

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

In the Matter of
Implementation of Section 6002(b) of the
Omnibus Budget Reconciliation Act of 1993
Annual Report and Analysis of Competitive
Market Conditions With Respect to Commercial
Mobile Services
WT Docket No. 02-379

EIGHTH REPORT

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By the Commission: Chairman Powell issuing a statement; Commissioner Copps concurring and issuing a statement.

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I. INTRODUCTION

A. Background

1. In 1993, Congress created the statutory classification of Commercial Mobile Services¹ to promote the consistent regulation of mobile radio services that are similar in nature.² At the same time, Congress established the promotion of competition as a fundamental goal for CMRS policy formation and regulation. To measure progress toward this goal, Congress required the Federal Communications Commission (“FCC” or “Commission”) to submit annual reports that analyze competitive conditions in the industry.³ This report is the eighth of the Commission’s annual reports⁴ on the state of CMRS competition.⁵

¹ Commercial Mobile Services came to be known by the Commission as the Commercial Mobile Radio Services, or “CMRS.” CMRS includes a large number of terrestrial services and some mobile satellite services. *See* 47 C.F.R. § 20.9(10).

² The Omnibus Budget Reconciliation Act of 1993, Pub. L. No. 103-66, Title VI, § 6002(b), amending the Communications Act of 1934 and codified at 47 U.S.C. § 332(c). As in the past, this report bases its analysis on a consumer-oriented view of wireless services by focusing on specific product categories, regardless of their regulatory classification. In some cases, this includes an analysis of offerings outside the umbrella of “services” specifically designated by the Commission as CMRS. However, because providers of these other services can compete with CMRS providers, the Commission believes that it is important to consider them in the analysis. As the Commission said, paraphrasing the Department of Justice/Federal Trade Commission guidelines on merger review, “When one product is a reasonable substitute for the other in the eyes of consumers, it is to be included in the relevant product market even though the products themselves are not identical.” Application of Echostar Communications Corporation, General Motors Corporation, and Hughes Electronics Corporation (Transferors) and Echostar Communications Corporation (Transferee), *Hearing Designation Order*, 17 FCC Rcd 20559, 20606 (2002).

³ 47 U.S.C. § 332(c)(1)(C).

⁴ *See* Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, *First Report*, 10 FCC Rcd 8844 (1995) (“*First Report*”); Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, *Second Report*, 12 FCC Rcd 11266 (1997) (“*Second Report*”); Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, *Third Report*, 13 FCC Rcd 19746 (1998) (“*Third Report*”); Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, *Fourth Report*, 14 FCC Rcd 10145 (1999) (“*Fourth Report*”); Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, *Fifth Report*, 15 FCC Rcd 17660 (2000) (“*Fifth Report*”); Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, *Sixth Report*, 16 FCC Rcd 13350 (2001) (“*Sixth Report*”); Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, *Seventh Report*, 17 FCC Rcd 12985 (2002) (“*Seventh Report*”). The reports can also be found on the FCC’s website at <<http://wireless.fcc.gov/cmrs-cforum.html>>.

⁵ This report, like the others before it, discusses CMRS as a whole because Congress called on the Commission to report on “competitive market conditions with respect to commercial mobile services.” 47 U.S.C.

2. Since the release of the *Seventh Report*, the Commission has expanded its efforts to improve the quality and granularity of the data used to examine competition in the CMRS industry. In December 2002, the Commission released a Notice of Inquiry (“*NOI*”) seeking data and information on the status of competition in the CMRS industry.⁶ The questions asked in the *NOI* and the comments received are discussed in detail below.⁷

3. The statute requiring the annual report on CMRS competition states,

The Commission shall review competitive market conditions with respect to commercial mobile services and shall include in its annual report an analysis of those conditions. Such analysis shall include an identification of the number of competitors in various commercial mobile services, an analysis of whether or not there is effective competition, an analysis of whether any of such competitors have a dominant share of the market for such services, and a statement of whether additional providers or classes of providers in those services would be likely to enhance competition.⁸

4. With the *Eighth Report*, we continue to comply with each of the four statutory requirements for analyzing competitive market conditions with respect to commercial mobile services. First, Section II.C.1.b(ix), *infra*, identifies the number of CMRS competitors. Second, Section I.C, *infra*, discusses the Commission’s analysis of effective competition. Like previous reports, this report addresses the third issue of whether any competitor has a dominant market share in two main ways. First, the report provides data on the total number of subscribers served by the 25 largest carriers, which can be used to derive subscribership market share figures for such carriers on a nationwide basis.⁹ Second, the report includes measures of competition, such as churn,¹⁰ service quality, pricing, and market entry, which provide evidence that no single carrier is able to act anti-competitively in the marketplace.¹¹ These figures indicate that while there are several large, established carriers in the CMRS industry, they have no guarantee of maintaining their market share, and they are faced with consumers that would readily leave carriers that attempted to raise prices or diminish service quality. Furthermore, in exercising its forbearance authority, the Commission has routinely acknowledged that it has chosen not to regulate

§ 332(c)(1)(C). Any individual proceeding in which the Commission defines relevant product and geographic markets, such as an application for approval of a license transfer, may present facts pointing to narrower or broader markets than any used, suggested, or implied in this report.

⁶ 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, WT Docket No. 02-379, *Notice of Inquiry*, 17 FCC Rcd 24923 (2002) (“*NOI*”).

⁷ See Section I.B, Sources of Information, *infra*.

⁸ 47 U.S.C. § 332 (c)(1)(C).

⁹ See Appendix D, Table 4, at D-8.

¹⁰ “Churn” refers to the number of customers an operator loses over a given period of time. See Section II.C.1.b(v), Churn, *infra*.

¹¹ See Sections II.C.1.b(v), Churn; II.C.1.c, Pricing Data and Trends; and II.C.1.b(ix), Market Entry, *infra*. See *Seventh Report*, at 13007-13016.

CMRS providers as dominant carriers.¹²

5. In addressing the final statutory requirement to provide a statement of whether additional providers would likely enhance competition, we conclude that the market, as it is currently structured, is competitive,¹³ and we include, as has been done in previous reports, an analysis of how entry by new competitors has enhanced competition.¹⁴ Nevertheless, we continue to examine ways to eliminate barriers to spectrum access in order to encourage entry for new competitors.

B. Sources of Information

6. As mentioned above, the Commission issued an *NOI* in December 2002 seeking data and information on the status of competition in the CMRS industry for this report.¹⁵ The Commission requested data based on several metrics, including service availability, subscribership, average revenue per unit (“ARPU”), usage, churn, and pricing.¹⁶ For each of these metrics, it requested data on both national and sub-national levels, for different demographic groups, and broken down by urban and rural areas.¹⁷ The *NOI* also sought comment on the extent to which these various metrics contribute to an analysis of CMRS competition.¹⁸ In order to enhance our analysis of CMRS service availability and competition, the Commission asked service providers to submit their coverage maps in an electronic, mapable format and to distinguish between the areas where they offer coverage to subscribers and the areas where they market service to new customers.¹⁹ The *NOI* also requested input on whether there is meaningful competition in rural areas and on how the Commission should define “rural” for purposes of its analysis of CMRS competition.²⁰ Furthermore, the *NOI* asked for information on service quality, cost

¹² Implementation of Sections 3(n) and 332 of the Communications Act, GN Docket No. 93-252, *Second Report and Order*, 9 FCC Rcd 1411, 1478 (1994); *see also*, 2000 Biennial Regulatory Review, *Report and Order*, 16 FCC Rcd 10647, 10653 (2001) (Commission determined that its forbearance analysis regarding the public interest need for complete detarrifing of international interexchange services by non-dominant carriers is applicable to CMRS providers of international interexchange services); Interconnection and Resale Obligations Pertaining to Commercial Mobile Radio Services, *Report and Order*, 15 FCC Rcd 13523 (2001) (In declining to adopt interconnection rule, the Commission acknowledged that it has not regulated CMRS providers as dominant carriers.).

¹³ *See* Section I.C, Status of Competition, *infra*.

¹⁴ *See Seventh Report*, at 13095; *Sixth Report*, at 13456; *Fifth Report*, at 17757-17758.

¹⁵ *See* Section I.A, Background, *supra*.

¹⁶ *NOI*, at 24927-24936.

¹⁷ *Id.*, at 24927-24940.

¹⁸ *Id.*, at 24926.

¹⁹ *Id.*, at 24927-24930.

²⁰ *Id.*, at 24936-24937. *See also*, Facilitating the Provision of Spectrum-Based Services to Rural Areas and Promoting Opportunities for Rural Telephone Companies To Provide Spectrum-Based Services, WT Docket No. 02-381, *Notice of Inquiry*, 17 FCC Rcd 25554 (2002) (“*Rural NOI*”) (Commission sought comment on whether and how it could modify its policies to promote the further development and deployment of spectrum-based services in rural areas).

of capital, wireless-wireline competition, mobile telephone service resellers, and satellite providers, as well as mobile data services, service availability, and pricing.²¹

7. Parties that submitted comments in response to the *NOI* included regional and national wireless operators, rural telephone companies, industry trade groups, technology advocacy consortiums, and resellers.²² Many commenters stated that the CMRS marketplace is competitive and cited the data presented in previous reports as evidence of that assertion.²³ These commenters also noted that the publicly-available data on the industry that is included in our reports is sufficient for analyzing CMRS competition.²⁴ Furthermore, many commenters addressed the issue of the extent of competition in rural areas, and offered suggestions on how to analyze data more effectively and how to define rural for purposes of this report; such statements and suggestions have been integrated into the *Eighth Report* below.²⁵ Other commenters provided input on the extent to which mobile satellite providers and mobile telephone resellers compete in the CMRS industry, and some parties submitted information on networks that providers use and plan to use to offer high-speed mobile data services.²⁶ On the other hand, many of the questions posed in the *NOI* were not directly addressed in the comments. For example, the Commission did not receive from commenters any new data on subscribership, ARPU, usage, churn, or pricing on a national or sub-national level, or broken down by demographic groups or urban/rural areas. In addition, service providers did not submit maps of their coverage areas or distinguish between areas where they provide coverage and areas where they market service.

8. Prior to the *Seventh Report*, the Commission based its analysis of competition in the CMRS industry solely on numerous publicly-available sources of data on the industry. These sources included: company filings with the Securities and Exchange Commission (“SEC”), data compiled and released by trade associations and by other government agencies, reports by securities analysts and other research companies and consultants, company news releases and web sites, newspaper and periodical articles, and the Commission’s Universal Licensing System (“ULS”) database. In the *Seventh Report*, the Commission added two new sources of information: the Numbering Resource Utilization / Forecast (“NRUF”) database, described below, and information submitted at a Public Forum held in February 2002. The Public Forum was held in order to examine ways in which to better gather and analyze data for its reports, in particular data regarding the development of competition in rural and underserved areas.²⁷ And for the

²¹ *NOI*, at 24926, 24940-24941, 24942-24948.

²² See Appendix G for a list of parties that filed comments in response to the *NOI*.

²³ See Cellular Telecommunications & Internet Association, *NOI Comments*, at ii, 4-5 (filed Jan. 27, 2003) (“*CTIA Comments*”); Dobson Communications Corporation, *NOI Comments*, at 3 (filed Jan. 27, 2003) (“*Dobson Comments*”); T-Mobile USA, Inc., *NOI Reply Comments*, at 1-2 (filed Feb. 11, 2003) (“*T-Mobile Reply Comments*”); South Dakota Telecommunications Association, *NOI Reply Comments*, at 5 (filed Feb. 11, 2003) (“*SDTA Reply Comments*”).

²⁴ See *CTIA Comments*, at ii, 4-5; *Dobson Comments*, at 3; *T-Mobile Reply Comments*, at 1-2; *SDTA Reply Comments*, at 5.

²⁵ See Section II.C.1.e, Geographical Comparisons: Urban vs. Rural, *infra*.

²⁶ Information from these comments is included in the report in the following sections: II.C.4, Satellite Operators; II.C.2, Resellers; II.C.3, Mobile Data; and II.B.2, Network Technology, *infra*.

²⁷ See Wireless Telecommunications Bureau Announces Agenda and Speakers For Public Forum For The 7th Annual Commercial Mobile Radio Services Competition Report, *Public Notice*, DA 02-422 (rel. Feb. 25, 2002).

Eighth Report, we have included the relevant information submitted in response to the *NOI*. Nevertheless, we continue to rely primarily on the aforementioned publicly-available sources and believe that they, when taken together, allow us to analyze the extent of competition in the industry on a nationwide basis. Because many of these publicly-available sources report national averages that reflect trends in the nation as a whole or in urban markets, they may provide limited insight into the extent of competition in sub-national markets and in rural areas. However, the additional sources included in the *Seventh* and *Eighth Reports* – the NRUF data and the information submitted at the Public Forum and in response to the *NOI* – have enabled us to conduct a more granular analysis of competition on a sub-national level and on an urban/rural basis.

