers of responding carriers in its YE2003 survey were digital (CTIA does not estimate the digital percentage for its total estimate of subscribers). CTIA, *Digital Migration Keeps a Steady Pace* (visited May 20, 2004) <http://files.ctia.org/img/survey/2003_endyear/752x571/Digital_Migration_Dec03.jpg>.

⁴⁷⁷ Based on *U.S. Wireless Matrix* digital penetration rates.

⁴⁷⁸ Subscribers that can access both the digital and analog networks of carriers are considered to be digital subscribers.

⁴⁷⁹ Craig Stroup and John Vu, *Numbering Resource Utilization in the United States as of December 31, 2003*, Federal Communications Commission, May 2004, at 12 (Table 1: Number Utilization by Carrier Type as of December 31, 2003).

appears to be rising both absolutely and as a percentage of the mobile telephone subscriber base. The *Eighth Report* cited an estimate by one analyst that there were 11.9 million mobile telephone users who subscribed to some type of mobile data service at the end of 2002, less than 10 percent of the total number of U.S. mobile telephone subscribers at that time.⁴⁸⁰ In contrast, an analyst report published in April 2004 estimates that almost 25 percent of U.S. mobile subscribers can be considered casual data users, most of whom use SMS and some of whom use picture mail, download ring tones or do simple web surfing.⁴⁸¹ Sprint PCS, which as previously mentioned currently leads the other nationwide mobile carriers in wireless data usage, reported that at the end of the first quarter of 2004 more than 6 million of its customers, or about 28 percent of the total, were subscribing to Sprint PCS data services, including more than 4 million customers of its mobile Internet service plan PCS Vision.⁴⁸²

179. With respect to the number of data-only mobile users, the same analyst report estimates that there are only about 1 million wireless data devices in service today, with a data device defined as a PDA such as a Blackberry or a laptop card.⁴⁸³ While this estimate comes from a report published in April 2004, it is lower than the figure of 2.3 million data-only mobile users at the end of 2002 cited in the *Eighth Report*.⁴⁸⁴

c. Satellite

180. Satellite industry analysis firm TelAstra estimates that the number of subscribers to mobile satellite telephone services worldwide, including the United States, grew to 885,000 in 2004, up by 27 percent from 695,000 in 2003.⁴⁸⁵

2. Minutes of Use

181. Wireless subscribers continue to increase the amount of time they communicate using their wireless phones. Average minutes-of-use per subscriber per month ("MOUs") jumped again in 2003, to 599 minutes, or 10 hours of use, for the average subscriber of a nationwide operator in the last quarter of the year.⁴⁸⁶ This is an increase of 100 MOUs, or one and one half hours of additional use, from a year earlier.⁴⁸⁷ Increasing MOUs most likely are a result of the decreasing prices and the wider acceptance of

⁴⁸⁰ See *Eighth Report*, at 14839.

⁴⁸¹ *Wireless Data Prospects Brightening*, at 10.

⁴⁸² Sprint, *Sprint Reports First Quarter Results*, News Release, Apr. 20, 2004. For the purpose of calculating the percentage of Sprint PCS customers who subscribe to mobile data services, subscribers from Sprint PCS affiliates as well as its direct retail and wholesale subscribers were included in its subscriber base.

⁴⁸³ *Wireless Data Prospects Brightening*, at 1 and 9.

⁴⁸⁴ See *Eighth Report*, at 14839.

⁴⁸⁵ Roger J. Rusch, *Satellite Statistics: Is Recovery a Mirage?*, TelAstra, Presentation at Satellite 2004, Washington, D.C., Mar. 3, 2004.

⁴⁸⁶ *NextGen VIII*, at 22.

⁴⁸⁷ *Id.* There apparently is still lots of room for growth. According to one survey, only 56 percent of wireless subscribers use all of their available minutes on a monthly basis. *Customer Loyalty Becoming a More Critical Issue in the Wireless Industry*.

and reliance upon wireless service.⁴⁸⁸ According to CTIA, MOUs averaged 507 between June and December 2003, an increase of 19 percent from 427 average MOUs during the same period in 2002, and an increase of 330 percent from an average of 380 MOUs from the same period in 2001.⁴⁸⁹

3. Mobile Data Usage

182. As previously noted, the limited coverage to date of high-speed wireless data networks and the slow speeds, relative to fixed broadband, of the most widely available next-generation wireless network technologies have tended to limit demand for mobile Internet access service, especially among data-centered users who typically access the Internet via laptops.⁴⁹⁰ Data on the use of handset-based mobile data applications are fragmentary and their availability varies with the particular type of application. By a number of indicators, however, handset-based mobile data applications have been gaining popularity among U.S. mobile subscribers. For example, the volume of SMS traffic continued to increase at a rapid pace in the past year. CTIA estimates that SMS traffic volume rose to more than 2 billion messages per month in December 2003, double the figure cited in the *Eighth Report* of 1 billion messages per month during June 2002.⁴⁹¹ One analyst report credits increased penetration of advanced devices with stimulating the growth of SMS, citing as an example the fact that the percentage of AT&T Wireless's subscriber base with two-way SMS capable handsets has now risen to 68 percent, up from 56 percent in early 2002 and nearly zero only a couple of years prior to that.⁴⁹²

183. The popularity of mobile gaming also appears to have increased in the past year. One analyst estimates that some 12.2 million Americans downloaded or subscribed to wireless games through their cell phone in 2003.⁴⁹³ Verizon Wireless announced at the end of the fourth quarter of 2003 that game downloads had surpassed those of ring tones.⁴⁹⁴ Mobile gaming on the Sprint network has also expanded in the past year, with Sprint selling more than 3.5 million games in 2004 and thereby increasing its total game sales since the launch of Sprint PCS Vision in 2003 to 9.5 million.⁴⁹⁵

184. In addition to playing more mobile games, Sprint PCS customers shared and uploaded more than 23 million pictures in the third quarter of 2003,⁴⁹⁶ and in March 2004 Sprint announced that Sprint

⁴⁸⁸ See, e.g., *Wireless 411*, at 57 (attributing growth in usage to "the lower effective price per minute").

⁴⁸⁹ *Dec 2003 CTIA Survey*, at 213. 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.

⁴⁹⁰ *Wireless Data Prospects Brightening*, at 34.

⁴⁹¹ *CTIA Comments*, at 16; *Eighth Report*, at 14847.

⁴⁹² *Wireless Data Prospects Brightening*, at 7.

⁴⁹³ Roland Jones, *Cell Phone Gaming Gathers Momentum*, MSNBC, Aug. 17, 2004 (citing Schelley Olhava, a wireless gaming analyst at market research firm IDC).

⁴⁹⁴ Aude Lagorce, *Verizon's Get It Now Vs. Sprint PCS's Vision*, FORBES.COM, Apr. 19, 2004.

⁴⁹⁵ *Sprint Announces More than 3.5 Million Game Purchases in 2004*, Press Release, Sprint PCS, May 10, 2004, available at http://www3.sprint.com/PR/CDA/PR_CDA_Press_Releases_Detail/0,3681,1112042,00.html?refurl=03ar.

⁴⁹⁶ *Lights, Camera, Action! Sprint Introduces Video Mail*, Press Release, Sprint PCS, Dec. 3, 2003.

PCS Vision customers have shared a total of more than 100 million images and 15-second video clips using the photo and video messaging services offered through Sprint's PCS Vision mobile data plan.⁴⁹⁷ Similarly, Verizon Wireless advertises that customers shared more than 21 million picture messages over its nationwide network between January 2004 and March 2004, and that customers now share an average of 7 million picture messages per month.⁴⁹⁸

4. Sub-National Penetration Rates.

185. NRUF data is collected on a small area basis and thus allows the Commission to compare the spread of mobile telephone subscribership across different areas within the United States.⁴⁹⁹ 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.⁵⁰⁰ 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.⁵⁰¹ Thus, an EA would seem to capture the market where the average person would shop for and purchase his or her mobile phone most of the time – near home, near the workplace, and all of the places in between. Second, wireless carriers have considerable discretion in how they assign telephone numbers across the rate centers in their operating areas.⁵⁰² 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

⁴⁹⁷ *Sprint Customers Share More Than 100 Million Memories via Enhanced Sprint Nationwide PCS Network*, Press Release, Sprint PCS, Mar. 22, 2004.

⁴⁹⁸ *Wireless Network*, Verizon Wireless (visited June 8, 2004) <<http://www.verizonwireless.com/b2c/aboutUs/wirelessNetwork.jsp>>.

⁴⁹⁹ 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 18,000 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.

⁵⁰⁰ There are 172 EAs, each of which is an aggregation of counties. See Kenneth P. Johnson, *Redefinition of the EA Economic Areas*, SURVEY OF CURRENT BUSINESS, Feb. 1995, at 75, (Redefinition of the EA"). 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>>.

⁵⁰¹ *Redefinition of the EA*, SURVEY OF CURRENT BUSINESS, Feb. 1995, at 75.

⁵⁰² According to one analyst, wireless carriers assign numbers so as to minimize the access charges paid to local wireline companies. See Linda Mutschler *et al.*, *Wireless Number Portability*, Merrill Lynch, Equity Research, Jan 9, 2003, at 8 ("For wireless operators, the standard practice is to aggregate phone numbers within the same area code onto the same or several rate centers, whose physical locations would result in the least amount of access charges paid to ILECs. Therefore, in each market, wireless operators are present in only a small number of rate centers. According to our industry sources, this percentage is probably below 20%, and could be meaningfully lower than 20%.").

or usage (but generally still in the same EA).⁵⁰³

186. Regional penetration rates for the 172 EAs covering the 50 United States, sorted by EA population density, can be seen in Appendix A, Table 3.⁵⁰⁴ The rates range from a high of 70 percent in the Atlanta, GA-AL-NC EA (EA 40) to a low of 36 percent in the Paducah, KY-IL EA (EA 72). In 2003, the EA with the lowest penetration rate had a rate three times as high as the EA with the lowest rate in 2002 (Northern Michigan, with 11 percent).⁵⁰⁵ Ninety-Six EAs (twice as many as in 2002), with a combined population of over 230 million, have penetration rates of over 50 percent. Twenty-one EAs, with a combined population of 83 million, have penetration rates of over 60 percent. The Anchorage, AK EA (EA 171), with the lowest population density, had a penetration rate of 46 percent, while the Tampa-St. Petersburg-Clearwater, FL EA (EA 34), with the highest density, had a penetration rate of 59 percent. As previously stated, based on an analysis of NRUF data, the national penetration rate is 54 percent.

C. Variety, Innovation, and Diffusion of Service Offerings

187. Section IV on carrier conduct detailed the variety of service offerings available to U.S. mobile subscribers, ranging from the multitude of mobile calling plans to the various types of mobile data plans. Consumers can choose from service offerings that vary widely with regard to a number of characteristics, including pricing level and structure, handset type, and the scope of ancillary services such as push-to-talk and caller ID as well as mobile data applications such as short text messaging, web browsing, and games. In addition, as discussed in Section VII.A below on wireless-wireline competition, some mobile wireless carriers offer service plans designed to compete directly with wireline local telephone service by allowing subscribers to make unlimited local calls and receive unlimited calls from anywhere for a flat monthly fee.

188. The U.S. mobile telecommunications market continued to be marked by rapid innovation and diffusion of service offerings in the past year. A prime example is the expansion of free “mobile-to-mobile” calling among a particular carrier’s customers. As with earlier innovations such as national single-rate calling plans, this innovation was initiated by a single carrier but soon spread as other carriers sought to match their rival with broadly similar offerings. Verizon Wireless’s deployment of a nationwide high-speed data network based on CDMA EV-DO technology is another noteworthy example of innovation in the past year. As previously indicated, although Sprint PCS initially planned to wait until 1xEV-DV is commercially available rather than building out 1xEV-DO, analysts report that Verizon’s decision to deploy 1xEV-DO ultimately pressured Sprint to announce plans to deploy EV-DO across its PCS network in an apparent effort to match Verizon’s high-speed data offering.

189. As discussed above, carriers have continued to upgrade their networks over the past year with next generation technologies that allow for faster mobile Internet access at speeds ranging from 30

⁵⁰³ “Once the NPA-NXX (i.e., 212-449) is assigned to the wireless carrier, the carrier may select any one of its NPA-NXXs when allocating that number to a particular subscriber. Therefore, with regard to wireless, the subscriber’s physical location is not necessarily a requirement in determining the phone number assignment – which is very different from how wireline numbers are assigned.” Linda Mutschler *et al.*, *US Wireless Services: Wireless Number Portability – Breaking Rules*, Merrill Lynch, Equity Research, Feb. 28, 2003, at 3.

⁵⁰⁴ See also, Appendix B, Map 4, at B-5.

⁵⁰⁵ See *Eighth Report*, at 14815.

to 70 kbps.⁵⁰⁶ To date, 277 million people, or 98 percent of the U.S. population, live in counties where GPRS, 1xRTT, and/or 1xEV-DO networks have been deployed.⁵⁰⁷

D. Quality of Service

190. To evaluate the quality of service, this section summarizes the results of relevant consumer satisfaction surveys and reports on the incidence of customer complaints. When examining such indicators of the quality of mobile telephone service, it is important to keep in mind that they are based on consumers' subjective perceptions of service quality. There are several points to note in this regard. First, mobile telecommunications service is an experience good, and therefore the quality of the product is unknown until the consumer actually uses it. Second, the perceived quality of any good or service depends partly on its price, and a consumer's evaluation of the relationship between price and quality determines his or her level of satisfaction. As stated in one survey of cellular customer satisfaction, "When customers make a purchase, they are choosing a price/quality package that they expect to meet their needs and desires. Ordinarily, higher price is associated with higher quality."⁵⁰⁸ Third, consumer perceptions can change independently of actual changes in network performance as their expectations evolve.

191. Finally, service quality in this market is dependent on when and where the service is used. In this regard, service quality concerns may stem from customer expectations that mobile phone service should be available at all times and at all points within the coverage area. Many mobile phone providers make maps of their service areas available to their subscribers either at their service stores or on their websites. Although these maps may contain disclaimers that the maps only show approximate coverage areas or contain other conditions or limitations, customers nevertheless may expect to be able to complete all calls and use all services within the entire service areas shown on the maps. When the full range of expected services is not available, consumer expectations may not be met.

192. Based on the national Consumer Utility Benchmark Survey ("CUBS") conducted over the internet between January 9 and February 3, 2003, the National Regulatory Research Institute ("NRRRI") found that a relatively high proportion of cellular customers are satisfied with their cellular service provider.⁵⁰⁹ In particular, nearly 72 percent of customers reported that they are satisfied with their provider, with the remaining 28 percent indicating that they are dissatisfied.⁵¹⁰ The CUBS estimate of

⁵⁰⁶ See IV.B.1.c. Technology Choices and Upgrades of Mobile Telephone Carriers, *supra*.

⁵⁰⁷ See IV.B.1.d. Coverage by Technology Type, *supra*.

⁵⁰⁸ Vivian Witkind Davis, *Consumer Utility Benchmark Survey: Consumer Satisfaction and Effective Choice for Cellular Customers*, The National Regulatory Research Institute at The Ohio State University, Nov. 2003, at 4 ("*Consumer Utility Benchmark Survey*").

⁵⁰⁹ *Id.*, at 7-8. The purpose of the survey is to provide state commissions, regulated industries and other stakeholders with insights on consumer perceptions of quality and price for the utilities and telecommunications industries. Almost 19,000 consumers filled out the survey, of which 11,492, or 64 percent of the respondents, reported they have a cellular phone. The survey results are weighted to reflect the actual age and gender distribution of the U.S. population. However, because the CUBS was conducted over the internet, the results may include proportionately more high-end users of technology than would be the case in the general population.

⁵¹⁰ *Id.*, at 7-8.

the level of consumer satisfaction is lower than, but still generally consistent with, the 83 percent customer satisfaction rate found by the General Accounting Office ("GAO")⁵¹¹ in a telephone survey of mobile phone customers that was discussed in the *Eighth Report*.⁵¹² NRRI suggests that the difference between the customer satisfaction rates found in the CUBS and the GAO survey is due in part to the GAO's use of a telephone survey rather than an internet survey.⁵¹³

193. The CUBS results are also similar to those of the GAO survey in suggesting that, despite the fairly high percentage of respondents who expressed satisfaction with their current overall level of call quality, many mobile phone customers report that they are experiencing specific problems.⁵¹⁴ In addition to the question on overall customer satisfaction, CUBS measured quality based on: (1) the number of contacts respondents reported having with their service providers on a variety of aspects of service; and (2) how respondents graded their service providers for customer service. In particular, respondents were questioned on how many times in the twelve months prior to the answering the survey they had contacted their service provider about selected quality of service issues, including billing, difficulty understanding the phone's features, dropped calls, static/line noise, sales practices, or other issues. NRRI notes that "contacts" do not equate with "complaints," but may be indicators of problems. The percentage of customers who reported contacting their service providers one or more times was slightly more than 23 percent for dropped calls and 20 percent for static/line noise.⁵¹⁵ These categories ranked third and fourth behind billing (55.7 percent) and difficulty understanding the phone's features (28.3 percent) in terms of the percentage of respondents reporting contacts with their service providers.

194. CUBS respondents were also asked to grade nine utility and telecommunications (local, long-distance and cellular) industries on customer service by choosing one of the following: A (excellent), B (very good), C (good), D (poor) or F (very poor). Based on the results, NRRI computed a grade-point average ("GPA") the same way it is done by high schools and colleges. The resulting GPAs for all industries were clumped together at the low end of possible values, ranging from a high of 2.09 for water to a low of 1.66 for cable, with an average for all utilities of 1.93. Cellular service received a grade point average of 1.78, second to last.⁵¹⁶ In addition, cellular service received fewer A's, B's, and C's, and more D's and F's, than the average of all industries.

195. In interpreting the GPAs computed by NRRI, it is noteworthy that the utilities with the four highest GPAs – in order, water, electric, natural gas, and local phone service – are all dominated by

⁵¹¹ *FCC Should Include Call Quality in Its Annual Report on Competition in Mobile Phone Services*, General Accounting Office, GAO-03-501, Apr. 2003 at 27 ("*GAO Report*").

⁵¹² See *Eighth Report*, at 14825-14826.

⁵¹³ *Consumer Utility Benchmark Survey*, at 7-8. In particular, due to a poor response rate to the GAO telephone survey, a very large number of telephone numbers (19,000) needed to be dialed to reach the desired quota of 1,000 survey respondents, of which about 550 had mobile phones. NRRI asserts that "the increasingly poor response rate to telephone surveys, which means that respondents are self-selected, is one reason that internet surveys, with their *ex post* weighting, provide ever more valuable information on consumer behavior."

⁵¹⁴ *GAO Report*, at 28 and 42. The problems reported by respondents to the GAO survey included dead zones and dropped calls.

⁵¹⁵ *Consumer Utility Benchmark Survey*, at 5.

⁵¹⁶ *Id.*, at 4 and 6.

monopolies or near-monopolies. Long-distance telephone service, which ranked only slightly ahead of cellular phone service, is highly competitive, while even cable service, which ranked last behind cellular, is subject to competition from direct broadcast satellite providers and, in some locations, cable over-builders. In light of this consideration, the poor showing of cellular service in this part of the CUBS does not seem to have any bearing on the assessment of effective competition in the CMRS market.

196. The Commission releases a report on the informal inquiries and complaints processed by its Consumer & Governmental Affairs Bureau ("CGB") four times a year. The most recent report, issued on November 20, 2003, provides data on consumer inquiries and informal complaints during the third quarter of calendar year 2003.⁵¹⁷ Since consumers who submit complaints are self-selected, the data in these reports are not representative of the U.S. population or mobile phone customers as a whole, unlike the results of consumer satisfaction surveys conducted by NRRI and the GAO. Of the services regulated by the FCC, wireless services ranked third behind radio and television broadcasting and wireline telecommunications services in terms of number of complaints during the reporting period. Of the 36,274 complaints registered in the third quarter, wireless complaints accounted for 4,825 or 13 percent of the total.

197. Of those 4,825 complaints from wireless consumers, service quality ranked third behind billing and rates and early termination of service contracts in terms of the number of complaints during the reporting period. In particular, 2,666 of the complaints were related to billing and rates, 665 of the complaints were related to contract and early terminations issues, and 647 of the complaints were related to service quality issues, with the remaining complaints being related to carrier marketing and advertising (584 complaints) and equipment issues (263 complaints). For purposes of the report, service quality addresses a broad range of disputes and inquiries regarding quality of service or the lack of coverage within a geographic area served by a wireless provider, including dead zones, dropped calls, overall quality of service within the subscriber's local calling area, network busy signal, and roaming availability.

E. International Comparisons

1. Mobile Telephony

198. The *Eighth Report* and previous reports compared mobile market performance in the United States, Western Europe and parts of the Asia-Pacific region with regard to mobile penetration, usage, and pricing.⁵¹⁸ As noted in the *Eighth Report*, these comparisons have shown three consistent differences in performance between the U.S. mobile market and mobile markets abroad. First, mobile penetration is significantly higher in Western Europe and parts of the Asia-Pacific region than in the United States. Second, average minutes of use per subscriber are significantly higher in the United States than in

⁵¹⁷ See *Quarterly Report on Informal Consumer Inquiries and Complaints Released*, Federal Communications Commission, News Release, Nov. 20, 2003.

⁵¹⁸ *Eighth Report*, at 14867-14875. In accordance with established practice in using international benchmarking for the purpose of assessing effective competition in mobile markets, the comparison of mobile market performance is restricted to Western Europe and parts of the Asia-Pacific in order to ensure that the countries being compared are roughly similar to the United States with regard to their level of economic and telecommunications infrastructure development. See, for example, UK regulator Ofcom's review of effective competition in the mobile market: *Effective Competition Review: Mobile*, Office of Telecommunications, Feb. 2001, at 7.

Western Europe and parts of the Asia-Pacific region. Third, revenue per minute, a commonly used proxy for pricing, is significantly lower in the United States than in Western Europe and parts of the Asia-Pacific region.

199. More recent data confirm that the same pattern of international differences in mobile market performance continued into the year 2003.⁵¹⁹ Mobile penetration remains significantly higher in Western Europe and parts of the Asia-Pacific region than in the United States. Mobile penetration averaged an estimated 87 percent in Western Europe at the end of 2003.⁵²⁰ In several countries, including Italy, Greece, and Sweden, mobile penetration reached 99 percent at the end of 2003, while in Portugal reported mobile subscribers actually exceeded the total population at the end of 2003 due to apparent double counting.⁵²¹ As in years past, France finished 2003 with the lowest mobile penetration rate in Western Europe at 68 percent.⁵²² Thus, as in previous years, U.S. mobile penetration at the end of 2003, at approximately 54 percent, was lower than the lowest mobile penetration rate in Western Europe.

200. Japan finished the year with a mobile penetration level of 67 percent,⁵²³ just slightly below the low end of the range in Western Europe and significantly higher than the U.S. level. In contrast, year-end mobile penetration rates in South Korea and Australia were within the range of European levels at 70 percent and 78 percent, respectively.⁵²⁴ In Taiwan, as in Portugal, estimated mobile penetration at the end of 2003 exceeded 100 percent due to apparent double counting of some mobile subscribers.⁵²⁵

201. Average minutes of use per subscriber continued to be significantly higher in the United States than in Western Europe and parts of the Asia-Pacific region.⁵²⁶ In particular, average MOUs were estimated to be approximately 557 per month in the United States in the fourth quarter of 2003.⁵²⁷ This

⁵¹⁹ See Appendix A, Table 11, at A-12.

⁵²⁰ *Global Wireless Matrix 4Q03*, at 2.

⁵²¹ As noted in previous reports, reported mobile subscriber figures and penetration may tend to be significantly overstated in countries with a high percentage of prepaid subscribers due to double counting of subscribers with more than one handset and lags by some carriers in removing inactive prepaid subscribers from their subscriber base. See *Seventh Report*, at 13033, and *Sixth Report*, at 13391. See also Linda Mutschler, Sean Salji and Benjamin Billiard, *European Wireless*, Merrill Lynch, Global Securities Research, Feb. 9, 2004, at 13-14 ("*European Wireless*").

⁵²² *Global Wireless Matrix 4Q03*, at 2.

⁵²³ *Id.*

⁵²⁴ *Id.*

⁵²⁵ *Id.*

⁵²⁶ For purposes of comparing metrics in different countries, average MOUs include both incoming and outgoing traffic, and usually exclude traffic related to mobile data services. *Id.*, at 89.

⁵²⁷ *Id.*, at 2. MOUs figures are potentially somewhat overstated in the United States, and more generally in countries that do not employ calling party pays, relative to countries that do employ calling party pays, as a result of the double-counting of same-network ("on-net") mobile-to-mobile minutes. The double counting occurs because under the "mobile party pays" system used in the United States the same minute of an on-net call is billed to both the caller and the receiver. *Id.*, at 89.

compares with an average across Western Europe of 129, and with figures in individual European countries that ranged from a high of 243 in Finland to a low of 75 in Germany.⁵²⁸ MOUs in Japan, South Korea, and Australia remained considerably higher than the Western European average, but still well below the U.S. figure, ranging from a low of 161 in Japan to a high of 311 in South Korea.⁵²⁹

202. Revenue per minute⁵³⁰ in Western Europe averaged nearly \$0.27 in the fourth quarter of 2003, and ranged from a high of \$0.33 in Germany to a low of \$0.18 in Finland.⁵³¹ Average revenue per minute in the United States during the same period, at \$0.10, was less than half the European average and well below the low end of the European range.⁵³²

203. The two previous reports⁵³³ found that revenue per minute in Japan was the highest in the group of European and Asian-Pacific countries being compared. As of the end of 2003, this was no longer the case. At \$0.31, revenue per minute in Japan is triple the U.S. figure in 2003, but slightly lower than the European high of \$0.33 in the German mobile market.⁵³⁴ In contrast, revenue per minute is as low or nearly as low in South Korea (\$0.10) and Taiwan (\$0.12) as in the United States.⁵³⁵

204. The results of this international comparison can be interpreted as evidence that the U.S. mobile market is effectively competitive relative to mobile markets in Western Europe and Japan. As discussed in the *Eighth Report*,⁵³⁶ analysts argue that revenue per minute is significantly lower in the United States than in Western Europe or Japan in part because the United States has a more competitive mobile market environment. As Merrill Lynch analysts put it in their analysis of global wireless industry metrics for the fourth quarter of 2003, "the pricing environment is generally much better in Europe than in the U.S.,"⁵³⁷ by which they mean that the pricing environment is *less competitive* in Europe. Analysts further argue that MOUs are higher, and revenue per minute lower, in the United States than in Europe in part because competition among U.S. mobile carriers has resulted in much greater prevalence of bucket plans compared to the situation in Europe.⁵³⁸

⁵²⁸ *Id.*, at 2.

⁵²⁹ *Id.*

⁵³⁰ Revenue per minute is calculated by dividing monthly voice-only ARPU by MOUs. For purposes of international comparison, service revenues included in ARPU reflect the fees mobile operators collect from other network operators for terminating incoming calls on their networks as well as monthly service charges and usage fees paid by mobile subscribers. *Id.*, at 89.

⁵³¹ *Id.*, at 2.

⁵³² *Id.*

⁵³³ See *Seventh Report*, at 13036, and *Eighth Report*, at 14869.

⁵³⁴ *Global Wireless Matrix 4Q03*, at 2.

⁵³⁵ *Id.*

⁵³⁶ See *Eighth Report*, at 14869-14871.

⁵³⁷ *Global Wireless Matrix 4Q03*, at 3.

⁵³⁸ See *Eighth Report*, at 14871; *European Wireless*, at 17-24.

205. Lower mobile penetration in the United States as compared to Western Europe and parts of Asia appears to reflect factors other than differences in the competitive environment.⁵³⁹ One possible factor is that local landline telephone service is relatively more expensive abroad and that, in Europe and some Asian markets, consumers pay for local landline calls, as well as calls from a mobile phone, on a per minute basis.⁵⁴⁰ Another likely explanatory factor is that all the foreign countries included in the above comparison employ calling party pays ("CPP"), whereas the United States employs the mobile party pays ("MPP") system. The use of CPP may stimulate mobile subscriber growth in two ways.⁵⁴¹ First, CPP may encourage consumer take-up of mobile phones because the mobile subscriber only incurs airtime charges for outgoing calls, while receiving unlimited incoming calls free of charge. Second, in many CPP markets use of CPP tends to drive up mobile service revenues by enabling a mobile carrier to charge relatively high rates for terminating traffic on its network. According to a 2003 study, high termination rates on incoming calls may help mobile operators attract new subscribers by generating resources enabling them to offer handset subsidies and low outgoing call rates, but the effect of this subsidy mechanism also has been to harm wireline subscribers who absorb the high mobile termination rates through the high rates they pay for fixed to mobile calls.⁵⁴² In addition to stimulating mobile subscriber growth from the supply side, high mobile termination rates also contribute to relatively high revenue per minute in CPP countries.

206. The Canadian mobile market is similar to the U.S. model in that Canada also uses MPP rather than CPP. Significantly, Canadian mobile market performance is more consistent with the performance of the U.S. mobile market than that of mobile markets in Europe and parts of Asia.⁵⁴³ In particular, Canada's mobile penetration (41 percent) is lower than that of the United States, revenue per minute in Canada (\$0.12) is nearly as low as that of the United States, and MOUs in Canada (296) are higher than those of any European country.⁵⁴⁴ We recognize, however, that certain countries such as Hong Kong and Singapore have achieved the relatively high mobile penetration rates of CPP countries while still maintaining MPP.⁵⁴⁵

⁵³⁹ See *Eighth Report*, at 14871-14874.

⁵⁴⁰ *Id.*, at 14871.

⁵⁴¹ *Id.*, at 14871-14873.

⁵⁴² Olivier Bomsel, Martin Cave, Gilles Le Blanc and Karl-Heinz Newmann, *How Mobile Termination Revenues Shape the Dynamics of the Telecom Sector*, Jul. 9, 2003, at 7 and 53. The authors further argue that competition in European mobile markets has generally not been sufficiently intense to compete away all excess profits on mobile termination through handset subsidies and low outgoing call rates, as a result of which surpluses from call termination may have been shared in varying proportions between mobile operators and consumers. *Id.* In addition to harming wireline subscribers, the study concludes that the effect of transfers from fixed networks and their customers as a result of high mobile termination charges for fixed to mobile calls has been to damage competition in the wireline market and to distort competition between fixed and mobile operators. *Id.*, at 7 and 65-66. Furthermore, as noted in the *Eighth Report*, high mobile termination rates may contribute to lower usage (MOUs) in CPP countries by discouraging calls to mobile phones. See *Eighth Report*, at 14874.

⁵⁴³ See Appendix A, Table 11, at A-12.

⁵⁴⁴ *Global Wireless Matrix 4Q03*, at 2.

⁵⁴⁵ *Id.* Mobile penetration in Hong Kong and Singapore at the end of 2003 was 95 percent and 82 percent, respectively. *Id.* The possible impact of CPP versus MPP on mobile subscriber growth and penetration is controversial. One 2003 study of the effects of introducing CPP on mobile market growth finds that there is no

2. Mobile Data

207. The *Eighth Report* observed that the percentage of mobile service revenues from data services is significantly higher in Western Europe than in the United States.⁵⁴⁶ This difference in mobile data market performance continued into 2003. In the fourth quarter of 2003 revenues from mobile data services averaged nearly 14 percent of European mobile carriers' ARPU, and ranged from an estimated 6 to 21 percent in individual European markets.⁵⁴⁷ This compares with just 3 percent of U.S. mobile carriers' ARPU in the same period.⁵⁴⁸ The percentage of ARPU derived from mobile data services was even higher in Japan (24 percent) and the Philippines (35 percent) than in Western Europe.⁵⁴⁹ As was the case in previous years,⁵⁵⁰ SMS continues to be the most frequently used mobile data service in Europe, accounting for 92 to 94 percent of data revenues in the UK, Germany and Italy.⁵⁵¹ This compares to 47 percent in the United States, 35 percent in Japan and 30 percent in Korea, where the role of other types of mobile data services appears to be larger.⁵⁵² The more rapid spread of mobile data services in overseas markets than in the United States may reflect a variety of factors influencing the demand for mobile data services, including differences in the age composition of the mobile subscriber base, the degree of technological standardization and compatibility among competing mobile networks, the availability of more advanced handsets, wireline Internet penetration rates, and the relative prices of mobile voice, mobile data, and wireline Internet access. For example, given that average mobile voice usage is steeply higher in the United States than in Europe and that, according to analysts, mobile voice is still relatively expensive on a per minute basis in Europe compared to the United States,⁵⁵³ U.S. mobile subscribers may appear to lag behind their European counterparts in mobile data usage in part simply because they prefer to use their mobile phones to talk rather than to send text messages, whereas European mobile subscribers are more likely to opt for text messaging because it is cheaper than placing a call on their mobile phones.⁵⁵⁴

statistical correlation between penetration and whether CPP or MPP is applied, but nevertheless concludes that "MPP certainly has held back growth in the US and Canada" and, more generally, that "in the longer term CPP is likely to lead to more rapid market growth and higher penetration levels." See Stefan Zehle, *CPP Benchmark Report*, Coleago Consulting Ltd., Feb. 23, 2003, at 11. In contrast, another study predicts that mobile penetration in the United States and Canada will likely catch up with the penetration rates of CPP countries in the near term. See Robert W. Crandall and J. Gregory Sidak, *Should Regulators Set Rates to Terminate Calls on Mobile Networks?*, forthcoming in *YALE JOURNAL ON REGULATION*, Vol. 21, 2004, at 18.

⁵⁴⁶ *Eighth Report*, at 14875.

⁵⁴⁷ *Global Wireless Matrix 4Q03*, at 2.

⁵⁴⁸ *Id.*

⁵⁴⁹ *Id.*

⁵⁵⁰ See *Eighth Report*, at 14875.

⁵⁵¹ See *European Wireless*, at 34.

⁵⁵² *Id.*

⁵⁵³ *Id.*, at 23-24.

⁵⁵⁴ *Wireless Data Prospects Brightening*, at 12.

208. The number of foreign mobile telephone carriers providing mobile data services over next-generation networks continued to grow in the past year, but as in previous years the pace of 3G deployment abroad continues to lag behind initial expectations. During 2000 and 2001, countries in Western Europe and parts of Asia raced to award 3G licenses in the apparent belief that early licensing would jump-start the market for 3G services.⁵⁵⁵ To this end, the European Commission required Member States to take all measures necessary to allow for the coordinated introduction of 3G services by January 2002, and in particular to establish an authorization system no later than January 2000.⁵⁵⁶ As noted in previous reports, however, in October 2001 Japan's NTT DoCoMo became the world's first carrier to launch commercial service over a WCDMA network, whereas European carriers delayed the launch of commercial WCDMA service until 2003 at the earliest and in most cases 2004.⁵⁵⁷ As of the end of 2003, commercial start-up of WCDMA service in Europe was limited to a small number of carriers in a handful of markets, including Hutchison 3G in Austria, Denmark, Italy, Sweden and the UK, Mobilkom in Austria, and Tele2 and P&T Luxembourg in Luxembourg.⁵⁵⁸ Moreover, in 2002 and 2003 a number of European 3G license winners suspended their planned WCDMA deployments and withdrew from the 3G market in certain countries, in some cases returning the license to the regulator or selling it to another carrier.⁵⁵⁹ In several cases the license holders who pulled out of the 3G market had paid millions and even billions of dollars for the license in 3G auctions, but withdrawals also occurred in countries that awarded licenses through a so-called "beauty contest" for a low administrative fee or free of charge. In all cases, the license winners who have pulled out of the 3G market are would-be new entrants to national mobile markets rather than incumbent GSM operators.

209. Analysts attribute the delays in 3G deployment abroad to a number of factors. One is a lack of adequate handsets, due initially to technical problems with handsets and subsequently to the inability of equipment manufacturers to keep pace with rising demand.⁵⁶⁰ In addition, sluggish demand due to a lack of attractive applications ("killer applications") and consequently a lack of interest on the part of consumers has made it difficult for carriers to market 3G services.⁵⁶¹ Together with the relatively high cost of 3G network deployment and a difficult financial environment, the resulting erosion of confidence in the profitability of 3G services lead carriers to postpone network deployment in order to reduce capital expenditures.⁵⁶² In this regard, incumbent carriers in Europe have been able to meet consumer demand for mobile data services, albeit at much lower speeds than WCDMA potentially affords, by making relatively inexpensive GPRS upgrades to their existing GSM networks. Analysts also emphasize the role

⁵⁵⁵ See *Seventh Report*, Appendix D, Table 1, at 13103-13105.

⁵⁵⁶ *Decision No. 128/199/EC of the European Parliament and of the Council of 14 December 1998 on the coordinated introduction of a third-generation mobile and wireless communications system (UMTS) in the Community*, Official Journal L 17, Jan. 22, 1999.

⁵⁵⁷ See *Eighth Report*, at 14874-14875.

⁵⁵⁸ *Developments of Third-Generation Mobile Services in the OECD*, at 27-28.