9. In order to further uphold the integrity of our data on CMRS competition, we include, in many places, multiple data sources to report on the same metric or depict the same trend. For example, this report and previous reports have included data from three separate sources – the U.S. Department of Commerce Bureau of Labor Statistics (“BLS”); economic research and consulting firm, Econ One; and the Cellular Telecommunications and Internet Association (“CTIA”) – on the average price of mobile telephone service, all of which have shown the price of service declining.²⁸ In addition to using multiple sources for many metrics, we also emphasize that some of the sources upon which we rely, particularly SEC filings, are required by law to be accurate, and are scrutinized by independent third parties. The CTIA metrics used in the report are compiled and aggregated by an independent third party in a manner that protects carrier confidentiality, provides an incentive for carrier participation, and maintains the integrity of the results.²⁹ Furthermore, other carrier-reported data included in the report, such as coverage maps, are subject to contractual obligations with customers. Because all carrier-reported data is compiled by the carriers themselves and typically released in the aggregate to protect confidentiality, we are unable to have in-depth knowledge of the minutia of such data. However, we believe it is appropriate to use these sources in our analysis of CMRS competition for the reasons stated above.

10. As mentioned above, the *Seventh Report* integrated a new source of data submitted directly to

See FCC, Commercial Mobile Radio Services (CMRS) Competition Report Public Forum, <<http://wireless.fcc.gov/cmrs-crforum.html>> for access to participants’ presentations and forum transcript. The direct link to the forum transcript is <<http://wireless.fcc.gov/services/cmrs/presentations/020228.pdf>> (“*Transcript*”). Forum participants not only provided additional data, including data on the average price of mobile telephone service in rural areas, but also presented suggestions on how to analyze data more effectively. Research organizations and agencies offered insight into the methodologies they use to gather and analyze data, and the wireless carriers offered anecdotes on the competitive pressures that their companies face. The Commission incorporated these data, suggestions, and insights into the *Seventh Report*. For instance, the *Seventh Report* included an analysis of the average number of providers operating in urban versus rural areas, using three different proxies for urban and rural geographic areas: Metropolitan Statistical Area (“MSA”) and Rural Service Area (“RSA”) counties, Economic Area (“EA”) nodal and non-nodal counties, and counties with population densities above and below 100 persons per square mile. *See Seventh Report*, at 13022-23. For a description of nodal counties, *see* note 33. As stated in the *Seventh Report*, the Commission does not have a statutory definition of what constitutes a rural area. However, it analyzed market entry using these three criteria in order to gain insight into the competitive differences within different geographic areas of the United States. *See Seventh Report*, at 13022. Section II.C.1.e, Geographical Comparisons: Urban vs. Rural, *infra*, includes the same type of analysis for this year’s report.

²⁸ *See* Section II.C.1.c, Pricing Data and Trends, *infra*.

²⁹ For example, *see* note 211, *infra*, for a discussion of data reported by CTIA.

the FCC, the NRUF database.³⁰ The NRUF data tracks phone number usage by all telecommunications carriers, including wireless carriers, in the United States. All mobile wireless carriers must report to the FCC which of their phone numbers have been assigned to end users, thereby permitting the Commission to make an accurate estimate of the total number of mobile subscribers. As in the *Seventh Report*, we continue to use the NRUF data to determine the total number of mobile telephone subscribers and paging subscribers.³¹ In addition, because we collect NRUF data on a small, rate center area basis,³² we can use this information to estimate mobile telephone subscribership levels and penetration rates on a regional basis in addition to a national basis. In the *Seventh Report*, the Commission therefore began reporting mobile telephone penetration rates on an EA basis and continues to report them in this manner in this report.³³

11. One of the most important metrics that the Commission has tracked since 1995 is the number of facilities-based mobile telephone carriers providing service in a particular geographic area.³⁴ To track service launches by broadband Personal Communications Services (“broadband PCS” or “PCS”) and Specialized Mobile Radio (“SMR”) operators, the Commission has analyzed publicly-available information released by the operators, such as news releases, filings with the SEC, coverage maps available on operators’ Internet sites, and filings with the Commission. The Commission has based its analysis of cellular coverage on cellular licensees’ service area boundary maps, which are filed with the Commission. The Commission began tracking service launches on a BTA-by-BTA³⁵ basis in 1995, but switched to the more detailed, county-by-county basis in the *Fifth Report* in an effort to improve accuracy

³⁰ See Section II.C.1.b(i), Subscriber Growth, *infra*, for a further discussion of NRUF data.

³¹ See Sections II.C.1.b(i), Subscriber Growth and II.C.3.d(i), Paging, *infra*, for a detailed discussion. See *Seventh Report*, at 13005, 13049.

³² Rate centers are the geographic areas used by local exchange carriers as the primary basis for the determination of toll rates. See Harry Newton, *NEWTON’S TELECOM DICTIONARY: 16TH EXPANDED & UPDATED EDITION*, CMP Books, July 2000, at 732.

³³ See Section II.C.1.b(ii), Regional Penetration Rates, *infra*. 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. 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. Thus, an EA would seem to capture the market where the average person would use his or her mobile phone much of the time – around work, around home, 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. In other words, a mobile telephone subscriber can be assigned a phone number associated with a rate center that is a significant distance away from the subscriber’s place of residence (but generally still in the same EA). See *Seventh Report*, at 13005.

³⁴ See Sections II.C.1.b(ix), Market Entry and II.C.1.b(viii), Coverage by Technology Type, *infra*.

³⁵ Basic Trading Areas (“BTAs”) are Material Copyright (c) 1992 Rand McNally & Company. Rights granted pursuant to a license from Rand McNally & Company through an agreement with the Federal Communications Commission. BTAs are geographic areas drawn based on the counties in which residents of a given BTA make the bulk of their shopping goods purchases. Rand McNally’s BTA specification contains 487 geographic areas covering the 50 states and the District of Columbia. For its spectrum auctions, the Commission added additional BTA-like areas for: American Samoa; Guam; Northern Mariana Islands; San Juan, Puerto Rico; Mayagüez/Aguadilla-Ponce, Puerto Rico; and the U.S. Virgin Islands.

and significantly reduce the level of overcounting.³⁶ It has derived from this data the number of competitors operating in every U.S. county and hence the percentage of the U.S. population living in areas with a certain number of competitors.³⁷ This data has also been used to derive the percentage of the U.S. population living in counties with digital coverage. As mentioned in previous reports, there are several important caveats to note when considering the data. First, to be considered as “covering” a county, an operator need only be offering any service in a portion of that county. Second, multiple operators shown as covering the same county are not necessarily providing service to the same portion of that county. Third, the figures for POPs³⁸ and land area in this analysis include all of the POPs and every square mile in a county considered to have coverage. Therefore, our analysis overstates to some unknown and unavoidable degree the total coverage in terms of both geographic areas and population covered. On the other hand, we believe our analysis to be the most accurate in the industry today given the coverage data that is publicly available.

C. Status of Competition

12. Using the various information sources described above – the publicly-available sources used in several previous reports, the NRUF database, as well as the data and statements provided at the Public Forum and in the *NOI* comments – we have been able to examine in this report several structural and performance measures of competition in the CMRS industry. These measures include the nature and number of market participants, the geographic extent of service deployment, technological improvements and upgrades, price competition, investment, usage patterns, churn, subscriber growth, and product innovations, among other things. After analyzing these various measures, we conclude that there is effective competition in the CMRS marketplace.

13. Regarding rural areas specifically, we also conclude that CMRS providers are competing effectively in such areas. Moreover, while it appears that, on average, a smaller number of operators are serving rural areas than urban areas, this difference does not necessarily indicate that effective CMRS competition does not exist in rural areas.³⁹ On the contrary, as discussed in more detail below, data and statements presented by Public Forum participants and *NOI* commenters provide evidence that, despite the differing structure of rural markets, effective CMRS competition does exist in rural areas.⁴⁰ Wireless carriers serving rural areas describe the competition as “real,”⁴¹ “significant”⁴² and “sufficient.”⁴³ The

³⁶ BTAs can be sub-divided into counties. The United States is made up of approximately 3,200 counties versus 493 BTAs.

³⁷ For a complete list of cellular and PCS licenses on a county-by-county basis, see FCC Wireless Telecommunications Bureau, *Broadband PCS Data*, <<http://wireless.fcc.gov/services/broadbandpcs/data/>>; FCC Wireless Telecommunications Bureau, *Cellular Services Data*, <<http://wireless.fcc.gov/services/cellular/data/>>.

³⁸ POPs is an industry term referring to population, usually the number of people covered by a given wireless license or footprint. One “POP” equals one person.

³⁹ See Section II.C.1.e, Geographical Comparisons: Urban vs. Rural, *infra*; *Seventh Report*, at 13024.

⁴⁰ See Section II.C.1.e, Geographical Comparisons: Urban vs. Rural, *infra*. See also, *Rural NOI*, at ¶ 25 (“[I]t may be economically inefficient, and thus harmful to consumers, to require for each wireless service the same number of competitors in urban and rural areas. This appears to be true, for example, with regard to mobile telephony.”)

⁴¹ See *Seventh Report*, at 13024.

most recently released data provided by Econ One, which was also included in the *Seventh Report*, showed that the average price of mobile telephone service in rural areas appears to be very similar to the average price in urban areas.⁴⁴ Indeed, at least one *NOI* commenter noted that nationwide and urban price trends have acted to constrain prices in rural areas, even where the total number of operators may be lower.⁴⁵ Furthermore, in addition to competing with each other, CMRS carriers in rural areas may also provide competition to incumbent local exchange carriers. One commenter that provides mobile telephone services in rural areas stated that it “competes with wireline telephone companies as well as wireless companies” and that “[c]onsumers are enjoying a facilities-based competitive alternative to the local service formerly offered on a monopoly basis by the ILECs.”⁴⁶ In rural areas where wireless networks may be an efficient technology for providing any type of telephone service, additional CMRS providers may enhance not only CMRS competition but wireline competition as well, benefiting consumers by increasing customer choice, offering innovative services, and introducing new technologies.

14. In preparation for its ninth annual report and analysis of CMRS competition, the Commission will be issuing another Notice of Inquiry seeking additional and updated data from the public on the state of CMRS competition, particularly in rural areas and on a sub-national level. With this next Notice, we hope to build on the information employed in this year’s report and to obtain a wider range of facts and opinions from the public comments in order to assist in our analysis. We also plan to explore other avenues for data collection, such as contract research, for the next report.⁴⁷ In addition, for the next report, we will continue efforts to improve our approaches to collecting and evaluating the various types of data and information that are available in order to assess the status of competition in the CMRS industry. In particular, we plan to seek comment on the interrelationship among dimensions of industry structure, indicators of operator conduct, and other relevant measures of market conditions.

D. Structure of Report

15. As stated in previous reports, mobile voice and mobile data⁴⁸ services are no longer clearly

⁴² *Dobson Comments*, at 2.

⁴³ Fred Williamson and Associates, *NOI Reply Comments*, at 2 (filed Feb. 11, 2003) (“*FWA Reply Comments*”).

⁴⁴ *See Seventh Report*, at 13022-13024.

⁴⁵ Dobson Communications Corporation (“Dobson”) stated, “Clearly, if price is an indicator of the level of competition, the price reductions spawned by wireless competition in urban markets have come to rural areas.” *Dobson Comments*, at 3. Dobson also explained at the Public Forum that “small market carriers . . . are subject to the same competitive pressures of large market carriers. Because of national advertising and the Internet, consumers all over the country are educated about nationwide rate plans and services enabled by digital technology.” *Transcript*, at 115.

⁴⁶ Western Wireless Corporation, *NOI Comments*, at 6 (filed Feb. 3, 2003).

⁴⁷ The scale and scope of such collection efforts will be dependent upon the availability of funding and the discretion of the Commission.

⁴⁸ For purposes of this report, mobile data service is considered to be the delivery of non-voice information to a mobile device. Two-way mobile data services include not only the ability to receive non-voice information on an end-user device but to send it from an end-user device to another mobile or landline device using wireless technology.

delineated in the marketplace. Many mobile voice operators also offer mobile data services using the same spectrum, network facilities, and customer equipment. Furthermore, many U.S. mobile carriers have integrated the marketing of mobile voice and data services. For these reasons, we find it reasonable to analyze these services together in the *Eighth Report* in a larger, more cohesive section on the CMRS industry as a whole (Section II.C). This section includes a sub-section discussing the market structure and performance metrics and analyses related to mobile telephone operators,⁴⁹ many of which are now relevant to both mobile voice and mobile data services.⁵⁰ Section II.C includes another sub-section discussing individual mobile data services, devices, and related developments.⁵¹ This sub-section also provides information on those mobile data providers that offer only mobile data services, instead of both voice and data services, in many cases on networks distinct from those traditionally used to provide mobile voice.

16. The *Eighth Report* also provides an overview, for background purposes, of the spectrum and networks that mobile telephone operators currently use to offer both voice and data services, prior to the discussion of CMRS industry developments.⁵²

E. Industry Development

17. During 2002, the CMRS industry continued to experience increased service availability, lower prices for consumers, innovation, and a wider variety of service offerings.⁵³ The mobile telephony sector of CMRS has shown significant growth in spite of the difficult general economic environment, and mobile data services have begun to play a more significant role in the CMRS industry. In the 12 months ending December 2002, the mobile telephony sector generated over \$76 billion in revenues,⁵⁴ increased subscribership from 128.5 million to 141.8 million,⁵⁵ and produced a nationwide penetration rate of roughly 49 percent.⁵⁶ One analyst estimates that 11.9 million, or 8 percent, of the 141.8 mobile telephone subscribers at the end of 2002 subscribed to some type of mobile Internet service.⁵⁷ An additional 2.3 million consumers subscribed to mobile Internet services on data-only mobile devices at the end of

⁴⁹ For purposes of this report, the Commission defines mobile telephone operators as carriers that provide mobile voice and, in most cases, mobile data services using cellular, broadband PCS, and SMR spectrum.