⁵⁵⁹ *Id.*, at 26-27.

⁵⁶⁰ *Id.*, at 26.

⁵⁶¹ *Id.*, at 26; The Harris Poll, *Europeans Uninterested in 3G; Many Say Benefits Are Unclear*, THE WALL STREET JOURNAL ONLINE NEWS ROUNDUP, Mar. 23, 2004.

⁵⁶² *Developments of Third-Generation Mobile Services in the OECD*, at 16.

of entry barriers due to the first-mover and scale-economy advantages of incumbent GSM operators with an existing customer base in explaining why a number of potential new entrants decided to exit national 3G markets in Europe even before launching service.⁵⁶³ Despite these setbacks, recent sales figures for third-generation handsets suggest that third-generation mobile services may be finally gaining momentum in Europe. In April 2004, about 225,000 third-generation cell phones were sold to European consumers.⁵⁶⁴ Although this figure represents only about 2 percent of the European cell phone market, unit sales in April 2004 were more than double those in March.⁵⁶⁵

210. After two years of relatively sluggish growth, consumer uptake of NTT DoCoMo's WCDMA service, which the company calls FOMA (Freedom of Multimedia Access), picked up speed in late 2003 and the first half of 2004. As of the end of April 2004, the number of FOMA subscribers had jumped to 3,575,700, more than ten times the figure of 330,000 at the end of March 2003.⁵⁶⁶ Despite this acceleration in subscriber growth, consumer uptake of rival Japanese carrier KDDI's CDMA2000 service continues to outpace that of NTT DoCoMo's WCDMA service. The number of subscribers to KDDI's 1xRTT-based service more than doubled from 6.8 million at the end of March 2003 to nearly 14 million at the end of April 2004.⁵⁶⁷ Data services offered over next-generation CDMA networks continue to be popular with consumers in Korea. Through March 2004 South Korea had accumulated a total of over 27.6 million CDMA2000 subscribers - more than 80 percent of South Korea's mobile telephone subscriber base - including 6.4 million subscribers who are using services offered over 1xEV-DO networks.⁵⁶⁸

VII. INTERMODAL ISSUES

A. Wireless – Wireline Competition

211. Once solely a business tool, wireless phones are now a mass-market consumer device.⁵⁶⁹ As one reporter commented, "Few products have ever fallen so fast from luxury perk to ubiquitous commodity."⁵⁷⁰ The overall wireless penetration rate in the United States is now at 54 percent.⁵⁷¹ Over 230 million people live in EAs with penetration rates of over 50 percent, while 83 million live in EAs

⁵⁶³ *Developments of Third-Generation Mobile Services in the OECD*, at 27.

⁵⁶⁴ David Pringle, *High-Tech Cellphones Catch On In Europe as Models Get Lighter*, THE WALL STREET JOURNAL, June 1, 2004.

⁵⁶⁵ *Id.*

⁵⁶⁶ Telecommunications Carriers Association ("TCA"), *Number of Subscribers* (visited May 17, 2004) <<http://www.tca.or.jp/eng/database/daisu/index.html>>.

⁵⁶⁷ *Id.*

⁵⁶⁸ *3G Subscribers*, 3G TODAY, (visited May 19, 2004) <<http://www.3gtoday.com/subscribers/index.html>>.

⁵⁶⁹ *See Sixth Report*, at 13381.

⁵⁷⁰ Jesse Drucker, *Big-Name Mergers Won't Ease Crowding in Cellphone Industry*, WALL STREET JOURNAL, Feb. 13, 2004.

⁵⁷¹ *See note 469, supra.*

with penetration rates of over 60 percent.⁵⁷² Industry survey firm Telephia estimated that 58 percent of the total population in 48 major metropolitan areas subscribed to wireless service at the end of 2003, with the highest being Greenville, SC and St. Louis, MO at 77 percent.⁵⁷³ In addition, wireless is now penetrating deeply into the youth market. One study found that 56 percent of 11- to 17-year olds have or shared a phone, while another study found that 29 percent of 8- to 10-year olds have a cell phone.⁵⁷⁴ One study from June 2003 found that 88.5 percent of surveyed mobile phones users said they kept their phones with them 24 hours a day.⁵⁷⁵

1. Wireless Substitution

212. While specific data is largely unavailable, it appears that only a small percent of wireless customers use their wireless phones as their only phone, and that relatively few wireless customers have “cut the cord” in the sense of canceling their subscription to wireline telephone service.⁵⁷⁶ As one analyst argued, “the wireless impact on wireline has more to do with opportunity lost for the wireline side.”⁵⁷⁷

213. Evidence continues to mount, however, that consumers are substituting wireless service for traditional wireline communications. One analyst estimated, for example, that 23 percent of voice minutes in 2003 were wireless, up from 7 percent in 2000.⁵⁷⁸ In the *Eighth Report*, we discussed the effects of mobile telephone service on the operational and financial results of companies that offer wireline services. Such effects included a decrease in the number of residential access lines,⁵⁷⁹ a drop in long distance revenues, and a decline in payphone profits.⁵⁸¹ In 2003 these trends continued, with the four

⁵⁷² See Section VI.B.4, Sub-National Penetration Rates, *supra*.

⁵⁷³ *KC Mobile Phone Use Rises From Last Year*, Business Journal of Kansas City, Nov. 11, 2003 (citing Telephia survey).

⁵⁷⁴ Jeffrey Selingo, *Hey Kid, Your Backpack Is Ringing*, NEW YORK TIMES, Mar. 18, 2004. See also, discussion of family plans in note 475.

⁵⁷⁵ COMMUNICATIONS DAILY, July 22, 2004, at 10 (citing a survey by technology vendor SMS.as).

⁵⁷⁶ In February 2004, the Current Population Survey of the Census Bureau included a special supplement about wireless phone usage. On the basis of this supplement, they estimate that 5 to 6 percent of all households now have wireless phones only. This is up from a previous estimate in November 2001 of a little over 1 percent. As part of the Consumer Expenditure Survey of the Bureau of Labor Statistics, demographic information about those who have a wireless bill and no wireline bill indicates that young single people are those most likely to have cut the cord. Tucker, Clyde, Michael Brick, and Brian Meekins, “Telephone Service in U.S. Households in 2004,” paper presented at the 2004 Annual Meeting of the American Association for Public Opinion Research. See, also *Seventh Report*, at 13017.

⁵⁷⁷ *NextGen VIII*, at 40.

⁵⁷⁸ *Id.*, at 41.

⁵⁷⁹ Total residential access lines can decline without wireline customers “cutting the cord” completely, as customers can replace additional residential lines (“second lines”) with DSL, cable broadband, or wireless connections. *NextGen VIII*, at 39-40. See, also, *Trends in Telephone Service*, Federal Communications Commission, May 2004, at 7-1 and 7-6 (Table 7.4: *Additional Residential Lines For Households with Telephone Service*, showing the decline of second lines since 2000).

largest LECS losing 4 percent of their access lines, and wireline long distance voice revenues declining further.⁵⁸³ One analyst stated that “wireless cannibalization remains a key driver of access line erosion.”⁵⁸⁴

214. Certainly, this is due to the relatively low cost, widespread availability, and increased use of wireless service. As we discussed in the *Eighth Report*, a number of analysts have argued that wireless service is cheaper than wireline, particularly if one is making a long distance call or when traveling.⁵⁸⁵ More recently, one analyst said, “we believe that a wireless customer is now indifferent as to whether he makes a call from a fixed line or from a wireless phone, given the prevalence of big buckets of cheap minutes.”⁵⁸⁶ The analyst later added:

Let’s think about this another way. If [the average] customer were sitting in a room, with his fixed line on a table and his wireless phone in his pocket, and he needed to make a call, he would reach for whichever device was more convenient – without thinking about price. And, if the number that he needed to call was stored in his mobile phone, he might well reach for his mobile phone first.⁵⁸⁷

2. Wireless Alternatives

215. The number of mobile wireless carriers offering service plans designed to compete directly with wireline local telephone service continues to increase. These plans offer unlimited local calling for around \$35 to \$40 a month. The largest of such providers, Leap, under its “Cricket” brand, offers mobile telephone service in 39 markets in 20 states.⁵⁸⁸ At the end of 2003, Leap had roughly 1.5 million

⁵⁸¹ See *Eighth Report*, at 14832.

⁵⁸³ *Global Telecom Services*, at 6 (declining access lines); Simon Flannery *et al.*, *Picking Winners and Losers in a Changing Industry View*, Morgan Stanley, Equity Research, Feb. 24, 2004, at 5 (LD voice revenues). See, also, Frank J. Governali *et al.*, *Downgrading CTL and CTCO to IL/C*, Goldman Sachs, Equity Research, Jan. 24, 2004 (noting that CenturyTel Inc. cited wireless substitution of long distance as a reason for weaker long distance demand in 2004). Moreover, the Commission has affirmed that the LNP rules that went into effect on November 24, 2003 require “intermodal” number porting between wireline and wireless carriers, thus enabling a wireline customer to port his or her telephone number to a wireless carrier serving the customer’s local calling area. Telephone Number Portability, CC Docket No. 95-116, *Memorandum Opinion and Order and Further Notice of Proposed Rulemaking*, 18 FCC Rcd. 23,697 (2003).

⁵⁸⁴ Frank J. Governali *et al.*, *Telecom Services: Wireless & Wireline*, Goldman Sachs, Equity Research, Apr. 1, 2004, at 10. ALLTEL attributed approximately 40 percent of its access line losses in the fourth quarter of 2004 to wireless substitution and 25 to 30 percent to broadband substitution. Colette M. Fleming *et al.*, *ALLTEL Corp.*, UBS Warburg, Equity Research, Jan 26, 2004, at 6.

⁵⁸⁵ See *Eighth Report*, at 14832-14833.

⁵⁸⁶ *European Wireless*, at 3.

⁵⁸⁷ *European Wireless*, at 23.

⁵⁸⁸ *Leap Reports Results for First Fiscal Quarter of 2004*, News Release, Leap, May 17, 2004. This is one market fewer than was reported in the *Eighth Report*. *Eighth Report*, at 14833.

customers.⁵⁸⁹ Leap claims that 43 percent of its customers do not have a wireline phone at home.⁵⁹⁰ MetroPCS, which began offering a similar unlimited calling plan in 2002, had almost 1 million customers at the end of 2003.⁵⁹¹ According to MetroPCS, its customers average approximately 1,700 minutes of use per month, which it believes exceeds the average monthly usage for the typical wireline customer.⁵⁹² The company also believes that a majority of its customers use their service as their primary means of communications, and that it is the sole telecommunications service provider for many of its customers.⁵⁹³ MetroPCS offers service in California, Florida, and Georgia.⁵⁹⁴

216. Other companies offering unlimited local calling plans include: Triton PCS in Virginia, North Carolina, South Carolina, Georgia, and Tennessee;⁵⁹⁵ Qwest in Arizona, Colorado, Idaho, Iowa, Minnesota, Nebraska, New Mexico, Oregon, Utah, Washington, and Wyoming;⁵⁹⁶ Northcoast PCS in Ohio;⁵⁹⁷ First Cellular of Southern Illinois in Illinois;⁵⁹⁸ Kiwi PCS in North Carolina;⁵⁹⁹ Rural Cellular in Vermont, New Hampshire, New York, Kansas, Minnesota, Maine, North Dakota, and South Dakota;⁶⁰⁰ Ntelos in Virginia, West Virginia, and North Carolina;⁶⁰¹ Iowa Wireless in Iowa and Illinois;⁶⁰² Hargray

⁵⁸⁹ See Appendix A, Table 4, at A-8.

⁵⁹⁰ *Leaping Over Landline: Leap Leads Wireless Displacement Trend*, News Release, Leap Wireless, Jun. 24, 2002.

⁵⁹¹ MetroPCS, SEC Form S-1, filed Mar. 23, 2004, at 1; Appendix A, Table 4, at A-8; MetroPCS, *Service & Phone* (visited May 20, 2004) <<http://www.metropcs.com/coverage/coverage.shtml>>.

⁵⁹² *Id.*, at 1.

⁵⁹³ *Id.*, SEC Form S-1, filed Mar. 23, 2004, at 1.

⁵⁹⁴ See MetroPCS, *Service & Phone* (visited May 26, 2004) <<http://www.metropcs.com/coverage/coverage.shtml>>.

⁵⁹⁵ See SunCom, *SunCom UnPlan "FREE" Zones* (visited May 27, 2004) <http://www.suncom.com/maps/suncom_unplan_maps.html>.

⁵⁹⁶ See Qwest, *Qwest Choice™* (visited May 28, 2004) <<http://www.qwestwireless.com/service/checkCoverage.jsp>>.

⁵⁹⁷ See Northcoast PCS, *Service Plans* (visited May 27, 2004) <http://www.northcoastpcs.com/Web/Service_Plans.html>.

⁵⁹⁸ See First Cellular, *Southern Illinois Unlimited Plan* (visited May 27, 2004) <http://www.firstcellular.com/pages/rates_details.php?id=1&cat=2>.

⁵⁹⁹ See Kiwi PCS (visited May 28, 2004) <<http://www.kiwipcs.com/service.htm>>.

⁶⁰⁰ See Rural Cellular, *Welcome To Rural Cellular Corporation* (visited May 27, 2004) <<http://www.ruralcellular.com/>>.

⁶⁰¹ See Ntelos, *homefree* (visited May 28, 2004) <http://www.ntelos.com/P/pdr_homefree.html>.

⁶⁰² See Iowa Wireless MEGAtalk plan (visited May 28, 2004) <[http://www.strawberrycomputing.net/TWS-plans.htm#\\$89%20MEGAtalk%20PHONE%20PACKAGE](http://www.strawberrycomputing.net/TWS-plans.htm#$89%20MEGAtalk%20PHONE%20PACKAGE)>.

Wireless in southeastern Georgia;⁶⁰³ Bluegrass Cellular in Kentucky;⁶⁰⁴ Onelink PCS in Missouri and Illinois;⁶⁰⁵ Immix Wireless in Pennsylvania;⁶⁰⁶ Corr Wireless in Alabama;⁶⁰⁷ and Leaco Wireless in New Mexico.⁶⁰⁸

217. In addition, in 2003 many carriers began offering calling plans that are effectively unlimited, with 1,000 “anytime” minutes and unlimited night and weekend minutes for around \$50-\$65 per month.⁶⁰⁹ One analyst commented, “We think that such plans were yet more evidence of the threat to the fixed line, which, for a similar price, offers unlimited local and long distance – without mobility.”

B. Wi-Fi

218. Wi-Fi or Wireless Fidelity, also known as the Institute of Electrical and Electronics Engineers’ (“IEEE”) family of 802.11x standards, is a technology used to create wireless local area networks (“WLANs”) with a range of 150 to 250 feet.⁶¹⁰ Wi-Fi operates on an unlicensed basis and allows data transfer speeds of up to 11 Mbps for 802.11b and up to 54 Mbps for 802.11a and 802.11g. Users of mobile devices with Wi-Fi capabilities can establish high-speed wireless Internet connections within buildings or spaces, commonly called “hot spots,” where Wi-Fi technology has been deployed. Hot spots typically rely on high-speed landline technologies, such as T-1 lines, DSL, or cable modems, to connect to the PSTN and Internet. Public hot spots include restaurants, coffee shops, hotels, airports, convention centers, and city parks, streets, and squares.⁶¹¹ The industry estimates there were more than 71,000 Wi-Fi hot spots worldwide as of May 2003, of which more than 28,000 were in North America, with retail outlets followed by hotels being the leading hot spot locations both worldwide and in North America.⁶¹²

⁶⁰³ See Hargray Wireless Local Unlimited Plan (visited May 28, 2004) <<http://www.hargraywireless.com/hws/Search.bok?category=calling+plans>>.

⁶⁰⁴ See Bluegrass Cellular Local Digital Price Plans (visited May 28, 2004) <http://www.bluecell.com/local_cellular.html>.

⁶⁰⁵ See OneLink Communications HomeLink plan (visited May 28, 2004) <<http://www.onelinkpcs.com/home.html>>.

⁶⁰⁶ See Immix Cellular Telezone Rate plan (visited May 28, 2004) <http://www.immix.com/_page/rate_telezone.htm>.

⁶⁰⁷ See Corr Wireless HomeFree Endless Minutes (visited May 27, 2004) <<http://www.corrcomm.net/>>.

⁶⁰⁸ See Leaco Mobile One Rate (visited May 28, 2004) <<http://www.rodeo.leaco.net/brochures41803/4999.htm>>.

⁶⁰⁹ *NextGen VIII*, at 33.

⁶¹⁰ Kenneth R. Carter, Ahmed Lahjouji, and Neal McNeal, *Unlicensed and Unshackled: A Joint OSP-OET White Paper on Unlicensed Devices and Their Regulatory Issues*, OSP Working Paper #39, May 2003, at 28-29. (“OSP-OET White Paper”)

⁶¹¹ See *Seventh Report*, at 13062-13063. Private Wi-Fi networks – typically not open to the public – have also been deployed in locations such as homes, office buildings, hospitals, and schools.

⁶¹² *Public Wireless LAN Hotspots: Worldwide, 2002-2008*, GARTNER, May 15, 2003, at 7.

219. While Wi-Fi itself is not a CMRS service,⁶¹³ it has begun to play an increasingly important role in the CMRS industry, and many CMRS providers have recently entered the Wi-Fi business. Because the technology allows consumers to obtain high-speed wireless Internet connections within certain locations, it has the potential to act as both a substitute and a complement to data services offered over mobile telephone networks. However, several obstacles currently prevent Wi-Fi from competing directly with CMRS-based mobile data services. First, roaming among Wi-Fi hotspots that are not part of the same network or are maintained by different providers can be problematic. Second, frequent handoffs are required in order for Wi-Fi users to roam beyond the relatively short service radii of individual hotspots. Technical obstacles also currently prevent Wi-Fi from connecting seamlessly with wide area CMRS networks and therefore acting as a more effective complement to such networks. However, carriers and equipment providers are working to overcome these obstacles.⁶¹⁴

220. There are several business models for Wi-Fi hot spots. These include: individuals or companies who install Wi-Fi equipment in commercial locations; wholesale aggregators who combine local installations to provide a national footprint; major CMRS providers; grass roots individuals who offer free or low-cost access; and providers of other products, such as restaurants, that offer Wi-Fi in order to sell their primary product.⁶¹⁵ When a Wi-Fi network operator chooses to install hot spot equipment in partnership with another commercial entity, the resulting Wi-Fi offering typically combines and builds on the special expertise derived from each member of the partnership.⁶¹⁶ Generally speaking, hot spot operators are companies that set up and maintain Wi-Fi networks in public locations and sell Wi-Fi access to end users. In return, hot spot operators share the revenue derived from the Wi-Fi access with the hosting business.