⁵⁰ See Section II.C.1, Mobile Telephony Overview and Analysis, *infra*.

⁵¹ See Section II.C.3, Mobile Data, *infra*.

⁵² See Sections II.A, Spectrum Allocation and II.B, Network Overview, *infra*.

⁵³ “Increased service availability” refers to the increase in the population living in counties served by 3 or more, 4 or more, 5 or more, 6 or more, and 7 or more CMRS providers. See Section II.C.1.b(ix), Market Entry, *infra*.

⁵⁴ See Appendix D, Table 1, at D-2.

⁵⁵ See Section II.C.1.b(i), Subscriber Growth, *infra*.

⁵⁶ *Id.*

⁵⁷ Luiz Carvalho *et al.*, *A Look at Wireless Data: Don't Short SMS*, Morgan Stanley, Equity Research – Wireless Telecom Services, Mar. 2, 2003, at 3 (“*Morgan Stanley Wireless Data Report*”). See Section II.C.3.a, Mobile Data Introduction, *infra*, for a further discussion.

2002.⁵⁸

18. To date, 270 million people, or 95 percent of the total U.S. population, live in counties with access to three or more different operators (cellular, broadband PCS, and/or digital SMR providers) offering mobile telephone service, a slight increase from what the Commission found in the *Seventh Report*.⁵⁹ More than 236 million people, or 83 percent of the U.S. population, live in counties with five or more mobile telephone operators competing to offer service.⁶⁰ Mobile telephone carriers continued to upgrade their networks with next generation technologies that allow them to offer mobile data services at higher data transfer speeds typically ranging from 30 to 70 kilobits per second (“kbps”), with maximum data rates of up to 144 kbps for some carriers. As of March 2003, operators were offering services over these next generation networks in at least some portion of U.S. counties containing 265 million people, or 93 percent of the U.S. population.⁶¹ Furthermore, the average price of mobile telephone service has declined during the year since the *Seventh Report*, continuing the trend of the last several years.⁶² At the same time, one survey indicates that the average revenue per minute of mobile telephone use fell 9 percent between 2001 and 2002.⁶³

19. Mobile data providers, which include both mobile telephone carriers and companies that offer data-only mobile services, began offering a variety of new services to consumers during the past year, including downloadable ring tones and graphics, multimedia messaging services (“MMS”),⁶⁴ and interactive gaming.⁶⁵ In addition, the more established mobile data services, such as text messaging and e-mail, continued to grow in popularity.⁶⁶ It is estimated that 20 percent of all mobile telephone subscribers used text messaging services during the fourth quarter of 2002.⁶⁷ Furthermore, while the use of paging devices has declined substantially over the past four years, we estimate there were 14.1 million paging units in service at the end of 2002.⁶⁸

⁵⁸ See Section II.C.3.a, Mobile Data Introduction, *infra*.

⁵⁹ See Appendix D, Table 5, at D-9; *Seventh Report*, at 13094.

⁶⁰ See Appendix D, Table 5, at D-9.

⁶¹ See Section II.C.1.b(viii), Coverage by Technology Type, *infra*.

⁶² See Section II.C.1.c, Pricing Data and Trends, *infra*, for a detailed discussion of price competition.

⁶³ *Id.*

⁶⁴ Services involving the exchange of photo, video, animation, and audio files using a mobile phone are often collectively called MMS because customers are using another medium instead of or in addition to text to communicate or convey a message.

⁶⁵ See Section II.C.3.d, Services, Content, and Applications, *infra*.

⁶⁶ *Id.*

⁶⁷ See Section II.C.3.d(ii), Text Messaging, *infra*.

⁶⁸ See Section II.C.3.d(i), Paging, *infra*.

II. DISCUSSION AND ANALYSIS

A. Spectrum Allocation

1. Current Allocation/Licensing

20. Currently, mobile telephone operators primarily use three types of spectrum licenses to provide mobile voice and, in most cases, mobile data services:⁶⁹ cellular, broadband PCS, and SMR.⁷⁰ This information is provided as a basis for understanding the formation of the current industry structure. However, we continue to take steps to increase spectrum flexibility and availability.⁷¹

21. Cellular – The Commission began licensing commercial cellular providers in 1982 and completed licensing the majority of operators by 1991. The Commission divided the United States and its possessions into 734 cellular market areas (“CMAs”), including 305 MSAs, 428 RSAs, and a market for the Gulf of Mexico.⁷² Two cellular systems were licensed in each market area. The Commission designated 50 megahertz of spectrum in the 800 MHz frequency band for the two competing cellular systems in each market (25 megahertz for each system). Initially, cellular systems offered service using analog technology, but today most of the service offered using cellular spectrum is digital.⁷³

22. Broadband PCS – Broadband PCS is similar to cellular service, except that broadband PCS systems operate in different spectrum bands and have been designed from the beginning to use a digital format. Broadband PCS licenses have been assigned through auction, beginning in 1995.⁷⁴ The most

⁶⁹ See Section II.C.1, Mobile Telephony Overview and Analysis, for a discussion of mobile voice services; and Section II.C.3, Mobile Data, for a discussion of mobile data services.

⁷⁰ See Appendix F, Table 1 and Maps 11-14, at F-12 – F-16, for descriptions and maps of various geographical licensing schemes employed by the Commission.

⁷¹ See, e.g., Promoting Efficient Use of Spectrum Through Elimination of Barriers to The Development of Secondary Markets, *Report and Order and Further Notice of Proposed Rulemaking*, FCC 03-113 (adopted May 15, 2003).

⁷² Under the original cellular licensing rules, one of the two cellular channel blocks in each market (the B block) was awarded to a local wireline carrier, while the other block (the A block) was awarded competitively to a carrier other than a local wireline incumbent. After awarding the first 30 MSA licenses pursuant to comparative hearing rules, the Commission adopted rules in 1984 and 1986 to award the remaining cellular MSA and RSA licenses through lotteries. By 1991, lotteries had been held for every MSA and RSA, and licenses were awarded to the lottery winners in most instances. In some RSA markets, however, the initial lottery winner was disqualified from receiving the license because of a successful petition to deny or other Commission action. Implementation of Competitive Bidding Rules to License Certain Rural Service Areas, *Report and Order*, 17 FCC Rcd 1960, 1961-1962 (2002). In 1997, the Commission auctioned cellular spectrum in areas unbuilt by the original cellular licensees. See FCC, *Auction 12: Cellular Unerved* (visited Apr. 12, 2002) <<http://wireless.fcc.gov/auctions/12/>>. In 2002, the Commission auctioned three RSA licenses where the initial lottery winner had been disqualified. See FCC, *Auction 45: Cellular RSA* (visited Jun. 7, 2002) <<http://wireless.fcc.gov/auctions/45/>>.

⁷³ See Section II.C.1.b(i), Subscriber Growth, *infra*.

⁷⁴ The first auction was for two license blocks of 30 megahertz each. *FCC Grants 99 Licenses For Broadband Personal Communications Services In Major Trading Areas*, News Release, FCC, Jun. 23, 1995. The

recent broadband PCS auction was completed in 2001.⁷⁵ The Commission has set aside the spectrum between 1850 MHz and 1990 MHz for broadband PCS. This spectrum includes 120 megahertz used for mobile telephony, divided originally into three blocks of 30 megahertz each (blocks A, B, and C) and three blocks of 10 megahertz each (blocks D, E, and F).⁷⁶ Two of the 30 megahertz blocks (A and B blocks) are assigned on the basis of 51 Major Trading Areas (“MTAs”).⁷⁷ One of the 30 megahertz blocks (C block) and all three of the 10 megahertz blocks are assigned on the basis of 493 BTAs.⁷⁸

23. SMR - The Commission first established SMR in 1979 to provide for land mobile communications on a commercial basis. The Commission initially licensed spectrum in the 800 and 900 MHz bands for this service, in non-contiguous bands, on a site-by-site basis.⁷⁹ The Commission has since licensed additional SMR spectrum through auctions.⁸⁰ In total, the Commission has licensed 19 megahertz of SMR spectrum, plus an additional 7.5 megahertz of spectrum that is available for SMR as

Commission has had five additional broadband PCS auctions. See FCC, *Auctions Home* (visited Apr. 29, 2003) <<http://wireless.fcc.gov/auctions/>>. Three licenses were also awarded as part of a pioneer preference program in 1994. *Three Pioneer Preference PCS Applications Granted*, News Release, FCC, Dec. 14, 1994.

⁷⁵ See *Sixth Report*, at 13368. See also, Disposition of Down Payment and Pending Applications By Certain Winning Bidders in Auction No. 35; Requests for Refunds of Down Payments Made In Auction No. 35, *Order and Order on Reconsideration*, 17 FCC Rcd 23354 (2002); and *Federal Communications Commission v. NextWave Personal Communications, et al.*, 537 U.S. 293 (2003).

⁷⁶ The Commission’s broadband PCS allocation includes 20 megahertz of spectrum at 1910 MHz - 1930 MHz for unlicensed broadband PCS.

⁷⁷ Major Trading Areas are Material Copyright (c) 1992 Rand McNally & Company. Rights granted pursuant to a license from Rand McNally & Company through an arrangement with the Federal Communications Commission. Rand McNally’s MTA specification contains 47 geographic areas covering the 50 states and the District of Columbia. For its spectrum auctions, the Commission has added three MTA-like areas: Guam and the Northern Mariana Islands, Puerto Rico and the U.S. Virgin Islands, and American Samoa. In addition, Alaska was separated from the Seattle MTA into its own MTA-like area. MTAs are combinations of two or more BTAs. See note 35 for a description of BTAs.

⁷⁸ In June 1998, broadband PCS C block licensees were permitted to elect to disaggregate their licenses and return 15 megahertz of C block spectrum to the Commission. As a result, a number of licensees elected to disaggregate some or all of their licenses, creating some BTAs with seven broadband PCS spectrum licenses. See Amendment of the Commission’s Rules Regarding Installment Payment Financing for Personal Communications Services (PCS) Licensees, *Second Report and Order and Further Notice of Proposed Rule Making*, 12 FCC Rcd 16436 (1997); Amendment of the Commission’s Rules Regarding Installment Payment Financing for Personal Communications Services (PCS) Licensees, *Order on Reconsideration of the Second Report and Order*, 13 FCC Rcd 8345 (1998). In August 2000, the Commission decided to reconfigure each 30 megahertz C block license available for auction, beginning with Auction No. 35, into three 10 megahertz licenses. Amendment of the Commission’s Rules Regarding Installment Payment Financing for Personal Communications Services (PCS) Licensees, *Sixth Report and Order and Order on Reconsideration*, 15 FCC Rcd 16266, 16267 (2000).

⁷⁹ The “900 MHz” SMR band refers to spectrum allocated in the 896-901 and 935-940 MHz bands; the “800 MHz” band refers to spectrum allocated in the 806-824 and 851-869 MHz bands. See 47 C.F.R. § 90.603; see also 47 C.F.R. § 90.7 (defining “specialized mobile radio system”).

⁸⁰ The Commission has held multiple auctions for SMR licenses. FCC, *FCC Auctions* (visited Mar. 7, 2002) <<http://wireless.fcc.gov/auctions/>>.

well as other services.⁸¹ While Commission policy permits flexible use of this spectrum, including the provision of paging, dispatch, mobile voice, mobile data, facsimile, or combinations of these services,⁸² the primary use for SMR traditionally has been dispatch services.⁸³ Dispatch differs from mobile voice communications offered by PCS and cellular carriers in that it allows both one-to-one and one-to-many communication (including real-time conferencing with groups), and it generally does not operate through interconnection with the public switched telephone network.⁸⁴ SMR systems have also had the ability to offer interconnected service, but until the development of digital technologies, analog SMR systems had limited capacity to provide mobile telephony. In recent years, however, the nature of SMR service has evolved significantly. SMR providers such as Nextel Communications, Inc. (“Nextel”) and Southern LINC, a unit of energy concern Southern Company, have used digital technologies to increase spectral efficiency and to become more significant competitors in mobile telephony, while also providing dispatch functionality (also known as “push-to-talk”) as a part of their service offerings.⁸⁵ Furthermore, in apparent

⁸¹ There are five megahertz in the 900 MHz band (200 paired channels x 12.5 kHz/channel). See 47 C.F.R. § 90.617, Table 4B. There are 21.5 megahertz in the 800 MHz band: 14 megahertz in the 800 MHz SMR Service (280 paired channels x 25 kHz/channel) and 7.5 megahertz in the 800 MHz General Category (150 paired channels x 25 kHz/channel). See 47 C.F.R. § 90.615, Table 1 (SMR General Category) and 47 C.F.R. § 90.617, Table 4A (SMR Service). In 2000, the Commission amended its rules to allow Business and Industrial/Land Transportation licensees in the 800 MHz band to use their spectrum for CMRS operations under certain conditions. Implementation of Sections 309(j) and 337 of the Communications Act of 1934 as Amended Promotion of Spectrum Efficient Technologies on Certain Part 90 Frequencies; Establishment of Public Service Radio Pool in the Private Mobile Frequencies Below 800 MHz; Petition for Rule Making of The American Mobile Telecommunications Association, *Report and Order and Further Notice of Proposed Rule Making*, 15 FCC Rcd 22709, 22760-61 (2000). This could make up to five megahertz of additional spectrum available for digital SMR providers: 2.5 megahertz in the Industrial/Land Transportation Category (50 paired channels x 25 kHz/channel) and 2.5 megahertz in the Business Category (50 paired channels x 25 kHz/channel). See 47 C.F.R. § 90.617, Tables 2A and 3A.