221. As noted in the *Eighth Report*, several mobile telephone carriers have entered the hot spot operation business through acquisitions, partnerships, or independent deployments. Over the past year their list of hotspots has grown.⁶¹⁷ Subscribers to carriers' Wi-Fi services may choose from a wide range of service plans including annual access, month-to-month access, daily access, and metered access.⁶¹⁸ In addition, some mobile carriers extended their Wi-Fi coverage in the past year by entering into agreements with other carriers. For example, Sprint PCS signed a reciprocal agreement with AT&T Wireless that would allow each carrier's Wi-Fi subscribers to access the airport hotspots operated by the other carrier.⁶¹⁹ Likewise, T-Mobile entered into an agreement with AT&T Wireless, whereby the

⁶¹³ See 47 C.F.R. §§ 20.3, 20.9 for a discussion of commercial mobile radio services.

⁶¹⁴ See, e.g., Stephen Lawson, *Cisco to Ship Wi-Fi Mobile Phone in June, Device Will Work Only Within Facilities*, INFOWORLD, Apr. 16, 2003.

⁶¹⁵ *OSP-OET White Paper*, at 37.

⁶¹⁶ *Id.*

⁶¹⁷ See, for example, T-Mobile, *T-Mobile Hotspot U.S. Location Map* (visited May 20, 2004) <<http://locations.hotspot.t-mobile.com/>>.

⁶¹⁸ See, for example, Sprint PCS, *PCS for Business: Voice and Data* (visited May 20, 2004) <<https://wifi.sprintpcs.com/signup/terms.aspx>>; T-Mobile, *T-Mobile Hotspot: Service Plans* (visited May 20, 2004) <https://selfcare.hotspot.t-mobile.com///services_plans.do>.

⁶¹⁹ *Sprint and AT&T Wireless Sign Bilateral Airport Wi-Fi Roaming Agreement*, Press Release, Sprint PCS, Apr. 19, 2004.

customers of both carriers will have access to the airport Wi-Fi hotspots operated by the other carrier.⁶²⁰

VIII. CONCLUSION

222. By a number of performance indicators, U.S. consumers continue to benefit greatly from robust competition in the CMRS marketplace. During 2003, the CMRS industry experienced another year of growth, demonstrating the continuing demand for and reliance upon mobile services. As of December 2003, we estimate there were approximately 160.6 million mobile telephone subscribers, which translates into a nationwide penetration rate of roughly 54 percent.⁶²¹ Consumers continued to increase their use of mobile telephones for both voice and data services. Partly because of the prevalence of mobile service packages with large buckets of inexpensive minutes, on average U.S. mobile subscribers continued to spend more than twice as much time per month talking on their mobile phones than mobile subscribers in Western Europe or Japan.⁶²² Moreover, although U.S. mobile subscribers still prefer to use their mobile phones to talk rather than to send text messages, the popularity of text messaging and other handset-based data applications increased during 2003 as evidenced by, among other indicators, a steep rise in the volume of SMS traffic and an increase in the estimated percentage of U.S. mobile subscribers considered to be casual data users.⁶²³ Relatively low prices on mobile voice and data services appear to have been a key factor stimulating subscriber growth and usage. While only two of three different indicators of mobile pricing continued to drop in 2003,⁶²⁴ it is estimated that mobile voice calls are still two to three times less expensive on a per minute basis in the United States than in Western Europe, and that mobile data pricing is about 50 percent cheaper in the United States than in Western Europe.⁶²⁵

223. In addition to the indicators of mobile market performance cited in the preceding paragraph, a wide variety of indicators of carrier conduct and market structure also show that competition in mobile telecommunications markets is robust. For example, mobile telephony providers continued to build out their networks and expand service availability during 2003.⁶²⁶ Carriers also continued to deploy GPRS, 1xRTT, or 1xEV-DO networks that allow them to offer mobile Internet access services for mobile telephone handsets, PDAs, and/or laptops. With respect to market structure, to date 276 million people, or 97 percent of the total U.S. population, have three or more different operators offering mobile telephone service in the counties in which they live. Roughly 250 million people, or 87 percent of the U.S. population, live in counties with five or more mobile telephone operators competing to offer service.

⁶²⁰ *AT&T Wireless and T-Mobile USA Sign Airport Wi-Fi Roaming Agreement*, Press Release, T-Mobile USA, Feb. 5, 2004.

⁶²¹ See Section VI.B.1, *Subscriber Growth*, *supra*.

⁶²² See Section VI.E, *International Comparisons*, *supra*.

⁶²³ See Section VI.B.1, *Subscriber Growth*, *supra*, and Section VI.B.3, *Mobile Data Usage*, *supra*.

⁶²⁴ See Section VI.A.1, *Pricing Trends*, *supra*.

⁶²⁵ See *Wireless Data Prospects Brightening*, at 12.

⁶²⁶ See Section IV.B.1, *Technology Deployment and Upgrades*, *supra*.

224. In addition, while relatively few wireless customers have “cut the cord” in the sense of canceling their subscription to wireline telephone service, evidence continues to mount that consumers are substituting wireless service for traditional wireline communications. One analyst estimated, for example, that 23 percent of voice minutes in 2003 were wireless, up from 7 percent in 2000.

225. Using the various data sources and metrics discussed above, we have met our statutory requirement to analyze the competitive market conditions with respect to commercial mobile services⁶²⁷ and conclude that the CMRS marketplace is effectively competitive.

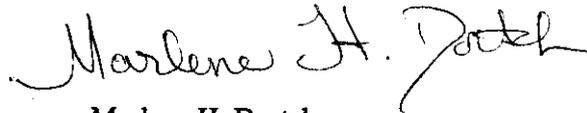
IX. ADMINISTRATIVE MATTERS

226. This Ninth 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).

227. 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.

228. It is FURTHER ORDERED that the proceeding in the WT Docket No. 04-111 IS TERMINATED.

FEDERAL COMMUNICATIONS COMMISSION



Marlene H. Dortch
Secretary

⁶²⁷ See Section II.A, Background, *supra*.

**APPENDIX A:
MOBILE TELEPHONY**

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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
June 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
June 02	134,561,370		\$36,707,086	\$1,846,267	131,350	186,956	\$118,418,677	\$47.42
Dec 02	140,766,842	12,392,330	\$39,801,101	\$2,049,245	139,338	192,410	\$126,922,347	\$48.40
June 03	148,065,824		\$41,384,171	1,825,243	147,719	187,169	\$134,147,049	\$49.46
Dec 03	158,721,981	17,955,139	\$46,239,922	1,941,024	162,986	205,629	\$145,866,914	\$49.91

Source: CTIA, *Semi-Annual Wireless Industry Survey* <<http://www.wow-com.com/industry/stats/surveys/>>.

Table 2: FCC's Semi-Annual Local Telephone Competition Survey

State	December 2003		Subscribers								Percent Change Dec 02 - Dec 03		
	Carriers ¹	Percent Resold ²	1999		2000		2001		2002			2003	
			Dec	Jun	Dec	Jun	Dec	Jun	Dec	Jun		Dec	
Alabama	10	7 %	1,080,410	1,253,084	1,386,294	1,930,631	1,979,075	2,027,845	1,987,234	2,100,557	2,242,108	13 %	
Alaska	4		165,221	169,892	*	218,424	240,216	242,133	267,606	*	303,184	13	
Arizona	14	5	1,125,821	1,624,668	1,855,115	2,018,410	2,171,021	2,412,998	2,520,058	2,643,952	2,843,661	13	
Arkansas	7	4	719,919	715,467	743,928	891,275	970,127	1,130,302	1,156,345	1,351,291	1,296,901	12	
California	15	6	8,544,941	12,283,569	12,710,520	14,184,625	15,032,203	16,007,376	17,575,105	18,892,619	20,360,454	16	
Colorado	10	3	1,552,718	1,654,989	1,856,075	1,983,805	2,145,816	2,247,166	2,358,748	2,426,929	2,554,731	8	
Connecticut	6	4	1,077,089	1,136,618	1,277,123	1,418,367	1,639,914	1,577,873	1,694,110	1,791,944	1,928,988	14	
Delaware	6	4	270,848	275,219	371,014	389,284	412,611	433,059	438,196	503,353	543,526	24	
Dist. of Columbia	6	9	346,681	333,813	354,735	362,457	404,489	415,399	472,332	520,182	513,102	9	
Florida	11	13	5,158,079	4,983,478	6,369,985	7,536,670	8,937,063	8,607,715	9,482,349	10,252,348	10,855,430	14	
Georgia	13	6	2,538,983	2,687,238	2,754,784	4,076,119	4,149,717	4,300,831	4,497,576	4,709,288	4,940,091	10	
Guam	*	*	*	*	*	*	*	*	*	*	*	NA	
Hawaii	5	1	288,425	454,364	524,291	543,283	595,721	640,247	689,857	732,262	771,023	12	
Idaho	10	10	271,436	296,066	344,364	398,781	444,864	500,693	536,064	572,406	603,488	13	
Illinois	10	7	3,922,482	4,309,660	5,143,767	5,621,044	5,631,172	5,409,370	6,476,683	6,834,217	7,183,985	11	
Indiana	8	10	1,318,975	1,717,378	1,715,074	1,781,247	1,921,356	2,032,290	2,390,567	2,456,509	2,642,810	11	
Iowa	12	9	774,773	975,629	832,106	861,382	1,087,608	1,157,580	1,239,384	1,290,305	1,342,931	8	
Kansas	12	4	669,472	724,024	801,293	901,225	956,050	1,061,171	1,117,277	1,195,230	1,261,342	13	
Kentucky	11	8	911,700	999,544	1,026,334	1,176,736	1,405,043	1,505,982	1,456,703	1,595,290	1,812,657	24	
Louisiana	10	11	1,227,106	1,294,693	1,306,457	1,677,292	1,920,740	2,187,831	2,180,613	2,365,224	2,470,146	13	
Maine	5	2	187,903	283,640	359,786	399,616	427,313	437,835	466,896	524,246	568,159	22	
Maryland	8	4	1,634,625	2,013,058	2,298,651	2,446,818	2,614,216	2,684,441	2,913,943	3,108,086	3,319,605	14	
Massachusetts	6	3	1,892,614	2,228,169	2,649,130	2,753,683	2,996,816	3,289,934	3,375,726	3,506,039	3,741,975	11	
Michigan	14	7	3,512,413	3,423,335	3,351,719	4,071,091	4,238,399	4,738,538	4,674,980	4,889,269	5,114,299	9	
Minnesota	12	9	1,350,411	1,595,560	1,851,430	2,014,317	2,153,857	2,254,895	2,415,633	2,564,783	2,677,472	11	
Mississippi	10	12	673,355	509,038	708,577	993,371	1,048,061	1,106,700	1,112,765	1,232,730	1,324,160	19	
Missouri	11	6	1,855,452	1,848,775	1,767,411	1,937,684	2,106,599	2,246,430	2,289,831	2,515,325	2,691,255	18	
Montana	4	2	*	*	*	*	279,349	291,429	315,532	343,160	373,947	19	
Nebraska	9	2	576,296	600,985	659,380	712,683	791,799	838,568	867,810	900,744	937,184	8	
Nevada	8	6	750,333	825,163	844,732	766,581	842,153	895,586	984,486	1,077,380	1,216,838	24	
New Hampshire	8	11	280,508	309,263	387,264	445,181	492,390	529,795	525,689	598,504	648,788	23	
New Jersey	6	3	2,289,181	2,750,024	3,375,130	3,896,778	4,283,643	4,531,457	4,587,640	5,392,340	5,799,417	26	
New Mexico	10	12	363,827	395,111	443,343	619,582	660,849	735,107	780,855	828,869	859,408	10	
New York	12	5	4,833,816	5,016,524	5,918,136	6,749,096	7,429,249	7,915,526	8,937,685	8,829,070	9,433,613	6	
North Carolina	11	8	2,536,668	2,730,178	3,105,811	3,377,331	3,767,598	4,610,120	4,094,715	4,305,521	4,554,723	11	
North Dakota	*	*	*	*	*	*	*	345,578	*	*	*	NA	
Ohio	14	5	3,237,786	3,278,960	4,150,498	4,255,934	4,739,795	4,887,376	5,212,204	5,699,499	5,817,211	12	
Oklahoma	13	4	826,637	979,513	1,124,214	1,200,234	1,288,357	1,366,475	1,440,970	1,574,588	1,614,191	12	
Oregon	10	4	914,848	1,082,425	1,201,207	1,268,909	1,399,279	1,473,883	1,682,343	1,682,036	1,778,936	6	
Pennsylvania	10	5	2,767,474	3,850,372	4,129,186	4,378,216	4,849,085	4,987,067	5,258,844	5,681,653	6,073,573	13	
Puerto Rico	6	11	*	1,090,085	757,613	1,374,747	1,128,736	1,136,619	1,516,808	1,404,599	1,631,266	8	
Rhode Island	6	3	279,304	313,590	355,889	401,885	456,059	463,636	515,547	527,366	567,331	10	
South Carolina	11	16	1,137,232	1,236,338	1,392,586	1,502,345	1,752,457	1,830,516	1,896,369	2,041,541	2,149,480	13	
South Dakota	5	7	*	*	*	*	278,646	292,210	325,114	344,825	365,211	12	
Tennessee	12	5	1,529,854	1,876,444	1,983,853	2,251,208	2,510,978	2,660,868	2,674,566	2,800,735	2,974,512	11	
Texas	20	6	5,792,453	6,705,423	7,548,537	8,294,338	9,156,187	9,650,715	10,133,280	10,776,234	11,327,708	12	
Utah	9	3	643,824	692,086	750,244	833,492	919,002	970,834	1,032,522	1,094,563	1,154,992	10	
Vermont	*	*	*	*	*	*	*	*	*	*	*	NA	
Virgin Islands	*	*	*	*	0	0	*	*	*	*	*	NA	
Virginia	11	4	2,262,567	2,447,687	2,708,342	3,059,420	3,270,165	3,429,450	3,753,106	3,879,582	4,147,182	10	
Washington	10	5	1,871,475	2,144,767	2,286,082	2,493,214	2,706,090	2,849,043	2,869,784	3,102,730	3,377,193	18	
West Virginia	10	10	241,265	347,916	392,384	452,036	498,811	549,722	576,503	579,981	675,257	17	
Wisconsin	11	8	1,525,818	1,342,988	1,698,520	2,008,679	2,229,389	2,523,956	2,396,562	2,535,215	2,723,965	14	
Wyoming	4	2	127,634	*	*	173,939	194,685	168,232	191,339	276,344	295,706	54	
Nationwide	86	6 %	79,696,043	90,643,058	101,043,219	114,028,928	123,990,857	130,731,459	138,878,293	147,623,734	157,042,082	13 %	

NA - Not Applicable

* 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.

Source: Local Telephone Competition: Status as of December 31, 2003, Federal Communications Commission, June 2004 (Table 13: Mobile Wireless Telephone Subscribers).

Table 3: Economic Area Penetration Rates

EA	EA Name	Subscribers	EA Population	2003 Penetration Rate	2003 HHI	2002 Penetration Rate	EA density
34	Tampa-St. Petersburg-Clearwater, FL	1,420,786	2,395,997	59.30%	1578	55.73%	890.99
10	New York-No. New Jer.-Long Island, NY-NJ-CT-PA-MA-VT	15,287,972	25,712,577	59.46%	2091	52.92%	890.56
12	Philadelphia-Wilmington-Atl. City, PA-NJ-DE-MD	4,356,857	7,309,792	59.60%	2009	52.78%	778.84
161	San Diego, CA	1,922,868	2,813,833	68.34%	2078	57.86%	660.48
64	Chicago-Gary-Kenosha, IL-IN-WI	5,952,494	10,328,854	57.63%	1538	52.81%	556.54
31	Miami-Fort Lauderdale, FL	3,595,876	5,602,222	64.19%	1524	59.10%	483.20
55	Cleveland-Akron, OH-PA	2,341,367	4,692,460	49.90%	2152	42.26%	427.84
3	Boston-Worcester-Lawrence-Lowell-Brockton, MA-NH-RI-VT	4,530,215	7,954,554	56.95%	2083	53.60%	421.83
13	Washington-Baltimore, DC-MD-VA-WV-PA	5,572,046	8,403,130	66.31%	1881	59.55%	402.76
63	Milwaukee-Racine, WI	1,226,088	2,255,183	54.37%	2194	46.85%	366.88
57	Detroit-Ann Arbor-Flint, MI	4,297,348	6,963,637	61.71%	1830	54.49%	364.07
50	Dayton-Springfield, OH	608,034	1,133,004	53.67%	*	39.82%	318.52
49	Cincinnati-Hamilton, OH-KY-IN	1,211,492	2,184,860	55.45%	2404	49.22%	294.08
11	Harrisburg-Lebanon-Carlisle, PA	589,975	1,125,265	52.43%	2798	44.34%	292.42
20	Norfolk-Virginia Beach-Newport News, VA-NC	1,016,383	1,722,764	59.00%	1748	53.66%	289.89
160	Los Angeles-Riverside-Orange County, CA-AZ	11,020,865	18,003,420	61.22%	1971	52.69%	286.10
53	Pittsburgh, PA-WV	1,517,384	2,971,829	51.06%	2534	45.92%	284.77
33	Sarasota-Bradenton, FL	416,557	763,795	54.54%	1716	51.04%	273.56
163	San Francisco-Oakland-San Jose, CA	5,725,178	9,111,806	62.83%	1990	56.27%	271.07
30	Orlando, FL	2,160,936	3,642,540	59.32%	1646	53.34%	265.84
40	Atlanta, GA-AL-NC	3,826,757	5,471,412	69.94%	1815	62.10%	246.04
23	Charlotte-Gastonia-Rock Hill, NC-SC	1,224,010	2,031,519	60.25%	1790	52.73%	240.50
32	Fort Myers-Cape Coral, FL	456,278	692,265	65.91%	1769	62.11%	234.27
133	McAllen-Edinburg-Mission, TX	400,030	978,369	40.89%	2650	48.86%	221.96
8	Buffalo-Niagara Falls, NY-PA	674,874	1,507,759	44.76%	2449	38.70%	212.89
62	Grand Rapids-Muskegon-Holland, MI	921,107	1,881,991	48.94%	2079	34.92%	206.76
170	Seattle-Tacoma-Bremerton, WA	2,508,180	4,135,291	60.65%	2070	55.28%	190.45
51	Columbus, OH	1,244,662	2,349,060	52.99%	2089	41.50%	190.40
18	Greensboro-Winston-Salem-High Point, NC-VA	922,422	1,854,853	49.73%	1847	47.30%	189.09
19	Raleigh-Durham-Chapel Hill, NC	1,086,930	1,831,510	59.35%	1858	55.08%	188.38
164	Sacramento-Yolo, CA	1,424,043	2,311,567	61.61%	1951	54.43%	188.08
172	Honolulu, HI	790,232	1,211,537	65.23%	2243	58.33%	187.20
65	Elkhart-Goshen, IN-MI	396,919	936,245	42.39%	2335	33.67%	185.73
41	Greenville-Spartanburg-Anderson, SC-NC	675,919	1,248,824	54.12%	2704	50.57%	183.62
70	Louisville, KY-IN	774,340	1,416,914	54.65%	1672	47.37%	180.92
83	New Orleans, LA-MS	957,082	1,725,338	55.47%	2009	51.09%	171.93
67	Indianapolis, IN-IL	1,548,388	3,066,469	50.49%	2316	44.49%	171.37
131	Houston-Galveston-Brazoria, TX	3,439,905	5,632,853	61.07%	1953	56.53%	169.25
7	Rochester, NY-PA	704,473	1,493,518	47.17%	3257	31.24%	167.21
44	Knoxville, TN	524,635	983,329	53.35%	1833	47.52%	165.64
22	Fayetteville, NC	282,041	528,224	53.39%	1930	48.85%	164.57
56	Toledo, OH	626,108	1,294,395	48.37%	2919	44.50%	163.94
66	Fort Wayne, IN	322,538	725,847	44.44%	3357	37.26%	158.50
130	Austin-San Marcos, TX	879,957	1,349,267	65.22%	1768	59.74%	156.06
81	Pensacola, FL	382,214	623,252	61.33%	1674	51.64%	154.06
26	Charleston-North Charleston, SC	363,532	587,297	61.90%	1964	57.50%	149.80

43	Chattanooga, TN-GA	371,278	720,375	51.54%	1974	44.46%	145.32
45	Johnson City-Kingsport-Bristol, TN-VA	280,985	576,081	48.78%	1993	44.90%	144.51
60	Appleton-Oshkosh-Neenah, WI	210,533	433,250	48.59%	2496	37.79%	143.62
82	Biloxi-Gulfport-Pascagoula, MS	213,257	396,754	53.75%	1737	45.64%	143.45
84	Baton Rouge, LA-MS	408,833	739,673	55.27%	3333	48.78%	140.30
78	Birmingham, AL	935,055	1,578,903	59.22%	2143	53.20%	137.13
5	Albany-Schenectady-Troy, NY	564,646	1,171,669	48.19%	2751	40.77%	134.71
46	Hickory-Morganton, NC-TN	219,830	519,208	42.34%	2581	38.50%	131.90
42	Asheville, NC	246,863	444,594	55.53%	3190	49.02%	128.63
96	St. Louis, MO-IL	1,917,848	3,558,651	53.89%	2057	48.16%	127.01
24	Columbia, SC	527,821	932,115	56.63%	2206	50.46%	125.95
52	Wheeling, WV-OH	123,003	327,645	37.54%	4170	29.92%	124.54
15	Richmond-Petersburg, VA	831,285	1,446,123	57.48%	1871	53.46%	124.03
74	Huntsville, AL-TN	566,031	997,824	56.73%	2379	49.04%	119.14
127	Dallas-Fort Worth, TX-AR-OK	4,369,646	7,645,530	57.15%	1743	51.53%	119.00
54	Eric, PA	200,808	519,348	38.67%	4151	32.45%	116.41
29	Jacksonville, FL-GA	1,173,446	1,885,190	62.25%	1329	53.47%	112.52
14	Salisbury, MD-DE-VA	161,757	363,970	44.44%	5560	36.69%	111.17
102	Davenport-Moline-Rock Island, IA-IL	281,431	558,913	50.35%	2562	44.61%	108.27
25	Wilmington, NC-SC	467,980	878,267	53.28%	1978	49.80%	107.39
71	Nashville, TN-KY	1,324,487	2,444,643	54.18%	1927	47.99%	105.12
6	Syracuse, NY-PA	812,041	1,902,640	42.68%	3159	36.05%	104.74
73	Memphis, TN-AR-MS-KY	1,009,301	1,882,332	53.62%	1702	46.19%	102.99
103	Cedar Rapids, IA	232,667	384,577	60.50%	2799	57.27%	101.33
85	Lafayette, LA	314,496	601,654	52.27%	3531	46.75%	99.99
162	Fresno, CA	688,956	1,419,998	48.52%	2455	41.73%	98.64
2	Portland, ME	370,657	748,817	49.50%	2778	42.50%	98.56
17	Roanoke, VA-NC-WV	389,827	826,284	47.18%	1915	45.04%	97.83
158	Phoenix-Mesa, AZ-NM	1,992,943	3,407,197	58.49%	1545	53.85%	93.91
9	State College, PA	333,346	809,979	41.15%	3665	34.68%	92.41
28	Savannah, GA-SC	392,450	668,214	58.73%	1675	48.11%	91.95
101	Peoria-Pekin, IL	264,545	528,671	50.04%	3487	44.05%	90.99
27	Augusta-Aiken, GA-SC	311,550	604,799	51.51%	2048	42.34%	89.79
87	Beaumont-Port Arthur, TX	231,219	456,637	50.64%	3242	46.79%	89.20
99	Kansas City, MO-KS	1,416,864	2,469,340	57.38%	1892	51.10%	88.73
92	Fayetteville-Springdale-Rogers, AR-MO-OK	210,732	405,160	52.01%	2842	43.83%	88.43
21	Greenville, NC	412,842	823,517	50.13%	2691	46.43%	87.74
48	Charleston, WV-KY-OH	454,265	1,199,373	37.88%	2502	33.72%	85.35
39	Columbus, GA-AL	272,995	496,538	54.98%	1638	51.30%	84.08
134	San Antonio, TX	1,150,957	2,141,060	53.76%	1960	47.34%	82.99
107	Minneapolis-St. Paul, MN-WI-IA	2,522,006	4,498,286	56.07%	1325	50.29%	82.98
47	Lexington, KY-TN-VA-WV	727,500	1,851,367	39.30%	1761	35.35%	80.39
167	Portland-Salem, OR-WA	1,596,419	2,883,737	55.36%	2160	49.89%	76.01
69	Evansville-Henderson, IN-KY-IL	416,392	854,714	48.72%	3407	42.96%	75.31
80	Mobile, AL	358,691	676,258	53.04%	2185	42.81%	74.75
93	Joplin, MO-KS-OK	123,942	263,904	46.96%	2554	38.77%	74.68
68	Champaign-Urbana, IL	300,716	630,898	47.66%	2998	40.16%	73.47
124	Tulsa, OK-KS	728,014	1,384,426	52.59%	1788	47.01%	72.44
104	Madison, WI-IL-IA	472,036	933,823	50.55%	4365	43.09%	71.33
72	Paducah, KY-IL	81,938	226,586	36.16%	5158	24.73%	70.02

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79	Montgomery, AL	281,736	481,137	58.56%	1842	49.84%	66.86
125	Oklahoma City, OK	711,495	1,698,197	41.90%	1836	45.61%	65.04
35	Tallahassee, FL-GA	412,759	720,434	57.29%	2140	46.41%	63.51
38	Macon, GA	349,525	768,701	45.47%	1810	40.78%	62.88
37	Albany, GA	219,967	468,178	46.98%	3074	32.43%	62.74
118	Omaha, NE-IA-MO	570,420	1,044,156	54.63%	1988	47.14%	62.40
159	Tucson, AZ	543,130	999,882	54.32%	1468	49.56%	60.03
97	Springfield, IL-MO	279,411	517,462	54.00%	3503	47.48%	58.20
98	Columbia, MO	205,585	369,014	55.71%	2559	42.64%	58.00
88	Shreveport-Bossier City, LA-AR	274,163	573,616	47.80%	2524	40.73%	57.96
4	Burlington, VT-NY	238,286	605,393	39.36%	4638	30.76%	57.62
89	Monroe, LA	171,614	333,519	51.46%	3466	44.84%	56.12
106	Rochester, MN-IA-WI	173,893	318,374	54.62%	3056	49.32%	55.65
36	Dothan, AL-FL-GA	148,980	332,409	44.82%	2422	36.23%	53.70
105	La Crosse, WI-MN	89,458	241,903	36.98%	4326	22.64%	53.67
86	Lake Charles, LA	248,726	536,758	46.34%	2291	40.12%	52.41
141	Denver-Boulder-Greeley, CO-KS-NE	2,510,708	3,984,105	63.02%	1955	58.63%	52.02
95	Jonesboro, AR-MO	139,986	303,852	46.07%	3163	35.50%	51.30
16	Staunton, VA-WV	168,045	334,087	50.30%	1747	51.47%	50.99
61	Traverse City, MI	184,273	286,745	64.26%	4316	24.44%	50.67
119	Lincoln, NE	214,999	379,321	56.68%	3986	46.95%	50.24
75	Tupelo, MS-AL-TN	278,151	625,002	44.50%	4373	36.83%	49.76
77	Jackson, MS-AL-LA	705,007	1,432,518	49.21%	2297	41.44%	49.67
94	Springfield, MO	418,473	859,559	48.68%	2719	37.35%	48.14
100	Des Moines, IA-IL-MO	833,124	1,683,257	49.49%	3111	44.48%	47.32
91	Fort Smith, AR-OK	148,448	329,136	45.10%	3146	34.82%	46.51
132	Corpus Christi, TX	270,785	549,012	49.32%	2135	42.84%	46.47
90	Little Rock-North Little Rock, AR	867,186	1,614,850	53.70%	3357	43.41%	46.09
166	Eugene-Springfield, OR-CA	389,541	791,776	49.20%	2756	41.57%	43.10
76	Greenville, MS	99,751	252,280	39.54%	3266	38.59%	40.96
117	Sioux City, IA-NE-SD	100,868	252,656	39.92%	3658	36.32%	39.51
152	Salt Lake City-Ogden, UT-ID	1,105,180	2,088,974	52.91%	2217	48.33%	35.68
123	Topeka, KS	221,648	454,539	48.76%	1783	39.56%	35.62
59	Green Bay, WI-MI	332,011	671,225	49.46%	2748	43.10%	34.15
108	Wausau, WI	181,806	487,723	37.28%	2654	39.38%	34.13
157	El Paso, TX-NM	390,818	955,602	40.90%	2229	32.42%	33.04
58	Northern Michigan, MI	119,818	269,986	44.38%	3290	11.45%	28.53
169	Richland-Kennewick-Pasco, WA	312,611	677,674	46.13%	2347	40.63%	27.68
137	Lubbock, TX	195,402	374,626	52.16%	2760	47.31%	27.17
153	Las Vegas, NV-AZ-UT	1,063,232	1,709,797	62.18%	1740	52.57%	23.74
147	Spokane, WA-ID	396,838	829,735	47.83%	2244	42.51%	23.63
1	Bangor, ME	219,874	526,106	41.79%	*	*	20.94
156	Albuquerque, NM-AZ	491,964	921,086	53.41%	1816	49.30%	20.89
122	Wichita, KS-OK	565,858	1,175,577	48.13%	1948	35.42%	20.49
128	Abilene, TX	95,681	222,147	43.07%	3472	36.13%	20.35
109	Duluth-Superior, MN-WI	158,866	350,059	45.38%	3694	41.64%	18.53
113	Fargo-Moorhead, ND-MN	182,726	371,691	49.16%	2769	43.48%	16.40
155	Farmington, NM-CO	97,146	193,872	50.11%	5371	44.55%	16.04
116	Sioux Falls, SD-IA-MN-NE	264,570	519,143	50.96%	3448	46.49%	15.11
165	Redding, CA-OR	160,583	336,820	47.68%	2184	41.01%	14.36

149	Twin Falls, ID	84,477	162,397	52.02%	2448	43.96%	14.08
150	Boise City, ID-OR	304,405	574,876	52.95%	2285	47.64%	13.69
139	Santa Fe, NM	126,983	258,790	49.07%	2855	44.21%	13.06
126	Western Oklahoma, OK	64,654	139,761	46.26%	3032	41.54%	12.04
138	Amarillo, TX-NM	233,841	481,633	48.55%	1579	44.91%	11.79
120	Grand Island, NE	147,025	288,047	51.04%	6566	35.13%	11.56
136	Hobbs, NM-TX	75,534	190,340	39.68%	3850	34.52%	11.21
148	Idaho Falls, ID-WY	170,065	306,120	55.56%	2566	45.49%	10.85
146	Missoula, MT	183,193	399,183	45.89%	4546	38.67%	10.79
110	Grand Forks, ND-MN	101,995	230,253	44.30%	3996	38.64%	10.16
135	Odessa-Midland, TX	190,603	388,007	49.12%	3461	42.52%	10.13
129	San Angelo, TX	85,352	202,679	42.11%	2254	39.37%	10.05
140	Pueblo, CO-NM	117,524	279,600	42.03%	2261	35.82%	8.71
168	Pendleton, OR-WA	76,267	200,681	38.00%	3656	30.75%	8.67
154	Flagstaff, AZ-UT	192,091	401,766	47.81%	2629	41.05%	8.24
142	Scottsbluff, NE-WY	44,944	92,360	48.66%	7084	26.91%	7.81
151	Reno, NV-CA	361,148	670,013	53.90%	2019	46.75%	7.56
111	Minot, ND	*	111,195	*	*	*	7.00
112	Bismarck, ND-MT-SD	81,663	175,427	46.55%	*	41.68%	6.26
114	Aberdeen, SD	*	82,608	*	*	*	5.39
143	Casper, WY-ID-UT	219,622	408,708	53.74%	4187	40.86%	5.17
115	Rapid City, SD-MT-NE-ND	94,190	213,696	44.08%	4612	38.09%	5.04
121	North Platte, NE-CO	*	61,758	*	*	*	4.95
144	Billings, MT-WY	196,797	404,902	48.60%	4205	39.99%	4.89
145	Great Falls, MT	65,214	166,564	39.15%	*	33.40%	4.23
171	Anchorage, AK	290,245	626,932	46.30%	5227	45.51%	1.07

* Data withheld to maintain firm confidentiality.

Source: Federal Communications Commission internal analysis based on preliminary year-end 2003 filings for Numbering Resource Utilization in the United States. Population based on 2000 Census. Density is persons per square mile.

**Table 4: Top 25 Mobile Telephone Operators by Subscribers
(in thousands)**

Year-End 2002		Year-End 2003	
Operator	Total	Operator	Total
1 Verizon Wireless	32,491	Verizon Wireless	37,522
2 Cingular Wireless	21,900	Cingular Wireless	24,027
3 AT&T Wireless	20,900	AT&T Wireless	21,980
4 Sprint PCS	14,760	Sprint PCS	15,900
5 Nextel	10,612	T-Mobil	13,128
6 T-Mobile	9,913	Nextel	12,882
7 ALLTEL	7,600	ALLTEL	8,023
8 US Cellular	4,103	US Cellular	4,409
9 Leap Wireless	1,512	Dobson Comm. (2)	1,552
10 Western Wireless	1,197	Leap Wireless	1,473
11 Qwest	1,034	Western Wireless	1,290
12 Centennial (1)	897	Nextel Partners	1,233
13 Nextel Partners	877	Centennial (3)	997
14 Triton PCS	830	Metro PCS	977
15 Dobson Comm.	768	Triton PCS	895
16 Rural Cellular	722	Qwest	871
17 American Cellular	690	Rural Cellular	746
18 Alamosa PCS	622	Alamosa PCS	727
19 AirGate	589	US Unwired	618
20 US Unwired	561	Cincinnati Bell Wireless (4)	474
21 Broadwing	470	Cellular South	400
22 Midwest Wireless	300	Airgate (5)	360
23 Horizon PCS	271	Midwest Wireless	350
24 Ntelos	267	Ubiquitel	328
25 Southern LINC	260	Southern LINC	260

Sources: For 2002, see *Eighth Report*, at 14897. For 2003, publicly available company documents such as operators' news releases and filings made with the Securities and Exchange Commission. Southern LINC, *Frequently Asked Questions* (visited May 12, 2004) <<http://southernlinc.com/faqs.asp>> (Southern LINC); Midwest Wireless, *Frequently Asked Questions* (visited May 12, 2004) <<http://www.midwestwireless.com/Home/Newsroom/FAQs>> (Midwest Wireless); Rhonda Wickham, *Down Home In The Cellular South*, WIRELESSWEEK, Mar. 22, 2004 (Cellular South). Horizon PCS reported 310,000 subscribers as of June 30, 2003.

Notes

- (1) As of Nov. 30, 2002, includes Puerto Rico.
- (2) American Cellular is now part of Dobson Communications.
- (3) As of Nov. 30, 2003, includes Puerto Rico.
- (4) Broadwing is now Cincinnati Bell Wireless.
- (5) AirGate no longer includes its subsidiary iPCS Inc.'s results following iPCS' bankruptcy filing last year. See *Eighth Report*, at 14809.

**Table 5: Estimated Mobile Telephone Rollouts
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	2477	276,261,963	96.8%	2,224,551	61.7%
4 or More	1984	265,410,528	93.0%	1,667,769	46.2%
5 or More	1519	249,735,162	87.5%	1,250,235	34.7%
6 or More	1002	216,266,842	75.8%	809,837	22.5%
7 or More	390	84,117,506	29.5%	316,104	8.8%

Source: Federal Communications Commission estimates based on publicly available information.

Notes:

- (1) POPs from the 2000 Census;
- (2) United States and Puerto Rico

Table 6: Keisling RCA Survey

	1998	1999	2000	2001	2002
ARPU	\$44.92	\$46.03	\$46.48	\$45.74	\$48.18
ARPU (excluding Roaming Revenues)	\$35.08	\$35.43	\$35.12	\$35.12	\$35.80
MOU	106	118	124	165	221
Price Per Minute (RPM)	\$0.33	\$0.30	\$0.28	\$0.21	\$0.16
Monthly Churn	1.55%	1.6%	1.9%	2.2%	2.2%
Prepaid revenue as percent of total revenue	.1%	.34%	.61%	.083%	1.22%
Competitors in RCA member markets	3.0	3.6	4.7	4.9	5.1

Source: *RCA Comments*, at 3.

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	275,710,198	96.63%	2,541,061	70.45%
TDMA / GSM	273,188,386	95.74%	2,200,750	61.02%
iDEN	261,280,668	91.57%	1,650,614	45.76%
Total Digital	283,165,002	99.24%	2,981,514	82.66%

Source: Federal Communications Commission estimates based on publicly available information.