⁸² *Principles for Reallocation of Spectrum to Encourage the Development of Telecommunications Technologies for the New Millennium*, Policy Statement, 14 FCC Rcd 19868 (1999); see also Applications of Various Subsidiaries and Affiliates of Geotek Communications, Inc., Debtor-In-Possession, Assignors, and Wilmington Trust Company or Hughes Electric Corporation, Assignees, For Consent to Assignment of 900 MHz Specialized Mobile Radio Licenses, *Memorandum Opinion and Order*, 15 FCC Rcd 790, 802 (2000).

⁸³ Dispatch services allow two-way, real-time, voice communications between fixed units and mobile units (e.g., between a taxicab dispatch office and a taxi) or between two or more mobile units (e.g., between a car and a truck). See *Fifth Report*, at 17727-17728, for a detailed discussion. A number of providers continue to provide both commercial and private dispatch services at 800 MHz, 900 MHz, 220 MHz, 217-219 MHz, and 450-470 MHz. See Applications of Motorola, Inc.; Motorola SMR, Inc.; and Motorola Communications and Electronics, Inc. Assignors; and FCI 900, Inc., Assignee, For Consent to Assignment of 900 MHz Specialized Mobile Radio Licenses, *Order*, 16 FCC Rcd 8451 (2001) (“*Motorola Order*”). Dispatch and SMR are often used interchangeably, although SMR refers to specific spectrum ranges.

⁸⁴ See The Strategis Group, THE STATE OF THE SMR INDUSTRY: NEXTEL AND DISPATCH COMMUNICATIONS (Sept. 2000), at 57; The Strategis Group, U.S. DISPATCH MARKETS (Jan. 2000), at 1. See also *Motorola Order*, at 8457.

⁸⁵ According to Nextel, “[We are] referred to as an ‘SMR provider’ . . . , although [our] services compete directly with and are regulated virtually identically to those of cellular and PCS providers.” Nextel, Automatic and Manual Roaming Obligations Pertaining to Commercial Mobile Radio Services, WT Docket No. 00-193, *Comments*, at note 4 (filed Jan. 5, 2001). However, in comparison with cellular and broadband PCS providers, digital SMR providers are more focused on the business than the individual consumer market. See, e.g., Nextel Communications, Inc., SEC Form 10-Q, Nov. 14, 2000, at 16.

response to the dispatch functionality of SMR services, cellular and broadband PCS carriers have recently begun to offer dispatch-like options (e.g., group calling and conferencing) as part of their service offerings, particularly for businesses.⁸⁶ Some cellular and broadband PCS carriers have said that they plan to offer push-to-talk functionality on their networks in 2003.⁸⁷ SMR spectrum is also used for certain data-only networks.⁸⁸

24. **Available Licenses** – In every geographical area of the country, the Commission initially authorized up to eight different mobile telephony licenses (two cellular and six broadband PCS), not including additional digital SMR licenses.⁸⁹ Moreover, under Commission rules, broadband PCS, cellular, and auctioned SMR licensees may, with Commission approval, disaggregate (divide the spectrum into smaller amounts of bandwidth) or partition (divide the license into smaller geographical areas) their licenses, or both, to other entities.⁹⁰ Many licensees hold more than one license in a particular market. While no longer in operation, the Commission's CMRS spectrum cap molded the current distribution of spectrum licenses. Under the spectrum cap, no entity could control more than 45 megahertz of cellular, broadband PCS, and SMR⁹¹ spectrum in an MSA, or more than 55 megahertz in an RSA.⁹² In November 2001, however, the Commission raised the spectrum cap to 55 megahertz in all markets, and decided to eliminate the restriction entirely effective January 1, 2003.⁹³ In addition, the Commission restricts an entity from having certain cross-interests in cellular licenses on both blocks within an RSA.⁹⁴

2. 700 MHz Bands

25. One of the Commission's primary goals in recent years has been to establish service rules in

⁸⁶ *Id.*, at 8462-8463.

⁸⁷ Yukari Iwatani, *Wireless Companies Turn to Walkie-Talkie Technology*, REUTERS, Mar. 6, 2003; Elizabeth V. Mooney, *Carriers Up On Cash Flow, Push-To-Talk*, RCR WIRELESS NEWS, Feb. 24, 2003, at 12.

⁸⁸ See Section II.C.3.c, CMRS Networks: Data-Only, *infra*.

⁸⁹ Some areas may have fewer than eight active licenses because certain auction winners or licensees have defaulted on payments to the Commission, because some licensees did not meet their buildout requirements, because some licensees returned their licenses, or because some licenses remained unsold in an auction.

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

⁹¹ No more than 10 megahertz of SMR spectrum was attributable to an entity under the cap. 47 C.F.R. § 20.6(b).

⁹² 47 C.F.R. § 20.6(a).

⁹³ 2000 Biennial Regulatory Review Spectrum Aggregation Limits For Commercial Mobile Radio Services, *Report and Order*, 16 FCC Rcd 22668 (2001), *petitions for reconsideration pending* ("Spectrum Cap Order"). The increase to 55 megahertz took effect February 13, 2002. See 67 Fed. Reg. 1626 (Jan. 14, 2002). All license transfers are still subject to review by the Commission to determine whether they are in the public interest. *Spectrum Cap Order*, at 22670-22671.

⁹⁴ *Spectrum Cap Order*, at 22669-22670.

new and reallocated spectrum bands that will promote innovative services and encourage the flexible and efficient use of the spectrum resource.⁹⁵ In recent years the Commission has addressed its statutory directives under Section 309(j) of the Communications Act by addressing the growing complexities of spectrum management using approaches consistent with general market-based principles. One example of this is the 700 MHz spectrum that is being reclaimed from use by broadcast services in connection with the transition of the analog television service to digital television. The reclamation of television spectrum has been addressed in two parts, primarily as a result of different statutory requirements applicable to the two bands and differing degrees of incumbency in the two bands.⁹⁶ These two bands are the 698-746 MHz (known as the “Lower 700 MHz”) band and the 746-806 MHz (or “Upper 700 MHz”) band. The Upper 700 MHz Band is currently used by TV stations on Channels 60-69 and comprises 60 megahertz, while the Lower 700 MHz Band, which is used by TV stations on Channels 52-59, comprises 48 megahertz of spectrum.⁹⁷

26. Seventy-eight megahertz of the total 108 megahertz of Upper and Lower 700 MHz spectrum will generally be open to a broad range of flexible uses.⁹⁸ Pursuant to statutory mandate, licenses for this spectrum will be assigned through competitive bidding.⁹⁹ These bands have many permissible uses: winning bidders may use the spectrum for fixed, mobile (including mobile wireless commercial services), and broadcast services.¹⁰⁰ The Commission expects that many of the new technologies to be developed and deployed in this band will support advanced wireless applications.¹⁰¹ However, much of the Upper and Lower 700 MHz spectrum is currently encumbered by television broadcasters, and may remain so until the end of period when broadcasters convert from analog to digital transmission systems.¹⁰² That period is defined by statute.¹⁰³ Nevertheless, there may be some portions of these bands that are not so

⁹⁵ See, e.g., 47 U.S.C. § 309(j)(3)(D) (Commission to promote efficient and intensive use of the electromagnetic spectrum).

⁹⁶ Reallocation and Service Rules for the 698-746 MHz Spectrum Band (Television Channels 52-59), GN Docket No. 01-74, *Notice of Proposed Rulemaking*, 16 FCC Rcd 7278, 7282 (2001).

⁹⁷ The Commission has allocated 24 megahertz of the Upper 700 MHz band for use by public safety entities, pursuant to Section 337(a) of the Communications Act. 47 U.S.C. § 337(a).

⁹⁸ See Reallocation and Service Rules for the 698-746 MHz Spectrum Band (Television Channels 52-59), GN Docket No. 01-74, *Report and Order*, 17 FCC Rcd 1022 (2002) (“*Lower 700 MHz Report and Order*”); Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission’s Rules, WT Docket No. 99-168, *Third Report and Order*, 16 FCC Rcd 2703 (2001); Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission’s Rules, WT Docket No. 99-168, *Second Memorandum Opinion and Order*, 16 FCC Rcd 1239 (2001); Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission’s Rules, WT Docket No. 99-168, *Memorandum Opinion and Order and Further Notice of Proposed Rulemaking*, 15 FCC Rcd 20845 (2000); Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission’s Rules, WT Docket No. 99-168, *Second Report and Order*, 15 FCC Rcd 5299 (2000) (“*Upper 700 MHz Second Report and Order*”).

⁹⁹ See *Lower 700 MHz Report and Order*, at 1024; *Upper 700 MHz Second Report and Order*, at 5301-2.

¹⁰⁰ *Id.*

¹⁰¹ *Lower 700 MHz Report and Order*, at 1032.

¹⁰² *Id.*, at 1028.

¹⁰³ See 47 U.S.C. § 309(j)(14)(A)-(B).

encumbered and are available for immediate use by new entrants.

27. The Balanced Budget Act of 1997 and subsequent legislation initially directed the Commission to license these reclaimed spectrum bands well in advance of the end of the DTV transition period.¹⁰⁴ Pursuant to statutory deadlines established in that legislation, the Commission announced that it would conduct auctions of the Upper 700 MHz band (Auction No. 31) and Lower 700 MHz band (Auction No. 44) starting on June 19, 2002.¹⁰⁵ In response to concerns over this schedule and questions about whether the statutory auction deadlines that had been enacted in that legislation were “consistent with sound telecommunications policy and spectrum management principles,” Congress passed, and the President signed into law, the Auction Reform Act of 2002.¹⁰⁶ The Auction Reform Act eliminated these statutory deadlines. Further, the Auction Reform Act provided the Commission with discretion to “determine the timing of and deadlines for the conduct of competitive bidding under [Section 309(j) of the Communications Act of 1934, as amended], including the timing of, and deadlines for, qualifying for bidding; conducting auctions; collecting, depositing, and reporting revenues; and completing licensing processes and assigning licenses.”¹⁰⁷

28. The Auction Reform Act ordered the Commission to delay the A, B, and E block portion of Auction No. 44 (Lower 700 MHz) and the entire Auction No. 31 (Upper 700 MHz), yet it also directed the Commission to proceed with an auction of the C and D blocks starting “no earlier than August 19, 2002, and no later than September 19, 2002.”¹⁰⁸ On September 18, 2002, the initial auction of Lower 700 MHz C and D block licenses (Auction No. 44) closed, raising \$88.7 million in net bids.¹⁰⁹ The Commission offered 740 licenses: one 12 megahertz license in 734 CMAs, and one 6 megahertz license in 6 Economic Area Groupings (“EAG”).¹¹⁰ The Commission selected CMAs as the license areas in part to address the needs of small, regional, and rural carriers.¹¹¹ A total of 102 bidders won 484 licenses,¹¹²

¹⁰⁴ Balanced Budget Act of 1997, Pub. L. No. 105-33, 111 Stat. 251 § 3003 (1997) (adding new Section 309(j)(14) to the Communications Act of 1934, as amended); § 3007 (uncodified; reproduced at 47 U.S.C. § 309(j) note 3); Consolidated Appropriations Act, 2000, Pub. L. No. 106-113, 113 Stat. 2502, App. E, § 213, 145 Cong. Rec. H12493-94 (Nov. 17, 1999) (“Consolidated Appropriations Act”); 47 U.S.C. § 309(j)(14)(C)(ii).

¹⁰⁵ Later, on May 24, 2002, the Commission announced that Auction No. 31 was postponed until January, 2003. Auction of Licenses in the 747-762 and 777-792 MHz Band (Auction No. 31) Postponed Until January 14, 2003; Auction of Licenses in the 698-746 MHz Band (Auction No. 44) Will Proceed As Scheduled, *Public Notice*, FCC 02-158, Report No. AUC-02-31-F (Auction No. 31) and AUC-02-44-D (Auction No. 44) (rel. May 24, 2002).

¹⁰⁶ Auction Reform Act of 2002, Pub. L. No. 107-195, 116 Stat. 715 (“Auction Reform Act”).

¹⁰⁷ 47 U.S.C. § 309(j)(15), as added by the Auction Reform Act.

¹⁰⁸ 47 U.S.C. § 309(j)(15)(C)(iii), as enacted by the Auction Reform Act.