Notes:

Broadband PCS and digital SMR licensees are analyzed by county; cellular licensees are analyzed by cellular market areas ("CMAs").

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
1997	100		100		100		100		100	
1998	101.6	1.6%	95.1	-4.9%	100.7	0.7%	101.6	1.6%	100.5	0.5%
1999	103.8	2.2%	84.9	-10.7%	100.1	-0.6%	103.4	1.8%	98.2	-2.3%
2000	107.3	3.4%	76	-10.5%	98.5	-1.6%	107.7	4.1%	91.8	-6.5%
2001	110.3	2.8%	68.1	-10.4%	99.3	0.8%	113.3	5.2%	88.8	-3.3%
2002	112.1	1.6%	67.4	-1.0%	99.7	0.4%	118.5	4.5%	84.9	-4.4%
2003	114.6	2.3%	66.8	-0.9%	98.3	-1.4%	123.3	4.1%	77.8	-8.4%
1997 to 2003		14.6%		-33.2%		-1.7%		23.3%		-15.1%

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	380	\$0.12	-30%
2002	\$48.40	427	\$0.11	-9%
2003	\$49.91	507	\$0.10	-13%

Note: Data covers the last six months of each year.

Source: See Appendix D, Table 1, at D-2 (ARPU); Dec 2003 CTIA Survey, at 213 (minutes of use).

Table 10: Market Entry Over Time

Total Number of Providers in a County	Percent of Total US POPs Covered				
	Ninth Report	Eighth Report	Seventh Report	Sixth Report	Fifth Report
3 or more	96.8%	94.7%	94.1%	90.8%	87.8%
4 or more	93.0%	89.3%	88.7%	84.4%	79.8%
5 or more	87.5%	82.6%	80.4%	75.1%	68.5%
6 or more	75.8%	71.1%	53.1%	46.7%	34.6%
7 or more	29.5%	25.4%	21.2%	11.9%	4.4%

Source: FCC estimates

Table 11: Mobile Market Structure and Performance in Selected Countries

Country	Number of Players	Penetration (%)	MOUs	Revenue per Minute (\$)	Data (% of ARPU)
MPP					
USA	6+	54	557	0.10	3
Canada	4	41	296	0.12	4
Hong Kong	6	95	380	0.07	N.A.
Singapore	3	82	231	0.11	14
CPP					
UK	5	91	147	0.22	17
Germany	4	79	75	0.33	17
Italy	4	99	116	0.25	13
France	3	68	174	0.23	11
Spain	3	94	109	0.29	12
Finland	3	92	243	0.18	13
Japan	3	67	161	0.31	24
South Korea	3	70	311	0.10	14
Australia	4	78	176	0.20	13

Sources: Michel Morin and Linda Mutschler, *Global Wireless Matrix 4Q03*, Global Securities Research, Merrill Lynch, Mar. 19, 2004.

**APPENDIX B:
MAPS**

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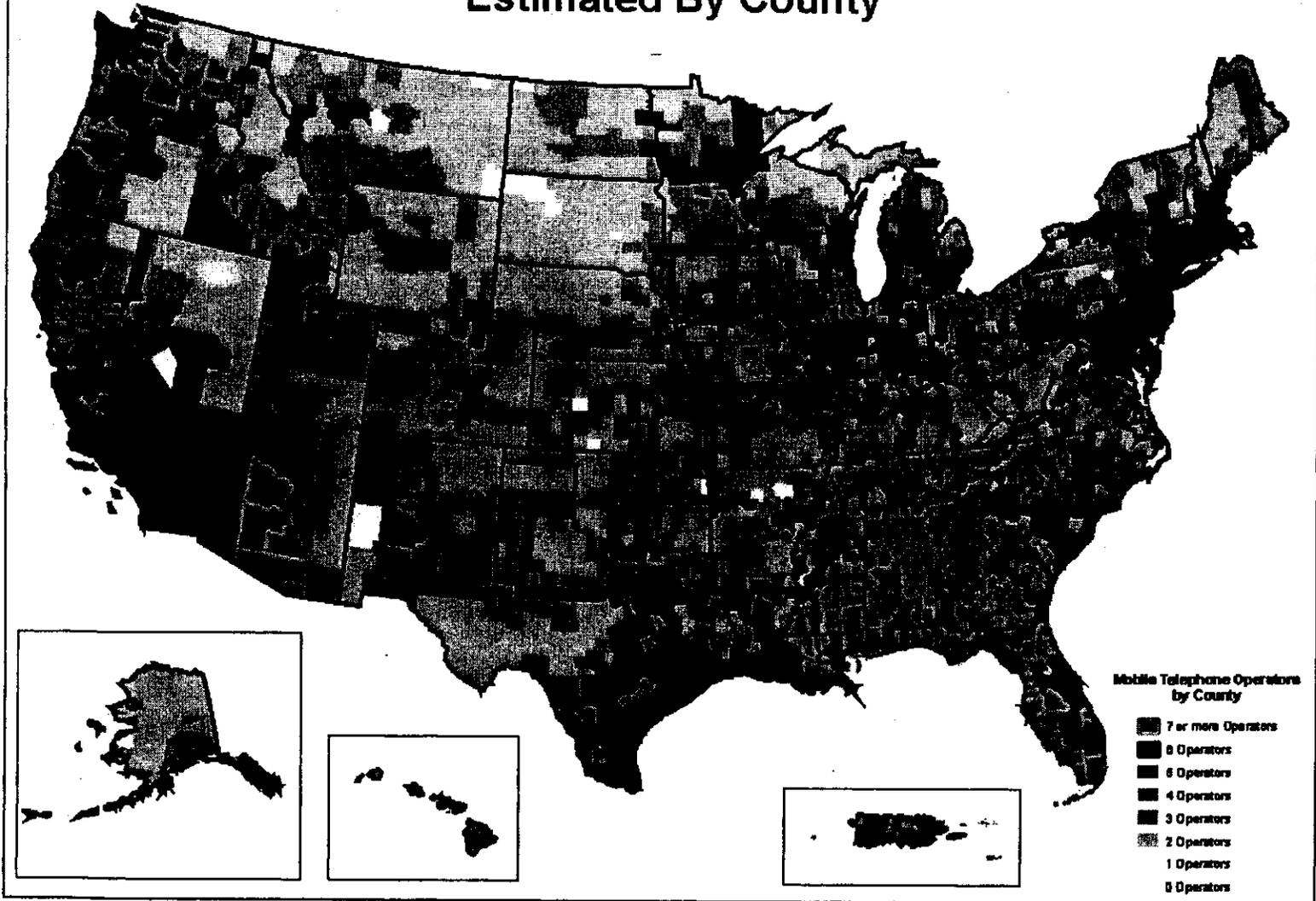
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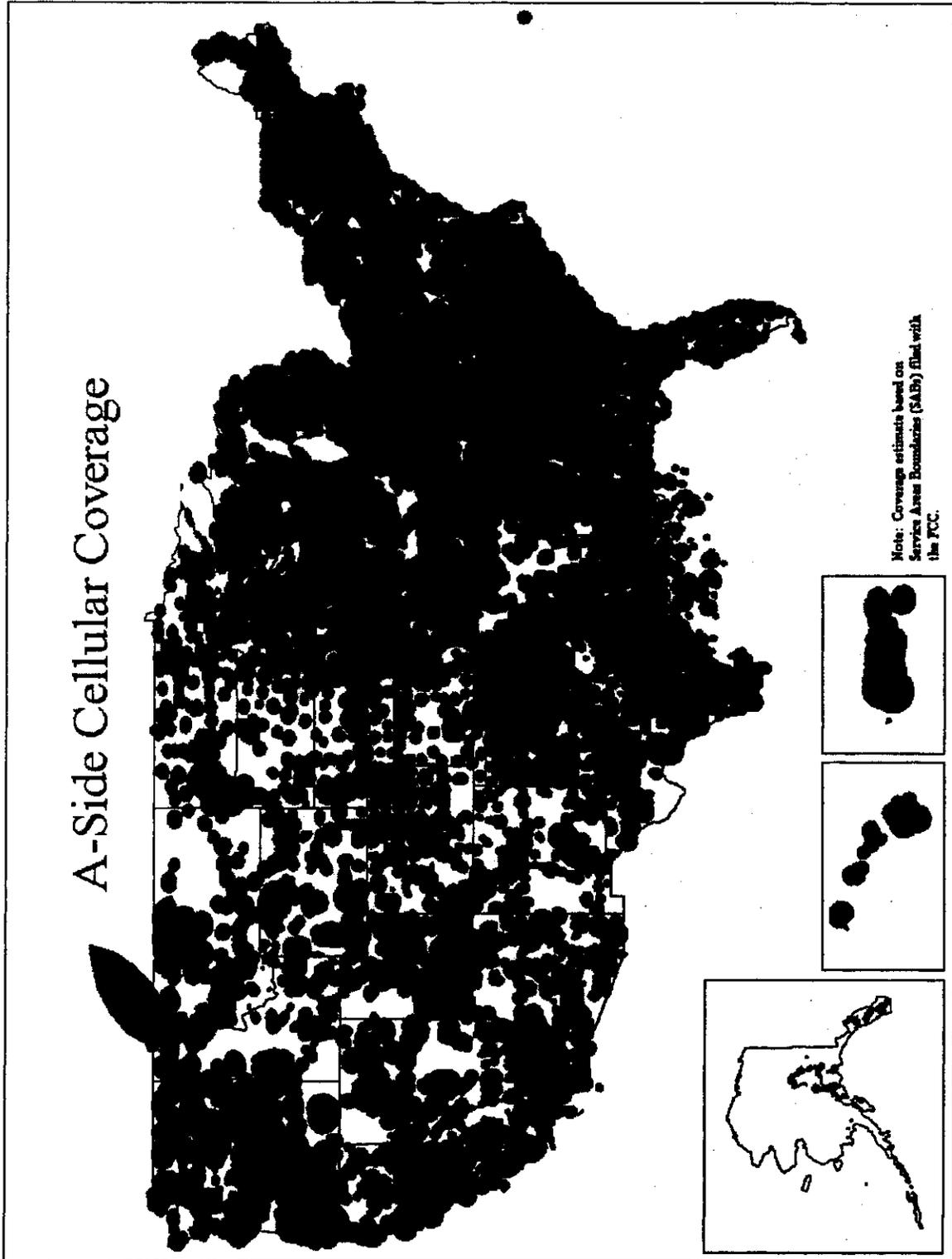
Mobile Telephone Operator Coverage Estimated By County