¹⁰⁹ FCC, Auction 44: Lower 700 MHz Band, *Factsheet* (visited Mar. 11, 2003) <<http://wireless.fcc.gov/auctions/44/factsheet.html>>.

¹¹⁰ *Id.*

¹¹¹ *Lower 700 MHz Report and Order*, at 1061-1062.

¹¹² FCC, Auction 44: Lower 700 MHz Band, *Factsheet* (visited Mar. 11, 2003) <<http://wireless.fcc.gov/auctions/44/factsheet.html>>.

47 of the winning bidders were rural telcos, and they won 136 licenses.¹¹³

29. On March 4, 2003, the Commission announced that it would reaucton the licenses that did not have winning bidders in auction 44.¹¹⁴ On June 13, 2003, the Federal Communications Commission completed the auction of 256 licenses in the Lower 700 MHz band C and D blocks (Auction No. 49), raising (in net high bids) a total of \$56.8 million.¹¹⁵ In that auction, 35 winning bidders won a total of 251 licenses.¹¹⁶

30. As required by the Auction Reform Act, we have prepared a report announcing when we intend to reschedule the remaining 700 MHz band auctions, and submitted the report to Congress on June 19, 2003.¹¹⁷

3. Future Allocation/Licensing

31. As discussed in the *Seventh Report*, U.S. mobile carriers have the flexibility to deploy technologies, including those commonly called Third Generation or “3G,” that will allow them to offer high-speed mobile data services using their existing CMRS spectrum.¹¹⁸ Nevertheless, the Commission has continued its efforts over the past year to allocate and license additional spectrum suitable for offering advanced wireless services. Since the publication of the *Seventh Report*, the Commission, in conjunction with the National Telecommunications and Information Administration (“NTIA”), allocated 90 megahertz of spectrum that can be used to offer advanced wireless, including 3G, services: 1710-1755 MHz, which is currently used by the Department of Defense, and 2110-2155 MHz, which is currently used by private and common carrier fixed microwave licensees and by Multipoint Distribution Service (“MDS”) licensees.¹¹⁹ In November 2002, the Commission released a *Notice of Proposed Rulemaking* seeking comment on service rules for offering advanced wireless services in these bands, including provisions for licensing, operational and technical rules, and for competitive bidding.¹²⁰ On February 10, 2003, we released an order reallocating 30 megahertz of spectrum from the Mobile Satellite Service in the 2 GHz band (“2 GHz MSS”) to fixed and mobile services that can be used to provide a variety of advanced wireless services. With this action, we preserved 40 megahertz of spectrum in the 2 GHz band for

¹¹³ Based on data available at the Commission’s Auction Form 175 database, *available at* <<http://auctionfiling.fcc.gov/form175/index.htm>> (last visited Mar. 12, 2002) (“*Form 175 Database*”).

¹¹⁴ Auction of Licenses in the Lower 700 MHz Band Scheduled for May 28, 2003, *Public Notice*, DA 03-567 (rel. Mar. 4, 2003).

¹¹⁵ Lower 700 MHz Band Auction Closes, *Public Notice*, DA 03-1978 (rel. Jun. 18, 2003).

¹¹⁶ *Id.*

¹¹⁷ Auction Reform Act of 2002, *Report To Congress*, FCC 03-138 (rel. Jun. 19, 2003).

¹¹⁸ See *Seventh Report*, at 13040. See Section II.B.2, Network Technology, *infra*, for a discussion of next-generation network technologies.

¹¹⁹ Amendment of Part 2 of the Commission’s Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems, ET Docket No. 00-258, *Second Report and Order*, 17 FCC Rcd 23193 (2002).

¹²⁰ Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands, WT Docket No. 02-353, *Notice of Proposed Rulemaking*, 17 FCC Rcd 24135 (2002).

MSS.¹²¹

32. In addition, the Commission in May 2002 implemented service rules for 27 megahertz of spectrum in seven different bands that had been reallocated for non-government use.¹²² The Commission determined that four of these bands – 1390-1392 MHz, 1392-1395/1432-1435 MHz, 1670-1675 MHz, and 2385-2390 MHz – would be open to flexible use and licensed by competitive bidding, while the remaining three would be licensed for telemetry services on a frequency coordinated site-by-site basis.¹²³ In April 2003, the Commission auctioned the 1670-1675 MHz band as a single, nationwide license, and the license was purchased by OP Corporation for \$12.6 million.¹²⁴

B. Network Overview

33. As mentioned above, many mobile telephony carriers use not only the same spectrum bands but also the same network design and technologies to offer both voice and data services. While different carriers have chosen different technology migration paths, which are described below,¹²⁵ all are in the process of upgrading their networks in order to improve capacity, increase their advanced service offerings, and/or provide compatibility for their roaming partners' customers. Furthermore, many carriers have continued to expand their networks in order to increase their competitiveness with more established operators.

1. Network Design

34. 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.¹²⁶ 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

¹²¹ Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems, ET Docket No. 00-258, *Third Report and Order, Third Notice of Proposed Rulemaking and Second Memorandum Opinion and Order*, 18 FCC Rcd 2223 (2003), *recon. pending*.

¹²² Amendments to Parts 1, 2, 27 and 90 of the Commission's Rules to License Services in the 216-220 MHz, 1390-1395 MHz, 1427-1429 MHz, 1429-1432 MHz, 1432-1435 MHz, 1670-1675 MHz, and 2385-2390 MHz Government Transfer Bands, WT Docket No. 02-8, *Report and Order*, 17 FCC Rcd 9980 (2002).

¹²³ *Id.*, at 9983.

¹²⁴ 1670-1675 MHz Band Auction Closes, *Public Notice*, DA 03-1472 (rel. May 2, 2003).

¹²⁵ See Section II.B.2, Network Technology, *infra*.

¹²⁶ 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 is equipped with its own radio transmitter/receiver antenna. Service regions are divided into cells so that individual radio frequencies may be used over and over again in different cells ("frequency reuse"), allowing for more calls in the system. When a person makes a call on a wireless phone, the message is transmitted to the nearest antenna, which connects with the local 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 antenna in the next cell. See *Sixth Report*, at 13361, note 55.

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.¹²⁷ 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 88 percent of all wireless subscribers using digital service.¹²⁸

2. Network Technology

35. 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").¹²⁹ As discussed in the *Seventh Report*, as a result 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.¹³⁰

36. Beyond the 2G digital technologies, mobile telephone carriers have been deploying next-generation network technologies¹³¹ that allow them to offer mobile data services at higher data transfer 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.¹³² GPRS's maximum data throughput rate is 115 kbps, but customers typically experience download speeds ranging from 30 to 60 kbps.¹³³ After

¹²⁷ See *Sixth Report*, at 13361.

¹²⁸ See Section II.C.1.b(i), *Subscriber Growth*, *infra*.

¹²⁹ See note 254 for a discussion of the cellular analog requirement and its sunset.

¹³⁰ See *Seventh Report*, at 13011.

¹³¹ 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 technologies, often labeled "2.5G." See *Seventh Report*, at 13038. Therefore, the *Eighth Report* uses a more general label to describe all of the technologies beyond 2G.

¹³² 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.

¹³³ *Id.*, at 13042-13043. T-Mobile USA, Inc. ("T-Mobile") advertises GPRS speeds of 56 kbps but also reports that its average GPRS user gets speeds around 40 kbps. AT&T Wireless Services, Inc. ("AT&T Wireless") reports that, during times of high usage, its GPRS users can download data at 20 to 30 kbps. 3G Americas states that GPRS's average, customer-experienced throughput is 30 to 40 kbps. See T-Mobile, *T-Mobile Internet Overview* (visited Jan. 24, 2003) <http://www.t-mobile.com/tmobile_internet/>; *U.S. Carriers' New Wireless*

rolling out GPRS, most U.S. TDMA/GSM carriers plan to deploy Enhanced Data Rates for GSM Evolution (“EDGE”) and eventually Wideband CDMA (“WCDMA,” also known as Universal Mobile Telecommunications System, or “UMTS”).¹³⁴ EDGE and WCDMA are expected to raise peak network speeds to 384-473 kbps and 2-2.4 Mbps, respectively.¹³⁵

37. 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 allows maximum data throughput rates of 144 kbps.¹³⁶ Actual download speeds range from 30 to 70 kbps.¹³⁷ 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,¹³⁸ respectively, and actual speeds ranging from 300 to 700 kbps.¹³⁹

C. CMRS Industry

1. Mobile Telephony Overview and Analysis

38. This report defines the mobile telephone sector to include all operators that offer commercially available, interconnected mobile voice services. These operators provide access to the public switched telephone network (“PSTN”) via mobile communication devices employing radiowave technology to transmit calls. As discussed above, providers using cellular radiotelephone, broadband PCS, and SMR licenses dominate this sector.¹⁴⁰ Because these licensees offer mobile telephone services that are essentially interchangeable from the perspective of most consumers, they are discussed in this report as a cohesive industry sector.

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

Networks Said to Barely Match Dial-Up Speeds, CTIA Daily News, Dec. 6, 2002 (citing ZDNET NEWS); 3G Americas LLC, *NOI Comments*, at 7 (filed Jan. 27, 2003) (“*3G Americas Comments*”).

¹³⁴ See Section II.C.1.b(vii), Technology Deployment, *infra*.

¹³⁵ *3G Americas Comments*, at 7. See *Seventh Report*, at 13044.

¹³⁶ See *Seventh Report*, at 12990.

¹³⁷ *Id.*, at 13042-13043. 3G Americas reports that 1xRTT’s customer-experienced data rate is 30 to 70 kbps. *3G Americas Comments*, at 7. Sprint PCS reports its mobile data customers using its 1xRTT network get average speeds of 50-70 kbps. Sprint Corp., SEC Form 10-K, Mar. 7, 2003, at 4.

¹³⁸ See *Seventh Report*, at 12990; CDMA Development Group, Inc., *NOI Comments*, at 6 (filed Jan. 27, 2003) (“*CDG Comments*”). CDMA2000 1xEV-DV provides a simultaneous voice and data upgrade and allows maximum data transfer speeds of 3.09 Mbps. *CDG Comments*, at 6.

¹³⁹ *Monet Launches 1x EV-DO Service*, News Release, Monet Mobile Networks, Nov. 4, 2002.

¹⁴⁰ See 47 C.F.R. §§ 22.900, 24.200, 90.601.

a. Market Structure

40. In the United States, there are six mobile telephone operators that analysts typically describe as nationwide: AT&T Wireless, Sprint PCS,¹⁴¹ Verizon Wireless, LLC (“Verizon Wireless”),¹⁴² T-Mobile,¹⁴³ Cingular Wireless, LLC (“Cingular Wireless” or “Cingular”),¹⁴⁴ and Nextel. When an operator is described as being “nationwide,” it does not necessarily mean that the operator’s license areas, service areas, or pricing plans cover the entire land area of the United States. The six mobile telephony carriers that analyst reports typically describe as nationwide all offer service in at least some portion of the western, midwestern, and eastern United States. In addition, each of the six national operators has networks covering at least 200 million people, while the next largest provider covers less than 60 million people.¹⁴⁵ In addition to the nationwide operators, there are a number of large regional players, including ALLTEL Corp. (“ALLTEL”), Western Wireless Corp. (“Western Wireless”), United States Cellular Corp. (“US Cellular”), and Dobson.

41. Since the end of 1999, carriers have been building nationwide footprints¹⁴⁶ through various forms of transactions.¹⁴⁷ One of the driving forces behind many of these transactions has been the desire of large regional carriers to enhance their ability to compete with existing nationwide operators that offer attractive nationwide pricing plans.¹⁴⁸ Also, as the Commission has previously concluded, operators with larger footprints can achieve certain economies of scale and increased efficiencies compared to operators with smaller footprints.¹⁴⁹ More recently, national operators have sought to fill in gaps in their coverage

¹⁴¹ Sprint PCS is a division of Sprint Corp. (“Sprint”). See Sprint Corp., SEC Form 10-K, Mar. 4, 2002, at 3.

¹⁴² Verizon Wireless is a joint venture of Verizon Communications, Inc. (“Verizon”) and Vodafone Group PLC (“Vodafone”). Verizon owns 55 percent of Verizon Wireless, and Vodafone owns 45 percent. See Verizon Communications, Inc., SEC Form 10-K, Mar. 20, 2002, at 10.

¹⁴³ T-Mobile USA, formerly known as VoiceStream Wireless Corp., is a wholly-owned subsidiary of Deutsche Telekom AG (“Deutsche Telekom”).

¹⁴⁴ Cingular Wireless is a joint venture of SBC Communications, Inc. (“SBC”) and BellSouth Corporation (“BellSouth”). See *Sixth Report*, at 13363-64.

¹⁴⁵ Colette M. Fleming *et al.*, *Wireless 411*, UBS Warburg, Equity Research, Jan. 22, 2003, at 15 (“*Wireless 411*”).

¹⁴⁶ Generally, “footprint” is an industry term of art referring to the total geographic area in which a wireless provider offers service or is licensed to offer service.

¹⁴⁷ The Commission must consent to the transfer of control or assignment of all spectrum licenses used to provide wireless telecommunications services. 47 C.F.R. § 1.948.

¹⁴⁸ See *Fifth Report*, at 17699 (For a complete discussion of the motivations for this phenomenon, see *Fourth Report*, at 10159-10160).