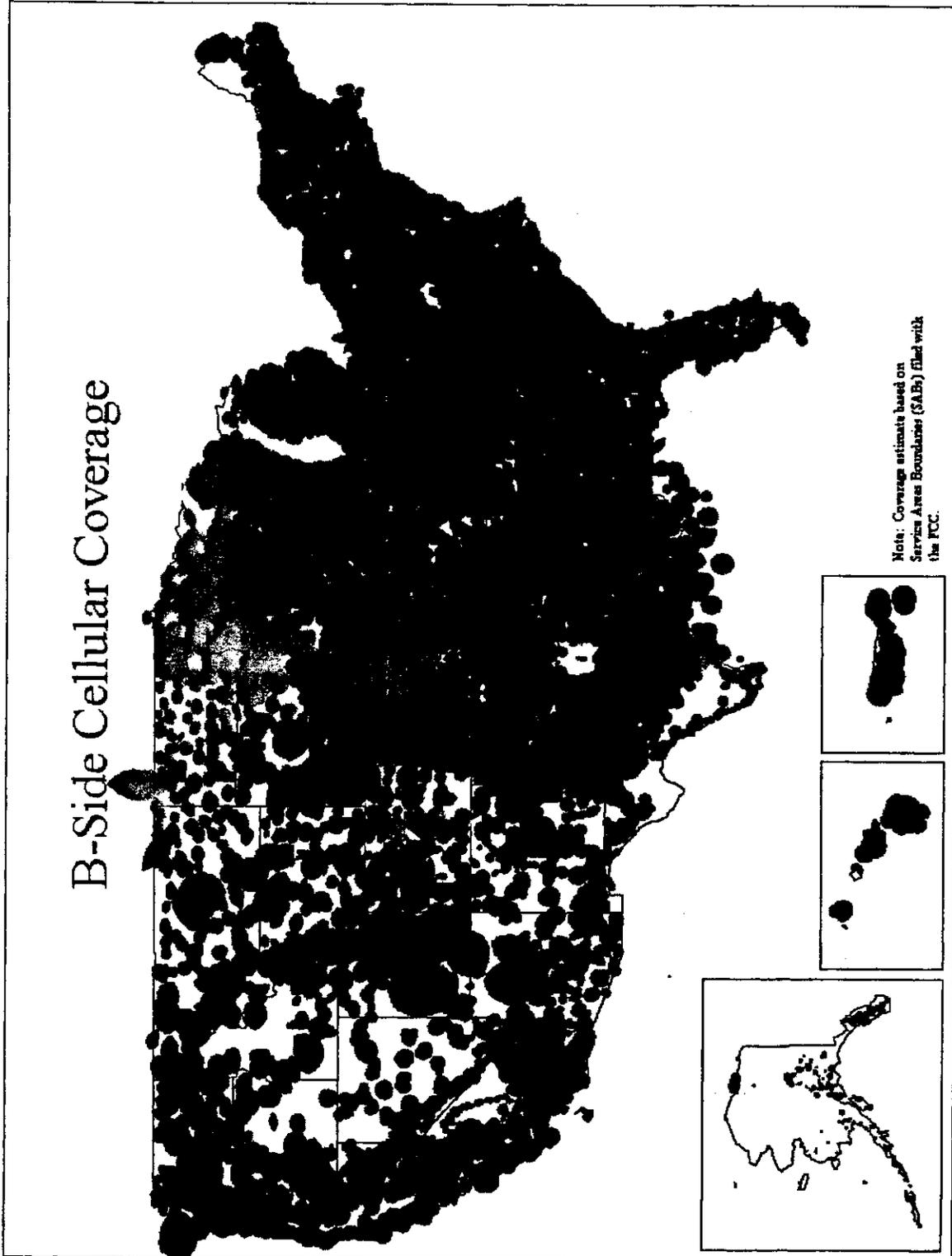
Map 1

B-2

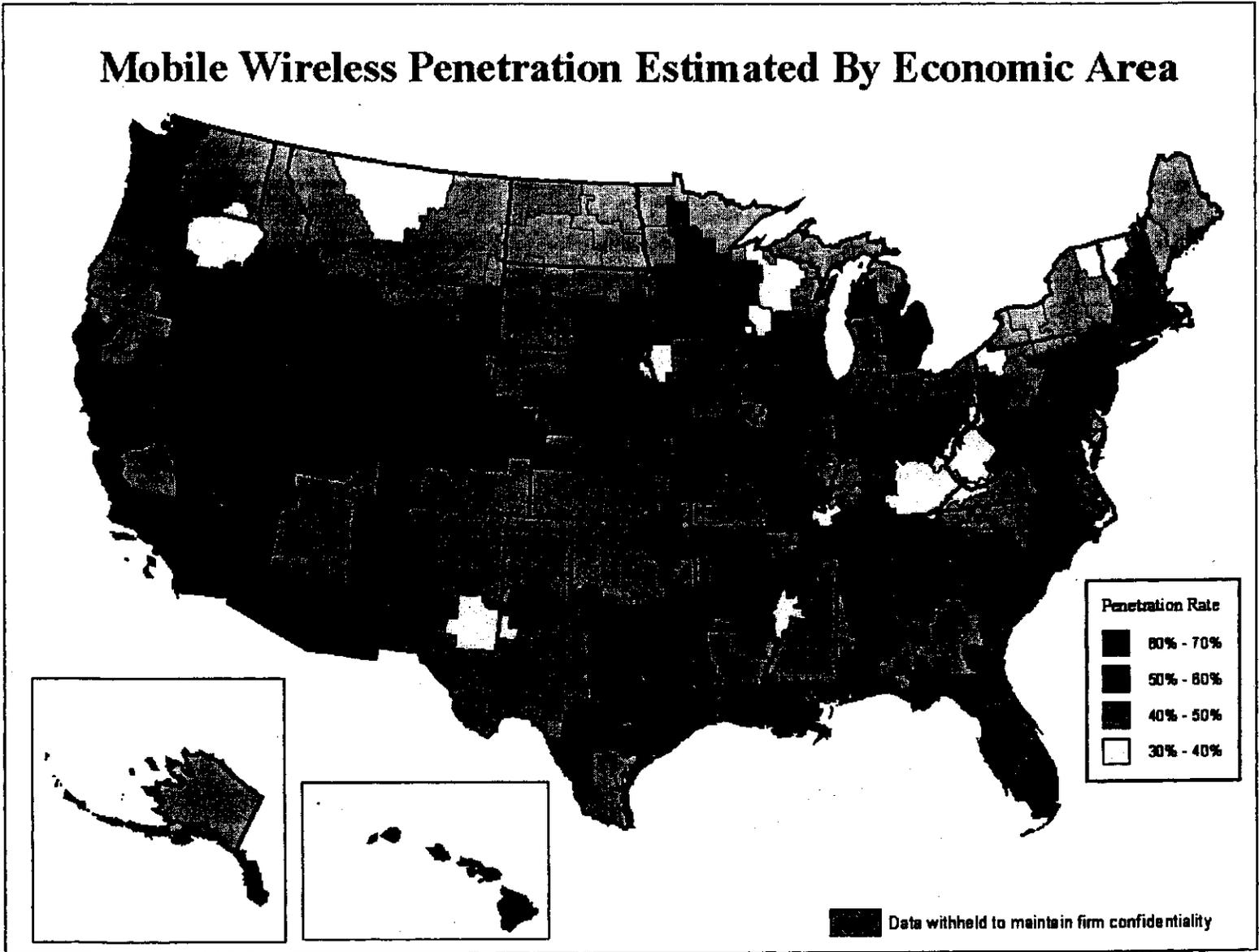
Map 2



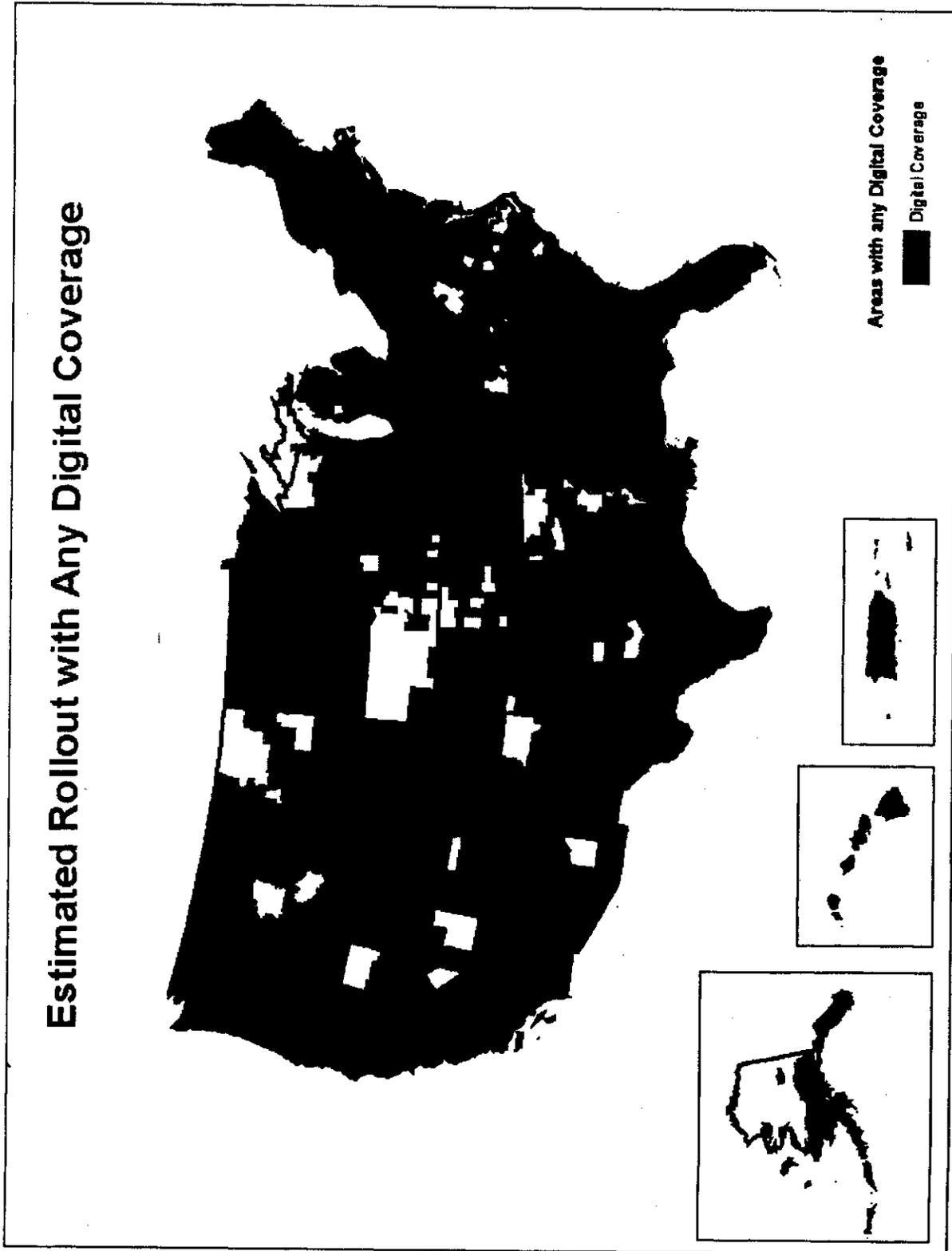
Map 3



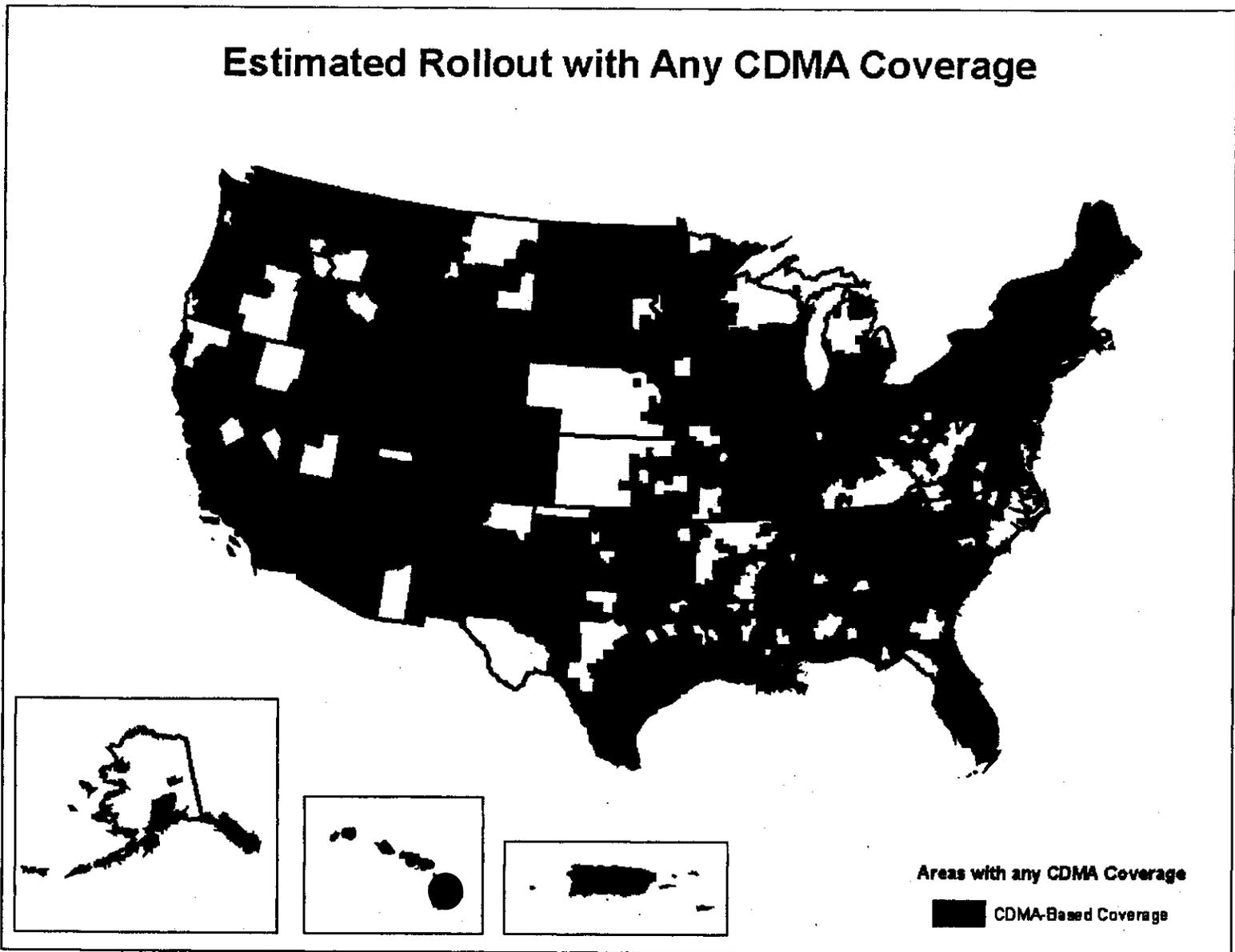
Mobile Wireless Penetration Estimated By Economic Area



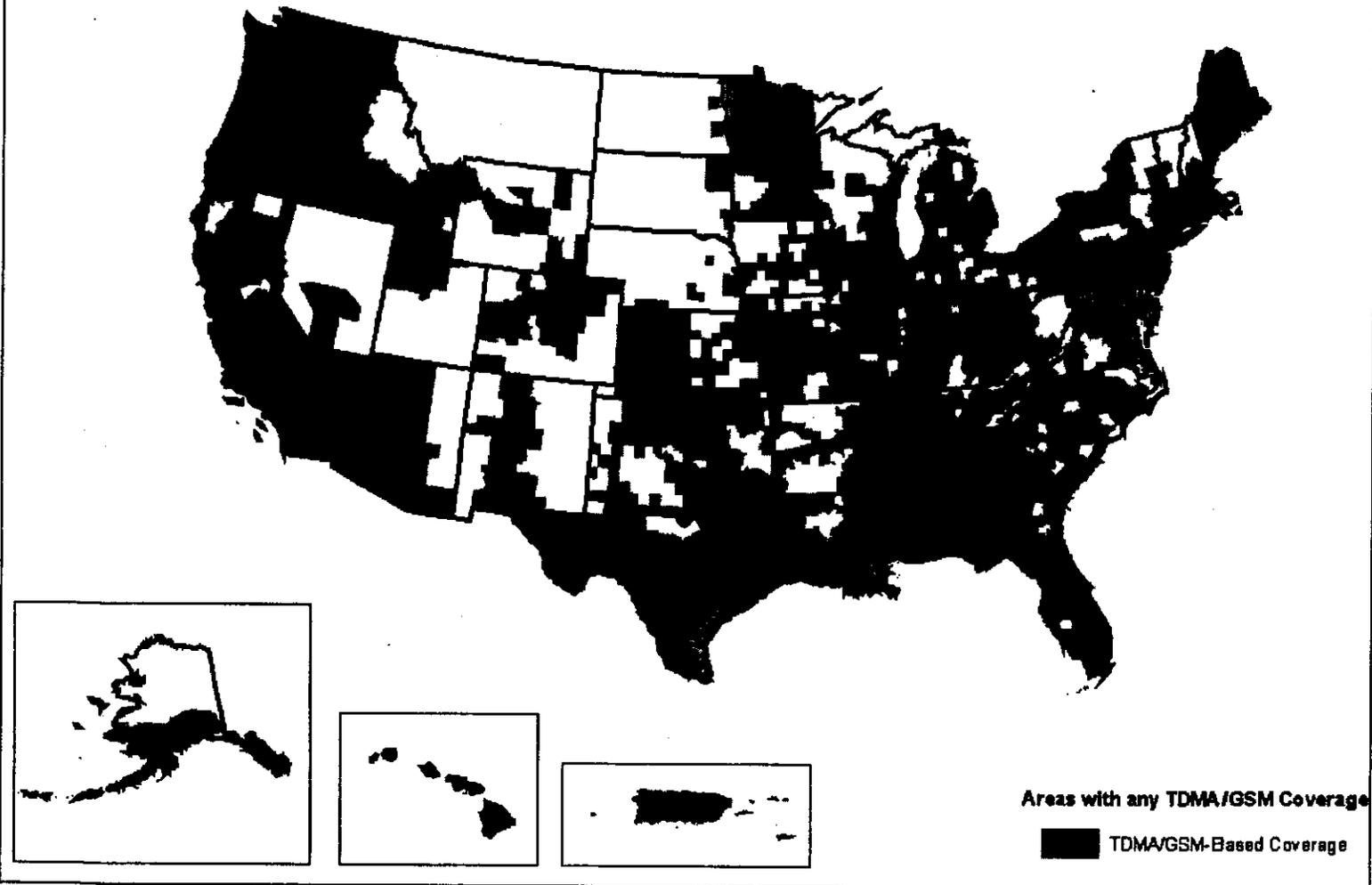
Map 5



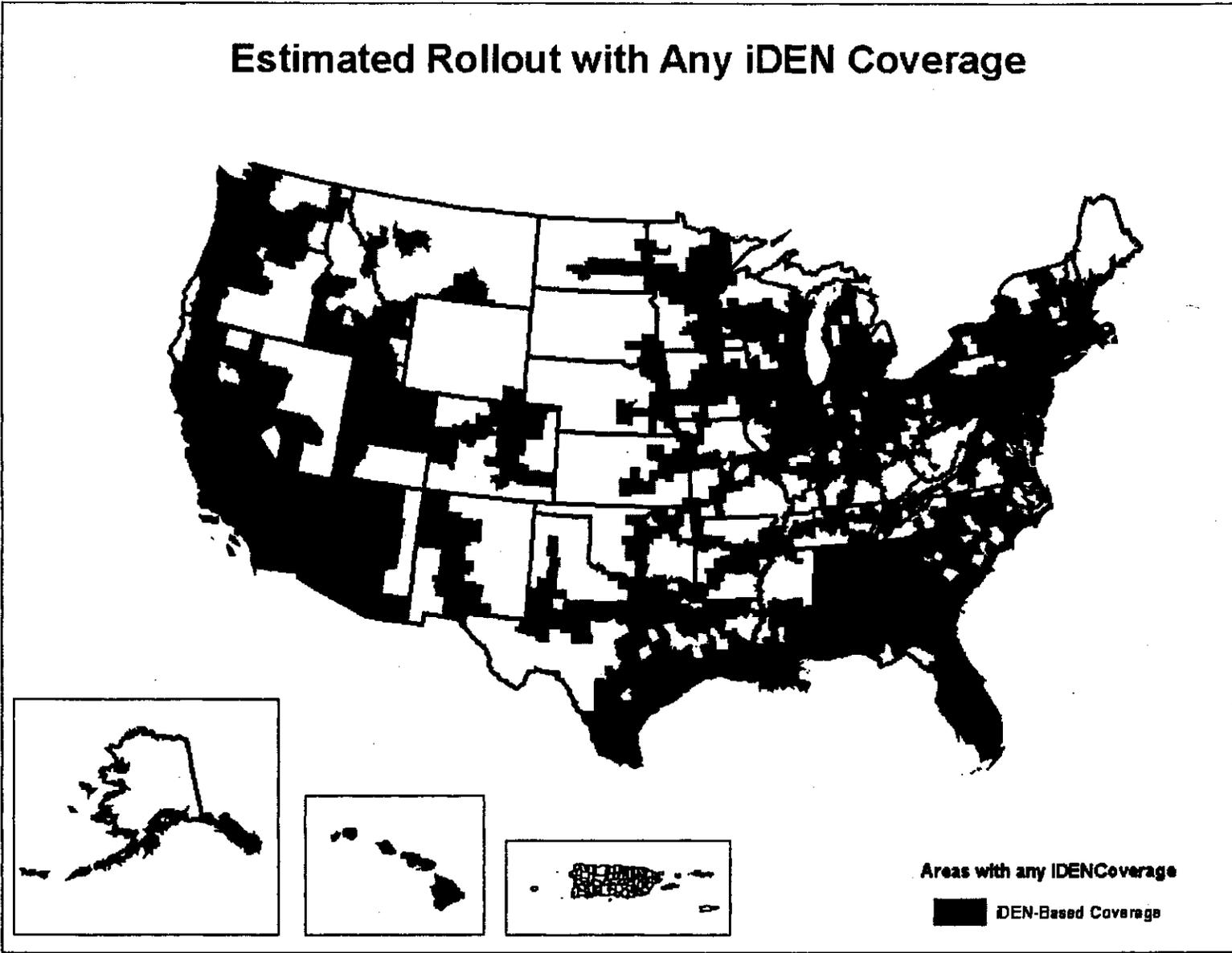
Map 6



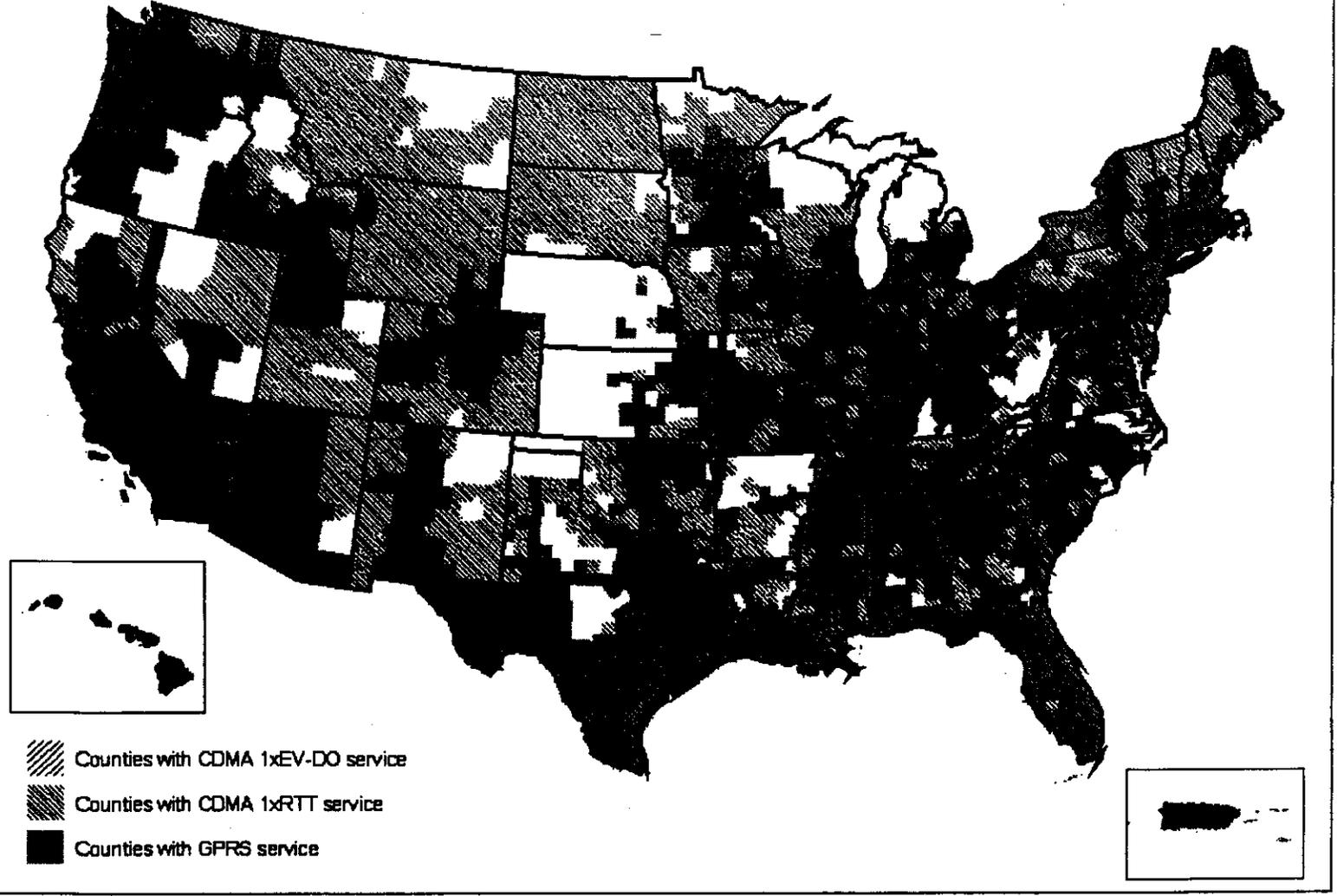
Estimated Rollout with Any TDMA/GSM Coverage



Map 8



Next Generation Network Rollout in the United States Estimated by County



B-10

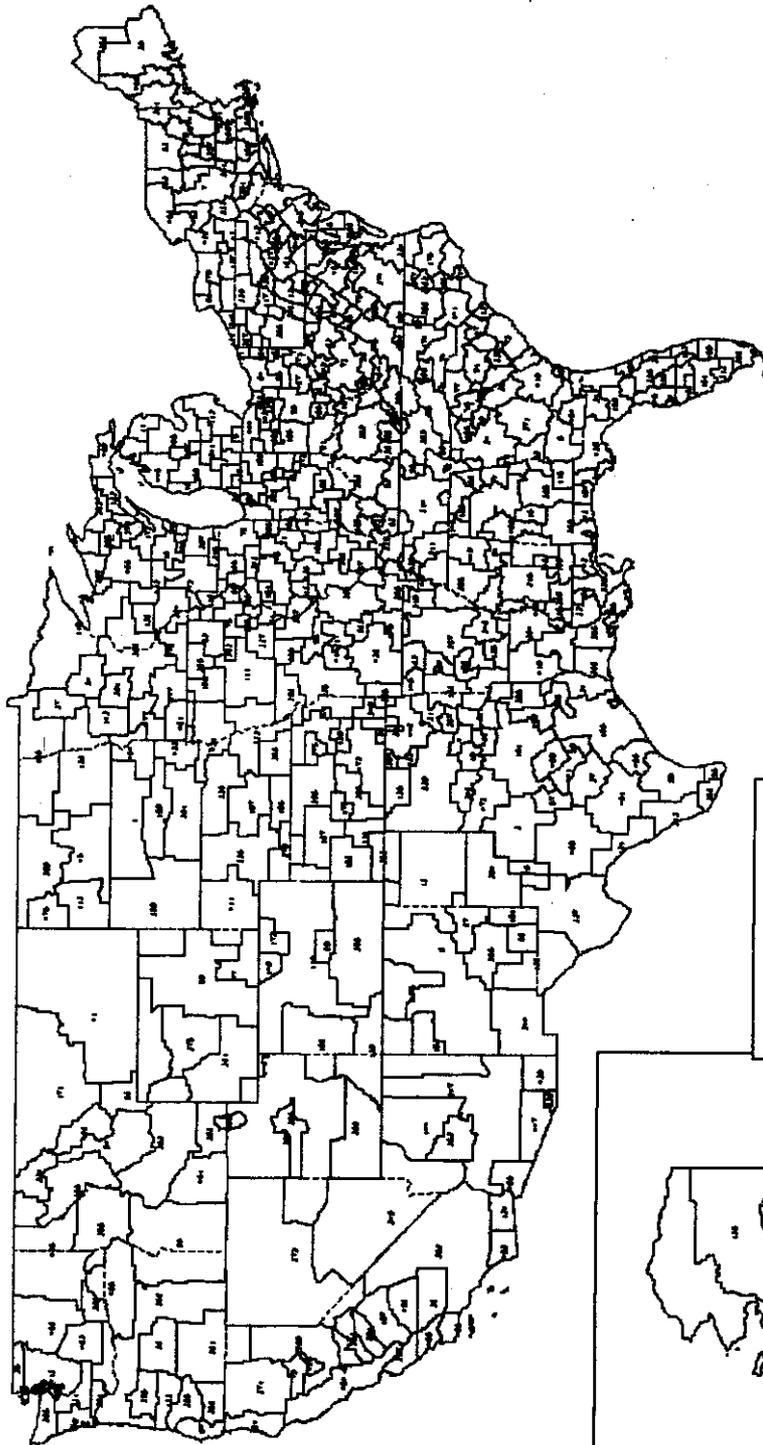
Map 9

Table 1: Geographic Licensing Schemes

Geographic Licensing Schemes	Number of Market Areas	Note
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	

Map10

The 493 Basic Trading Areas (BTAs)

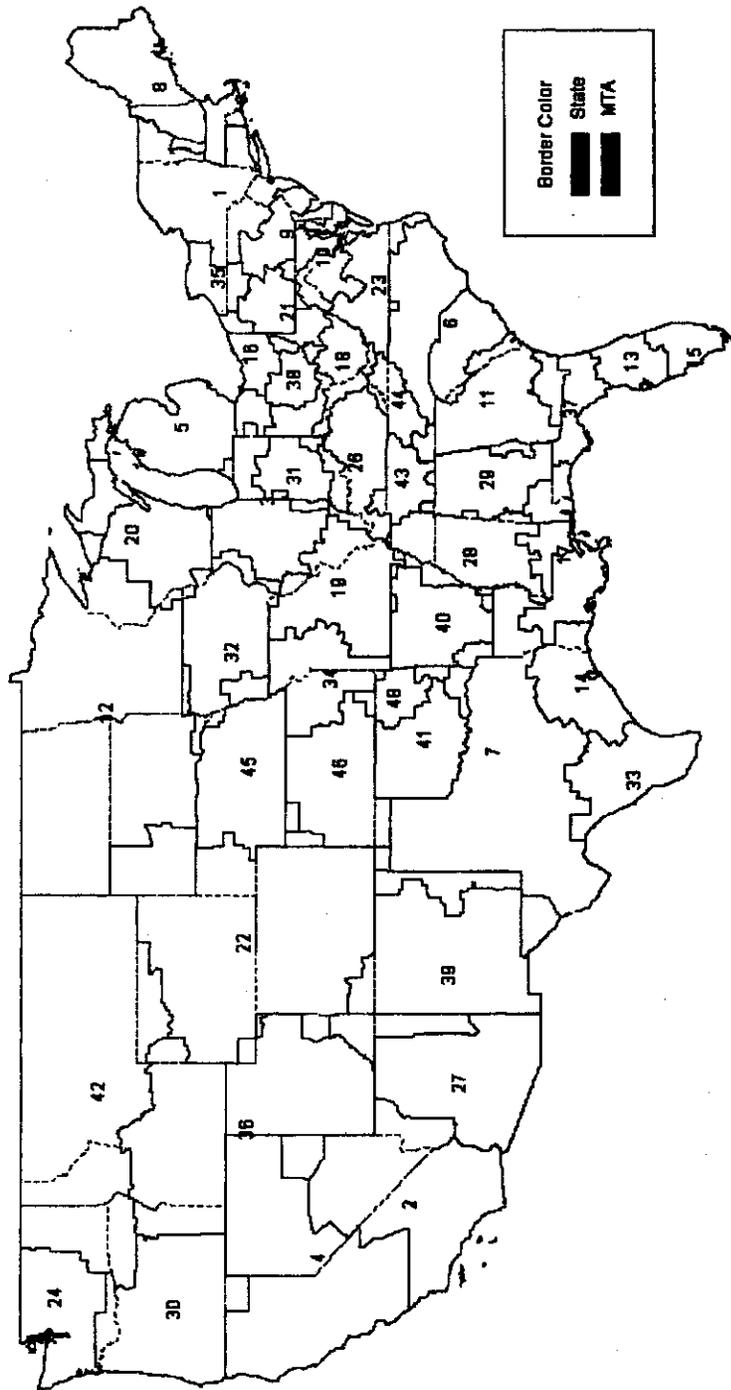


- BTAs-Like areas not shown:
B488 San Juan, PR
B489 Mayaguez, PR
B490 Guam
B481 US Virgin Islands
B482 American Samoa
B483 Northern Mariana Islands

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Association.

Map 11

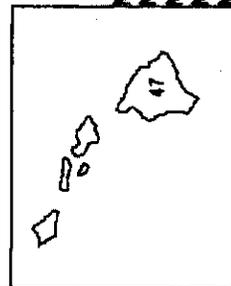
The 51 Major Trading Areas (MTAs)



Border Color
State
MTA

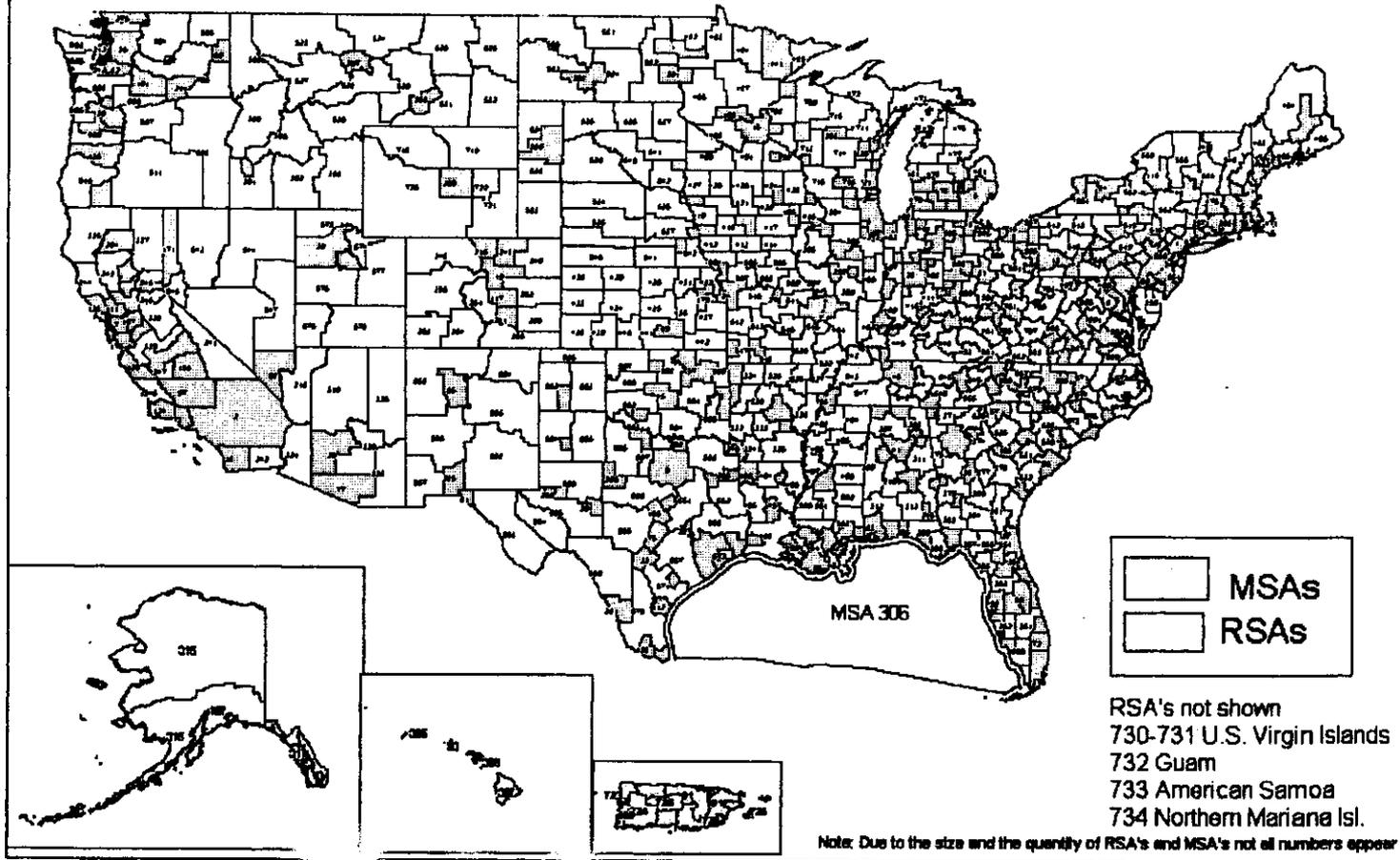
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The Personal Communications Industry
Association.

MTA-Like areas not shown:
M25 Puerto Rico & US Virgin Islands
M48 Alaska
M50 Guam and Northern Mariana Islands
M51 American Samoa



Cellular Market Areas

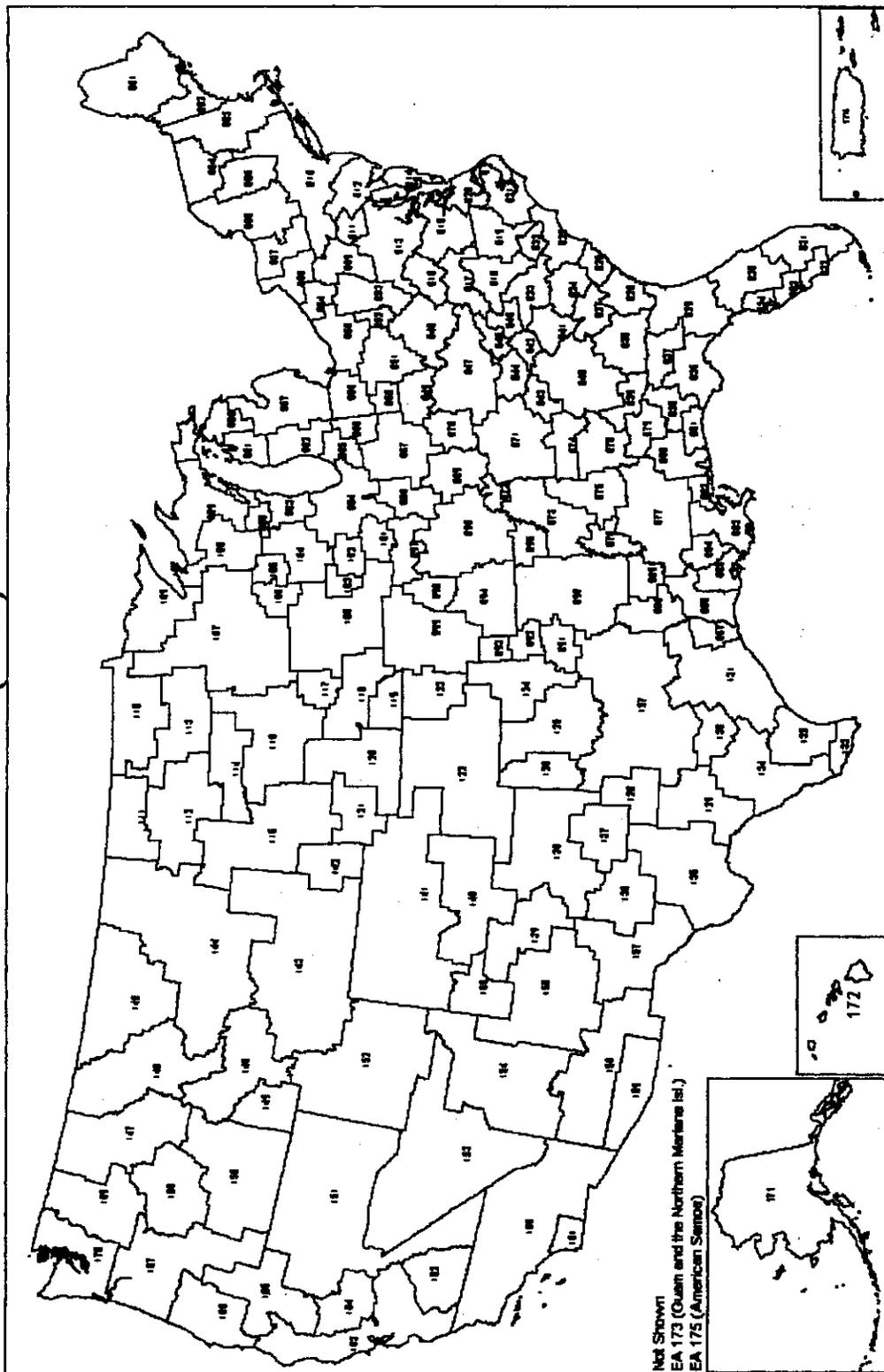
Metropolitan Statistical Areas and Rural Service Areas



B-14

Map 13

Economic Areas (EAs)



EAs delineated by the Regional Economic Analysis Division
Bureau of Economic Analysis, U.S. Department of Commerce
January 1995

**APPENDIX C:
LIST OF COMMENTERS**

Comments

Blooston Rural Carriers
Cellular Telecommunications & Internet Association
Metrocall Holdings, Inc.
National Telecommunications Cooperative Association
Rural Cellular Association
Virgin Mobile USA, LLC

Reply Comments

Cellular Telecommunications & Internet Association
Rural Telecommunications Group, Inc.
Sprint Corporation

**STATEMENT OF
CHAIRMAN MICHAEL K. POWELL**

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, Ninth Report.

Today's *Ninth Report* highlights that U.S. consumers continue to benefit from robust competition in the CMRS marketplace. As is evident by simply walking down the street and seeing so many people on their mobile phone, the continued growth in the CMRS industry in 2003, demonstrates the increased demand for and reliance upon mobile services. With over 160.6 million mobile telephone subscribers, roughly a 54 percent penetration rate, it is imperative that the Commission and Congress continue to work together to ensure customers can benefit from increased carrier competition and continue to enjoy new and innovative products and quality service.

Wireless voice communications is by far the most competitive and innovative market in the Commission's purview. Today's *Report* informs us that an astonishing 97 percent of the total U.S. population lives in counties with access to three or more different operators offering mobile telephone service, and that 30 percent of the population can now choose from seven or more carriers. Although these numbers are impressive, I look forward to working with my colleagues to increase access to wireless services to *all* U.S. consumers.

This is the most comprehensive report to date and I applaud the Wireless Telecommunications Bureau's hard work in continually striving to obtain the most accurate and diverse data.

**CONCURRING STATEMENT OF
COMMISSIONER MICHAEL J. COPPS**

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, Ninth Report.

This year's CMRS Competition Report is a marked improvement over last year's Report. For the first time we begin to use traditional competition analysis tools by calculating HHI scores for each EA in the country. We have also updated our analysis of the prices that consumers face. And I'm also heartened by our more complete analysis of the U.S. competitive position in comparison with the rest of the world. The information that it provides shows that consumers continue to benefit as wireless technologies march forward. The report shows that coverage is increasing, new services and pricing plans are being introduced, and more consumers have phones than ever before.

Nonetheless, the Report still contains arguments and omissions that trouble me. The central question of the legislation that requires this Report is whether the market is characterized by "effective competition." Yet again this year the Report does not provide a useful definition of this term. Without an well-articulated "effective competition" standard, the Report will always have trouble providing an analytically solid foundation for Commission or Congressional action. The Report also claims that consumers do not face difficulties obtaining the information that they need to adequately comparison shop for wireless plans. But just about every consumer I meet complains that wireless bills are bewilderingly confusing; that hidden and expensive line items magically appear on their bills that they weren't told about when comparing prices; and that the service maps that carriers provide don't allow them to determine where they will get service and where they won't. I also hear from small and rural carriers that the state of the roaming market is hardly as competitive as described in the Report, with large carriers allegedly imposing upon them unreasonable prices and also instituting new call blocking technologies that deny consumers the ability to roam in order to avoid compensating other carriers. I think we need to be looking into this, and I urge the Bureau to do so.

So I am going to concur. Again, I am impressed with the improvements in this Report, but I don't want us to rush to judgment. We need to be monitoring and studying these developments vigilantly, especially as consolidation creeps into the industry, if we are going to see improvements continue rather than witness new problems that threaten both consumers and competitors.

Thanks to the staff for their hard work.