¹⁴⁹ See *Seventh Report*, at 12997. However, as we note in Section II.C.1.b(ix), Market Entry, *infra*, slightly less than 50 percent of the geographic area of the country still is served by two or fewer carriers. Based in part on that statistic, in the *Rural NOI*, the Commission asked whether the use of small geographic licensing areas stimulates competition in the provision of wireless services to rural populations. It also asked if there was any evidence that smaller geographic areas will result in more rapid deployment of services and whether rural carriers are better positioned to serve the needs of rural America than nationwide carriers. *Rural NOI*, at ¶ 19.

areas,¹⁵⁰ as well as to increase the capacity of their existing networks. Since the writing of the *Seventh Report*, a number of transactions between market participants have been announced. We discuss the transactions involving the largest impact, either through the exchange of subscribers or spectrum licenses, on the structure of the market below. In addition, we discuss some of the carriers that have declared bankruptcy and/or announced other restructuring plans during the past year.

(a) Sales and Swaps

42. *Verizon Wireless/Northcoast Communications* – On December 19, 2002, Verizon Wireless announced that it had signed an agreement with Northcoast Communications, LLC (“Northcoast”) to purchase 50 of Northcoast’s 56 PCS licenses, as well as related network assets, for approximately \$750 million in cash.¹⁵¹ The fifty 10-megahertz licenses cover roughly 47 million people in parts of the Midwest and East Coast, including New York and Boston.¹⁵² Verizon Wireless stated that the additional spectrum would help it to increase capacity on its network.¹⁵³ The deal did not include the Cleveland market, where Northcoast is currently providing service under the brand name “Northcoast PCS.”¹⁵⁴ The Wireless Telecommunications Bureau granted consent to the transaction on April 8, 2003.¹⁵⁵

43. *Triton PCS/Lafayette Communications* – During 2002, Triton PCS announced agreements to acquire substantially all of the spectrum licenses of its affiliate, Lafayette Communications (“Lafayette”).¹⁵⁶ Triton PCS completed the acquisition of nine Lafayette licenses in the third quarter of 2002, paid for with the extinguishment of approximately \$22 million in debt that Lafayette owed to Triton PCS.¹⁵⁷ Triton PCS said that the acquisition was undertaken to meet the spectrum needs of its

¹⁵⁰ For a more complete discussion of the motivations for this phenomenon, see *Fourth Report*, at 10159-10160.

¹⁵¹ *Verizon Wireless to Purchase From Northcoast Communications Spectrum Licenses Covering 50 U.S. Market*, News Release, Verizon Wireless, Dec. 19, 2002.

¹⁵² *Id.*

¹⁵³ *Id.*

¹⁵⁴ See Northcoast, *Coverage Area* (visited Jun. 23, 2003) <<http://www.northcoastpcs.com/NewFiles/Coverage%20Area.html>>. Of the other five licenses, one was already being transferred to Triton PCS, Inc. (“Triton PCS”) (see Application #0000967526, submitted July 7, 2002); the other four licenses were “closed” licenses from Auction 35, and as such Verizon Wireless was not eligible at that time to purchase them, if the company did want them (callsigns WPTS936, WPTS938, WPTS939, and WPTS941). See FCC, *Auction 35: C and F Block Broadband PCS Fact Sheet* (visited Mar. 17, 2003) <<http://wireless.fcc.gov/auctions/35/factsheet.html>>.

¹⁵⁵ Applications of Northcoast Communications, LLC and Celco Partnership d/b/a Verizon Wireless For Consent to Assignment of Licenses, *Memorandum Opinion and Order*, DA 03-1102 (rel. Apr. 8, 2003).

¹⁵⁶ Triton PCS holds a 39 percent interest in Lafayette. Triton PCS, Inc., SEC Form 10-K, Mar. 22, 2002, at 9.

¹⁵⁷ *Triton PCS Third-Quarter EBITDA Rises to a Record \$50.5 Million EBITDA Margin Soars to 27.1%*, News Release, Triton PCS, Oct. 23, 2002; Triton PCS, Inc., SEC Form 10-K, Mar. 25, 2003, at 6. The Commission granted consent to the license transfers in September 2002. Wireless Telecommunications Bureau Grants Consent To Assign C, E And F Block Broadband PCS Licenses, *Public Notice*, DA 02-2313 (rel. Sept. 18, 2002); Wireless

current network overlay of GSM/GPRS technology.¹⁵⁸ In the fourth quarter of 2002, Triton PCS entered into agreements with Lafayette for the acquisition of most of Lafayette's remaining spectrum licenses for approximately \$127 million.¹⁵⁹ The Wireless Telecommunications Bureau granted consent to the transactions on April 30, 2003.¹⁶⁰ During 2001, Lafayette had acquired PCS licenses covering a population of approximately 6.3 million people in areas of Georgia, South Carolina, Tennessee, and Virginia.¹⁶¹

44. *AT&T Wireless/US Cellular* – On March 10, 2003, AT&T Wireless and US Cellular announced that they had signed an agreement to swap licenses and assets across 15 states and covering more than 18 million people.¹⁶² In this transaction, US Cellular is acquiring PCS licenses (but no networks) in 13 states in the Midwest and Northeast covering 16.6 million people, as well as \$31 million in cash.¹⁶³ AT&T Wireless is acquiring cellular licenses in Florida and Georgia, covering about 1.5 million people, as well as network facilities and 141,000 customers.¹⁶⁴ The acquisition fills a gap in AT&T Wireless's network¹⁶⁵ and may reduce the company's roaming expenses in Florida.¹⁶⁶ The deal, pending regulatory approval, is expected to close in the second half of 2003.¹⁶⁷

(b) Joint Ventures

45. *Cingular Wireless/AT&T Wireless* – As discussed in the *Seventh Report*, in January 2002, Cingular Wireless and AT&T Wireless announced the formation of an infrastructure joint venture to build

Telecommunications Bureau Assignment of Authorization and Transfer of Control Applications Action, *Public Notice*, DOC-226335 (rel. Sept 18, 2002).

¹⁵⁸ Triton PCS, Inc., SEC Form 10-K, Mar. 25, 2003, at 35.

¹⁵⁹ *Id.*

¹⁶⁰ Wireless Telecommunications Bureau Grants Consent to Assign C Block Broadband PCS Licenses, *Public Notice*, DA 03-1451 (rel. Apr. 30, 2003).

¹⁶¹ Triton PCS, Inc., SEC Form 10-K, Mar. 22, 2002, at 9.

¹⁶² *AT&T Wireless, U.S. Cellular Swap Wireless Licenses, Markets*, News Release, AT&T Wireless, Mar. 10, 2003.

¹⁶³ Colette Fleming *et al.*, *US Cellular and AT&T Wireless Swap Properties*, UBS Warburg, Equity Research, Mar. 11, 2003, at 2.

¹⁶⁴ *Id.*

¹⁶⁵ *AT&T Wireless, U.S. Cellular Swap Wireless Licenses, Markets*, News Release, AT&T Wireless, Mar. 10, 2003.

¹⁶⁶ “[US Cellular] management said that the Florida markets involved in this transaction have [AT&T Wireless] markets surrounding it and that [AT&T Wireless] was a large contributor to the properties’ revenues. [US Cellular] also said that the level of roaming in these markets was above the company average of roughly 10% - 12%.” Colette Fleming *et al.*, *US Cellular and AT&T Wireless Swap Properties*, UBS Warburg, Equity Research, Mar. 11, 2003, at 2.

¹⁶⁷ *AT&T Wireless, U.S. Cellular Swap Wireless Licenses, Markets*, News Release, AT&T Wireless, Mar. 10, 2003.

out a GSM/GPRS network along 3,000 miles of interstate highways predominantly in western and midwestern states.¹⁶⁸ The companies have since expanded the venture to include highways in New England, increasing the coverage of the joint venture to more than 4,000 miles of roads.¹⁶⁹ The companies also recently announced a new agreement to reduce roaming costs on each other's networks.¹⁷⁰

46. *AT&T Wireless/Sprint PCS* – In January 2003, AT&T Wireless and Sprint PCS signed an agreement through which they will cooperate in the construction of new wireless towers.¹⁷¹ Under the terms of the agreement, the companies will share information about their current tower inventories and future construction plans.¹⁷² This includes identifying areas of overlap; determining which company will build and maintain the tower; and deciding which will co-locate its network facilities on it.¹⁷³ The companies claim that the arrangement will enable them to reduce the number of towers needed and the associated capital expenditures, thus enhancing their wireless footprints faster and at lower cost.¹⁷⁴

47. *Cingular Wireless/T-Mobile* – As mentioned in the *Seventh Report*, Cingular Wireless and T-Mobile (then known as VoiceStream) announced an infrastructure sharing joint venture in October 2001 whereby the companies would share their existing GSM networks in California, Nevada, and New York.¹⁷⁵ Since then, in July 2002, T-Mobile launched service in California and Nevada (where Cingular already offered service), while Cingular launched service in New York City (where T-Mobile already offered service).¹⁷⁶

(c) Restructurings

48. *Leap Bankruptcy* – On April 13, 2003, Leap Wireless International, Inc. (“Leap”)¹⁷⁷ filed a voluntary petition for reorganization under Chapter 11 of the U.S. Bankruptcy Code in the United States

¹⁶⁸ See *Seventh Report*, at 13001. The Wireless Telecommunications Bureau granted consent to the transaction on February 12, 2003. Wireless Telecommunications Bureau Grants Consent for the Full and Partial Assignment and Transfer of Control of Licenses to Implement GSM Corridor, LLC Joint Venture, *Public Notice*, DA 03-418 (rel. Feb. 12, 2003).

¹⁶⁹ *AT&T Wireless and Cingular Wireless Complete Joint Venture*, News Release, AT&T Wireless, Mar. 13, 2003.

¹⁷⁰ *AT&T Wireless and Cingular Wireless Strike Accord Designed To Lower Costs, Improve Quality and Encourage Expansion Of GSM/GPRS Coverage Nationwide*, News Release, AT&T Wireless, Mar. 17, 2003.

¹⁷¹ *AT&T Wireless and Sprint to Cooperate in the Construction of New Wireless Towers*, News Release, AT&T Wireless, Jan. 28, 2003.

¹⁷² *Id.*

¹⁷³ *Id.*

¹⁷⁴ *Id.*

¹⁷⁵ See *Seventh Report*, at 13001.

¹⁷⁶ *T-Mobile Launches Wireless Service in California and Nevada*, News Release, T-Mobile, July 18, 2002; *Cingular Wireless Debuts in New York City*, News Release, Cingular, July 11, 2002.

¹⁷⁷ See Section II.C.1.d(ii), *Wireless Alternatives*, *infra*, for a discussion of Leap's service offerings.

Bankruptcy Court for the Southern District of California.¹⁷⁸ Based on Leap's fiscal 2002 results, the company's net loss for 2002 was \$664.8 million on revenues of \$618.5 million, with debt of almost \$2.5 billion.¹⁷⁹ The company stated that daily operations will continue during reorganization, and that it does not expect to implement any organization changes or dismiss employees as a result of the filing.¹⁸⁰ The company also expects that, under any plan of reorganization agreed to with its creditors, there will be little or no value left in the company for common stockholders.¹⁸¹ Leap's stock was delisted from the NASDAQ stock exchange in December 2002.¹⁸²

49. *Ntelos Bankruptcy* – Ntelos, Inc. (“Ntelos”) filed for Chapter 11 bankruptcy protection in the U.S Bankruptcy Court for the Eastern District of Virginia on March 4, 2003.¹⁸³ Ntelos, which had 266,000 wireless customers at the end of 2002 in Virginia, West Virginia, Kentucky, Tennessee, and North Carolina, had missed interest payments of more than \$24 million on loans from commercial debt holders in February 2003.¹⁸⁴ Under the terms of its loan agreements, Ntelos had a 30-day grace period before it was considered to be in default.¹⁸⁵ The company does not expect the bankruptcy filing to affect its operations.¹⁸⁶

50. *iPCS Bankruptcy* – On February 24, 2003, Sprint PCS affiliate AirGate PCS, Inc. (“AirGate”) announced that its wholly-owned subsidiary, iPCS Inc. (“iPCS”) filed a Chapter 11 bankruptcy petition in the United States Bankruptcy Court for the Northern District of Georgia.¹⁸⁷ At the time of its acquisition by AirGate in November 2001,¹⁸⁸ iPCS had licenses covering more than 7.4 million people in Illinois, Michigan, Iowa, and eastern Nebraska, and served roughly 30,000 customers.¹⁸⁹

¹⁷⁸ *Leap Moves to Reorganize Capital Structure*, News Release, Leap, Apr. 14, 2003. On May 23, 2003, Leap filed its amended Plan of Reorganization with the bankruptcy court.

¹⁷⁹ Leap Wireless International, Inc., SEC Form 10-K/A, Apr. 16, 2003, at 56-57. Debt level is as of December 30, 2002.

¹⁸⁰ *Leap Moves to Reorganize Capital Structure*, News Release, Leap, Apr. 14, 2003.

¹⁸¹ *Id.*

¹⁸² *Leap Files for Chapter 11 Bankruptcy*, SAN DIEGO DAILY, Apr. 14, 2003; Mike Dano, *Rollercoaster Continues for Carriers*, RCR WIRELESS NEWS, Dec. 16, 2002, at 1.

¹⁸³ *NTELOS Takes Another Step Toward Comprehensive Financial Restructuring Plan*, News Release, Ntelos, Mar. 4, 2003.

¹⁸⁴ *NTELOS in Active Discussions with Debtholders*, News Release, Ntelos, Feb. 18, 2003.

¹⁸⁵ *Id.*

¹⁸⁶ *NTELOS Takes Another Step Toward Comprehensive Financial Restructuring Plan*, News Release, Ntelos, Mar. 4, 2003.

¹⁸⁷ *AirGate PCS Subsidiary iPCS, Inc. Files Chapter 11 Reorganization Proceeding*, News Release, AirGate, Feb. 24, 2003.

¹⁸⁸ *See Seventh Report*, at 12999.

¹⁸⁹ *AirGate PCS, Inc. Announces Stockholder Approval of Merger With iPCS, Inc.*, News Release, AirGate, Nov. 27, 2001; *AirGate PCS, Inc. Completes Merger With iPCS, Inc.; Combined Company Guidance Provided for First Fiscal Quarter of 2002*, News Release, AirGate, Nov. 30, 2001.

51. *NextWave Telecommunications Inc. and NextWave Power Partners, Inc.* (“NextWave”) – NextWave, a wireless carrier with 95 C, D, E and F block PCS licenses covering 174 million POPs, recently announced that it will move forward with its bankruptcy reorganization efforts.¹⁹⁰

(d) Withdrawn IPO

52. On January 29, 2003, Verizon announced that Verizon Wireless had withdrawn its registration for an initial public offering (“IPO”).¹⁹¹ Verizon Wireless filed the initial registration statement on August 24, 2000.¹⁹² Verizon said that the IPO was no longer needed because of strong cash flow at Verizon Wireless and its lack of significant funding requirements.¹⁹³

(e) Affiliations

53. Three of the nationwide operators also have extended their coverage through contractual affiliations with smaller carriers. These affiliations create a “family” of operating companies with much closer relationships than those formed by traditional roaming agreements.¹⁹⁴ All of these affiliations were established to accelerate the build-out of the larger companies’ networks by granting smaller affiliates the exclusive right to offer mobile services for those companies, in some cases under the larger companies’ brand names, in selected mid-sized and smaller markets.¹⁹⁵

54. *AT&T Wireless* – The AT&T Wireless family consists of AT&T Wireless, as well as its affiliations with two companies: Triton PCS and Edge Wireless, LLC (“Edge”).¹⁹⁶ In the case of Triton

¹⁹⁰ Mary Greczyn, *Nextwave Seeks Court Approval for Partnership to Buy Spectrum*, COMMUNICATIONS DAILY, Jun. 2, 2003, at 4; *Cingular Could Be First at Nextwave Spectrum Trough*, WIRELESS DATA NEWS, Jun. 4, 2003.

¹⁹¹ *Verizon Communications Reports Strong Yearly Operational Growth and Gives Outlook for 2003*, News Release, Verizon, Jan. 29, 2003.

¹⁹² *See* Verizon Wireless, LLC, SEC Form S-1, filed Aug. 24, 2000.

¹⁹³ *Verizon Communications Reports Strong Yearly Operational Growth and Gives Outlook for 2003*, News Release, Verizon, Jan. 29, 2003.

¹⁹⁴ *See* Section II.C.1.c(ii), Roaming, *infra*.

¹⁹⁵ *See, e.g.*, Nextel, Automatic and Manual Roaming Obligations Pertaining to Commercial Mobile Radio Services, WT Docket No. 00-193, *Comments*, at note 20 (filed Jan. 5, 2001) (“To facilitate rapid deployment of its network throughout suburban, tertiary and rural areas of the country and move towards more ubiquitous nationwide service, Nextel entered into an agreement with Nextel Partners . . . to construct iDEN coverage using Commission licensed frequencies disaggregated by Nextel to [Nextel Partners], and offering its services to the public under the Nextel brand according to strict service quality standards.”).

¹⁹⁶ In addition, AT&T Wireless has close relationships with a number of other operators. AT&T Wireless and Dobson own equal interests in a joint venture, ACC Acquisitions, LLC (“ACC”), which provides service primarily in rural and suburban areas of the midwestern and eastern United States. Dobson Communications Corporation, SEC Form 10-K, Apr. 1, 2002, at 72. Dobson operates the ACC markets under the brand name Cellular One. Dobson Communications Corporation, SEC Form 10-K, Apr. 1, 2002, at 3, 8. AT&T Wireless owns approximately 12 percent of Dobson. On December 2002, as part of a license swap with Dobson, AT&T Wireless agreed to transfer to Dobson its shares of Dobson Series AA preferred stock, which AT&T Wireless Services purchased in

PCS, AT&T Wireless sold portions of some of its broadband PCS licenses to the company in exchange for a minority ownership interest.¹⁹⁷ While Triton PCS is marketed under the brand name SunCom¹⁹⁸ and Edge is marketed under its own name, both companies provide service as a “Member of the AT&T Wireless Network.” These affiliates, like AT&T Wireless, have committed to upgrading their TDMA networks to GSM/GPRS.¹⁹⁹

55. *Nextel* – The Nextel family consists of Nextel and Nextel Partners, Inc. (“Nextel Partners”). In an arrangement similar to that of AT&T Wireless with its affiliates,²⁰⁰ in 1999, Nextel sold some of its SMR licenses to Nextel Partners in exchange for a minority ownership interest in the company.²⁰¹ Nextel Partners is building out an iDEN network compatible with Nextel’s, and Nextel assists Nextel Partners in obtaining terms similar to those Nextel receives from vendors for equipment and services.²⁰² Both Nextel and Nextel Partners market their services under the Nextel brand name.

56. *Sprint PCS* – The Sprint PCS family consists of Sprint PCS and 10 affiliates.²⁰³ Each of the affiliates has an agreement with Sprint PCS to use the latter’s PCS licenses to deploy CDMA technology and Sprint PCS-branded service in specific areas of the country.²⁰⁴ In return, Sprint PCS receives 8

February 2001. Without the preferred stock, AT&T Wireless’s ownership in Dobson will drop from approximately 12.7 percent to 5.0 percent. AT&T Wireless Services, Inc., SEC Form 10-K, filed Mar. 25, 2003, at 108, 112. Cincinnati Bell Wireless, LLC (“Cincinnati Bell Wireless”) is a joint venture of Broadwing, Inc. (“Broadwing”) and AT&T Wireless, in which AT&T Wireless owns 19.9 percent and Broadwing owns the remaining 80.1 percent. Broadwing, Inc., SEC Form 10-K, Mar. 31, 2003, at 6. Cincinnati Bell Wireless services are sold under the Cincinnati Bell Wireless brand name. AT&T Wireless also has interests in a number of other broadband PCS licensee holders, including Cascade Wireless, LLC (85 percent), Lewis & Clark Communications, LLC (49.9 percent), and Alaska Native Wireless, LLC (38.2 percent). AT&T Wireless, FCC Form 602 (filed Mar. 10, 2003).

¹⁹⁷ AT&T Wireless owns 15.7 percent of Triton PCS and 40 percent of Edge. AT&T Wireless, FCC Form 602 (filed Mar. 10, 2003).

¹⁹⁸ Suncom, *Suncom Fact Sheet* (visited Mar. 19, 2003) <http://www.suncom.com/pr_news/index.html>.

¹⁹⁹ *Triton PCS First-Quarter EBITDA More Than Triples to \$36 Million; EBITDA Margin Rises to 23.7%; Revenue Increases 40% While Churn Declines to 1.88*, News Release, Triton PCS, May 8, 2002; Sue Marek, *Creating Rural E911 Solutions*, WIRELESS WEEK, Jun. 3, 2002, at 38.

²⁰⁰ For a comparison of the affiliate arrangements of AT&T, Nextel, and Sprint PCS, see Luiz Carvalho *et al.*, *Triton PCS*, Morgan Stanley, Equity Research, Mar. 5, 2003, at 2 (Exhibit 1: Difference Among the Affiliates).

²⁰¹ Nextel Partners, Inc., SEC Form 10-K, Mar. 22, 2002, at 4. Nextel owns 32 percent of Nextel Partners. Nextel, FCC Form 602 (filed Jan. 1, 2003).

²⁰² Nextel Partners, Inc., SEC Form 10-K, Mar. 22, 2002, at 3.

²⁰³ Five are public companies and five are privately-held. Cannon Carr *et al.*, *Avoiding the Hotel California: An Equity /High Yield Wireless Weekly*, CIBC World Markets, Apr. 7, 2003, at 4.

²⁰⁴ See, e.g., US Unwired Inc., SEC Form 4249(B)(1), May 17, 2000, at 7. In addition, Sprint PCS affiliate Horizon PCS has an agreement with Ntelos where Ntelos committed to build and maintain a network in certain markets and provide service at wholesale rates to Horizon PCS. See Ric Prentiss, *Ntelos*, Raymond James & Associates, Equity Research, Dec. 27, 2001, at 19-20. In March 2002, Ntelos CEO James Quarforth characterized the arrangement as a “network-sharing agreement.” Sue Marek, *Auction Winners Turn Spectrum Into Cash*, WIRELESS WEEK, Mar. 18, 2002, at 1.

percent of the affiliates' local service revenue.²⁰⁵ In addition, Sprint PCS performs back-office tasks at cost for most of its affiliates, giving them the benefits of economies of scale for billing and customer service.²⁰⁶ Sprint PCS affiliates now provide service to more than 2.5 million subscribers.²⁰⁷

b. Market Performance

57. Using the various information sources described in the introduction – the publicly-available sources used in several previous reports, the NRUF database, as well as the data and statements provided at the Public Forum and in the *NOI* comments – we have been able to examine in this report several structural and performance measures of competition in the CMRS industry. Some of the key metrics reported by mobile telephone operators, such as subscriber growth, average monthly usage per subscriber, and average revenue per subscriber, while not individually indicative of competition *per se*, demonstrate the increased demand for and reliance placed on mobile telephony services over the past year. Moreover, it is the totality of the circumstances – including prices, the number of competitors, investment levels, and churn rates, as well as the other metrics listed above – that shows the extent of competition in the growing CMRS industry. Continued downward price trends, the continued expansion of mobile networks into new and existing markets, high rates of investment, and churn rates of about 30 percent, when considered together with the other metrics, demonstrate a high level of competition for mobile telephone consumers. We examine these different metrics because each one highlights a different aspect of the industry, and collectively provide a fuller picture of the state of competition.

(i) Subscriber Growth

58. In 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,²⁰⁸ tracks phone number usage information for the United States.²⁰⁹ All

²⁰⁵ Sprint PCS said it received \$160 million in affiliate fees during 2002. Linda J. Mutschler *et al.*, *Sprint PCS*, Merrill Lynch, Equity Research, Feb. 6, 2003, at 3.

²⁰⁶ Ric Prentiss, *Sprint PCS*, Raymond James, Equity Research, Feb. 19, 2002, at 4. Sprint PCS says it received \$260 million in such payments in 2002. Linda J. Mutschler *et al.*, *Sprint PCS*, Merrill Lynch, Equity Research, Feb. 6, 2003, at 3.

²⁰⁷ *Sprint Reports Fourth Quarter and Full-Year 2002 Results*, News Release, Sprint PCS, Feb. 15, 2003 (data from accompanying related tables, *Sprint Corporation PCS Group: Net Customer Additions* (visited Mar. 19, 2003) <<http://www.sprint.com/sprint/ir/fn/qe/4q02.pdf>>).

²⁰⁸ 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, 2002 filings, operators reported that they served 136 million subscribers. *See* Appendix D, Table 2, at D-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).

²⁰⁹ 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

mobile wireless carriers must report to the FCC which of their phone numbers have been assigned to end-users, thereby permitting the Commission to make more accurate estimates regarding subscribership.²¹⁰ In previous years, for purposes of this report, the Commission had relied on national subscribership data from a highly-respected survey conducted by CTIA.²¹¹ 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.²¹²

59. As of December 2002, we estimate that there were 141.8 million mobile telephone subscribers,²¹³ which translates into a nationwide penetration rate of roughly 49 percent.²¹⁴ While this increase of 13.3 million subscribers²¹⁵ from the estimate of 128.5 million in 2001 is significant, it is only a 10 percent increase from the previous year and continues the leveling off of wireless growth the Commission noted in the *Seventh Report*.²¹⁶

because a premature exhaust of area codes imposes significant costs on consumers, the Commission has taken a number of steps to ensure that the limited numbering resources are used efficiently. Among other things, the Commission requires carriers to submit data on numbering resource utilization and forecasts twice a year. Federal Communications Commission, *Numbering Resource Utilization in the United States as of June 30, 2001* (Nov. 2001), at 1, 2. This information is submitted to the FCC on Form 502. *Id.*

²¹⁰ Federal Communications Commission, *Numbering Resource Utilization in the United States as of June 30, 2001* (Nov. 2001), at 1, 2. An assigned number is one that is in use by an end-user customer. Federal Communications Commission, *Numbering Resource Utilization in the United States as of June 30, 2001* (Nov. 2001), at 3. Carriers also report other phone number categories, including: intermediate – numbers given to other companies; aging – numbers held out of circulation; administrative – numbers for internal uses; reserved – numbers reserved for later activation; and available – numbers available to be assigned. *Id.* Assigned numbers are not necessarily from facilities-based carriers. A reseller can assign a number to an end user. This does not double-count in the assigned total, since the facilities-based carrier only counts that number as an “intermediate” number given to the reseller. *Id.*

²¹¹ See CTIA, *Wireless Industry Indices: Semi-Annual Data Survey Results* (results through December 2002) (“*Dec 2002 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. *CTIA Comments*, at 3; see also, *Dec 2002 CTIA Survey*, at 17-21.

²¹² The advantages of NRUF data over CTIA’s survey are discussed in the *Seventh Report*, at 13004.

²¹³ FCC, based on preliminary year-end 2002 filings for Numbering Resource Utilization in the United States.

²¹⁴ 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, 2002 was estimated to be 292.2 million. See U.S. Census Bureau, *Population Estimates* (visited Mar. 18, 2003) <<http://eire.census.gov/popest/estimates.php>>.

²¹⁵ The number of subscribers refer to the number of separate wireless accounts. A particular individual may have more than one wireless account.

²¹⁶ See *Seventh Report*, at 13005. The difficulty in acquiring new subscribers can be seen in that two nationwide operators, both for the first time, had quarters in 2002 in which they experienced net losses in

60. CTIA's estimate for year-end 2002 was 140.8 million subscribers, a 10 percent increase over its estimate of 128.4 million subscribers as of year-end 2001.²¹⁷ CTIA's absolute increase of 12.4 million subscribers represents the smallest 12-month increase in subscribership in the last five years, and the 10 percent increase was the smallest growth rate in subscribership since the survey began.²¹⁸ The large absolute number of new subscribers indicates the continued demand for mobile wireless service. Analysts believe that one reason for the slowdown in subscriber additions may be the industry's current focus on profitability rather than expansion of its subscriber base or revenue growth.²¹⁹

61. Digital subscribers made up approximately 88 percent of all wireless subscribers at the end of 2002, up from 80 percent at the end of 2001.²²⁰ During 2002, the number of customers subscribing to digital services climbed 21 percent, from approximately 102 million to 125 million.²²¹ Approximately 17 million mobile telephony subscribers are analog only, a drop of 34 percent from 2001.²²²

(ii) Regional Penetration Rates

62. 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.²²³ EAs, which

subscribers. COMMUNICATIONS DAILY, Oct. 29, 2002, at 5. In the third quarter, Sprint PCS lost 78,000 customers, while Cingular lost 107,000 customers in the third quarter and an additional 151,000 customers in the fourth quarter. Both companies still had positive net subscriber growth for the year. Luiz Carvalho *et al.*, *Wireless Tracker: Results Speak the Loudest*, Morgan Stanley, Equity Research, Mar. 17, 2003, at 25.

²¹⁷ See Appendix D, Table 1, at D-2.

²¹⁸ *Id.*

²¹⁹ See, e.g., Luiz Carvalho *et al.*, *3Q02 Preview: Subs Slow, Cash Grows*, Morgan Stanley, Equity Research, Oct. 9, 2002, at 3 ("top line growth of the industry is slowing significantly as the industry focuses more on profitability than on revenue or subscriber growth"). See also, Section II.C.1.b(vi), Capital Expenditures, *infra*. One analyst argues subscriber growth is slowing due to the high cost of acquiring new customers (cost per gross addition, or "CPGA"): "[U]ntil operators can lower their cost to add a new subscriber, it will not be profitable for the operators to go after the lower ARPU or high credit risk customers. As the United States nears 50% penetration, it could easily be argued that the incremental subscriber is probably less valuable than the customers that already have wireless service." Colette Fleming *et al.*, *3Q02 Wireless 411 – Outlook*, UBS Warburg, Equity Research, Jan. 23, 2003, at 1.

²²⁰ Linda Mutschler *et al.*, *The US Wireless Matrix*, Merrill Lynch, Equity Research, Mar. 19, 2003, at 15 ("ML Matrix"). CTIA found a similar rate: Almost 89 percent of subscribers of responding carriers in its YE2002 survey were digital (CTIA does not estimate the digital percentage for its total estimate of subscribers). CTIA, *Digital Migration Keeps a Steady Pace* (visited Mar. 19, 2003) <http://www.wow-com.com/images/survey/2003/752x571/Digital_Migration_2002_Slide_9.gif>.

²²¹ Based on *ML Matrix* digital penetration rates.

²²² Subscribers that can access both the digital and analog networks of carriers are considered to be digital subscribers.

²²³ 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 20,000 rate centers in the country. Rate center boundaries generally do not coincide with county boundaries. However, for

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.²²⁴ 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.²²⁵ Thus, an EA would seem to capture the market where the average person would use his or her mobile phone most of the time – around work, around home, and all of the places in between. Second, wireless carriers have considerable discretion in how they assign telephone numbers across the rate centers in their operating areas.²²⁶ In other words, a mobile telephone subscriber can be assigned a phone number associated with a rate center that is a significant distance away from the subscriber's place of residence (but generally still in the same EA).²²⁷

63. Regional penetration rates for the 172 EAs covering the 50 United States, sorted by EA population density, can be seen in Appendix D, Table 3.²²⁸ The rates range from a high of 62 percent in the Atlanta, GA-AL-NC (EA 40) and the Fort Myers-Cape Coral, FL (EA 32) EAs, to a low of 11 percent in the Northern Michigan, MI EA (EA 58). Forty EAs, with a combined population of over 170 million, have penetration rates of over 50 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 56 percent. As previously stated based on an analysis of NRUF data, the national penetration rate is 49 percent.

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.

²²⁴ There are 172 EAs, each of which is an aggregation of counties. See Kenneth P. Johnson, *Redefinition of the BEA Economic Areas*, SURVEY OF CURRENT BUSINESS, Feb. 1995, at 75. For its spectrum auctions, the FCC has defined four additional EAs: Guam and the Northern Mariana Islands (173); Puerto Rico and the U.S. Virgin Islands (174); American Samoa (175); and Gulf of Mexico (176). See FCC, *FCC Auctions: Maps* (visited Mar. 25, 2002) <<http://wireless.fcc.gov/auctions/data/maps.html>>.

²²⁵ Kenneth P. Johnson, *Redefinition of the BEA Economic Areas*, SURVEY OF CURRENT BUSINESS, Feb. 1995, at 75.

²²⁶ 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%.”).

²²⁷ “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.

²²⁸ See also, Appendix F, Map 4, at F-5.

(iii) Minutes-of-Use

64. Wireless subscribers continue to increase the amount of time they communicate using their wireless phones. Average minutes-of-use per subscriber per month (“MOUs”) continued a rapid rise in 2002, to 492 minutes, or more than 8 hours for the average subscriber of a nationwide operator in the last quarter of the year.²²⁹ Increasing MOUs most likely are a result of the decreasing prices and the wider acceptance of and reliance upon wireless service.²³⁰

65. According to CTIA, MOUs averaged 427 between June and December 2002, an increase of 12 percent from 380 average MOUs during the same period in 2001, and an increase of 67 percent from an average of 255 MOUs from the same period in 2000.²³¹ Other analysts also report higher MOUs in 2002. Paul Kagan and Associates estimated MOUs of 509 in mid-2002, an increase of 21 percent from 422 in mid-2001.²³² J.D. Power and Associates estimated 541 MOUs, an increase of 28 percent from 422 a year earlier.²³³

66. Operators with all-digital networks tended to have the highest MOUs, while regional operators, Verizon Wireless, and Cingular, which provide service to relatively large numbers of analog subscribers, had relatively lower levels.²³⁴ One analyst claims that this trend is due to averaging of much lower-usage analog subscribers in the latter’s subscriber bases.²³⁵

(iv) Average Revenue Per Unit

67. One financial metric widely used in analyzing the mobile telephone sector is average monthly revenue per subscriber (often referred to as average revenue per unit, or “ARPU”). CTIA’s estimate of ARPU decreased almost continuously between December 1988 and December 1998, when it reached a low of \$39.43.²³⁶ However, since 1999, ARPU has been increasing, rising to \$48.40 in December 2002, a

²²⁹ Luiz Carvalho *et al.*, *Wireless Pricing: Better Days Ahead*, Morgan Stanley, Equity Research, Mar. 3, 2003, at 7.

²³⁰ *See also*, Linda Mutschler *et al.*, *The Next Generation VII*, Merrill Lynch, Equity Research, Feb. 21, 2003, at 28-29, 38-42 (“*NextGen VII*”).

²³¹ *Dec 2002 CTIA Survey*, at 208. 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.

²³² Paul Kagan Associates, Inc., *Average Subscriber Talks 500 Minutes/Month*, WIRELESS MARKET STATS, Sept. 25, 2002, at 8 (weighted average, based on carriers’ reported MOUs, included Canadian operators).

²³³ Dennis K. Berman, *We May Be Reaching Limit For Yakking on Our Phones*, WALL STREET JOURNAL ONLINE, Dec. 23, 2002 (citing J.D. Power and Associates); *Wireless Phone Penetration Among U.S. Households Climbs Above 50 Percent As More First-Time Subscribers Enter the Marketplace*, News Release, J.D. Power and Associates, Sept. 26, 2001 (based on survey responses from 14,492 households in 25 of the largest U.S. markets).

²³⁴ *Wireless 411*, at 56.

²³⁵ *Id.*, at 52.

²³⁶ *See* Appendix D, Table 1, at D-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 2002 CTIA Survey*, at 184. CTIA defines an alternative measure of ARPU, which includes

23 percent increase during the last four years, but only a rise of 2 percent from \$47.37 in December 2001. This trend is evident even though per-minute prices declined throughout this period.²³⁷ 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.²³⁸

(v) Churn

68. 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.²³⁹ Most carriers report churn rates between 1.5 percent and 3 percent per month.²⁴⁰ At current rates, more than 30 percent of subscribers change service providers each year.²⁴¹ Average monthly churn rates for mobile telephone service have remained fairly constant over the past three years.²⁴²

69. Consistent with findings in previous reports, customers indicated cost and network quality as the main reasons for changing providers.²⁴³ A survey conducted in 2002 by the Yankee Group research firm found that 26 percent of wireless subscribers claimed pricing played the largest role in whether they would switch carriers, while 20 percent felt improved coverage was the most important issue.²⁴⁴ Phone

roaming revenues but not toll revenue. For a comparison between these two measures, see *Dec 2002 CTIA Survey*, at 185. See also, Linda J. Mutschler *et al.*, *Wireless Services: What Is Included in ARPU?*, Merrill Lynch, Equity Research, Jan. 24, 2003, for a discussion of what nationwide operators include in their estimates of ARPU. For most nationwide carriers, reported ARPU consists of roughly 70 to 80 percent monthly access fees, with overage and other fees (such as late fees, roaming, data/text messaging, long distance, and various regulatory fees) making up the rest.

²³⁷ See Section II.C.1.c, Pricing Data and Trends, *infra*.

²³⁸ Regardless of whether customers use the large bundles of minutes included with such plans, the higher monthly access fees increase operators' ARPU figures.

²³⁹ This assumes that each churned customer is a unique individual and that the same customers do not churn multiple times.

²⁴⁰ Paul Kagan Associates, Inc., *Churn Up For Four of Six National Carriers*, WIRELESS MARKET STATS, Dec. 12, 2002, at 4. In the third quarter of 2002, churn increased for three of the nationwide carriers, as Sprint PCS dealt with non-paying Clear Pay subscribers, and AT&T Wireless and Cingular disconnected WorldCom subscribers from their bases. Luiz Carvalho *et al.*, *Wireless Tracker: Cash Flow Matters Most*, Morgan Stanley, Equity Research, Dec. 11, 2002, at 7. See Section II.C.2, Resellers, *infra*.

²⁴¹ Paul Kagan Associates, Inc., *Churn Up For Four of Six National Carriers*, WIRELESS MARKET STATS, Dec. 12, 2002, at 4 (average includes Canadian operators).

²⁴² Colette M. Fleming *et al.*, *Wireless 411*, UBS Warburg, Equity Research, Jun. 2, 2003, at 28.

²⁴³ See *Sixth Report*, at 13372-73; *Seventh Report*, at 13007.

²⁴⁴ Dan Meyer, *More Satisfied Users, But Customer Care Remains Lead Complaint*, RCR WIRELESS NEWS, Jun. 10, 2002, at 18 (citing Yankee Group).

upgrade programs came in third with 14 percent, and loyalty programs came in fourth with 13 percent of survey respondents.²⁴⁵ One Yankee Group analyst claimed that it only took a 10 to 15 percent price difference to lure wireless subscribers to another carrier.²⁴⁶

(vi) Capital Expenditures

70. Capital expenditures, alternatively called “capital spending” or abbreviated to “capex,” is the amount of money spent during a particular period to acquire or improve long-term assets such as property, plant, or equipment.²⁴⁷ In the mobile telephone industry, capex consists primarily of spending to expand and 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).²⁴⁸ One analyst estimated that the wireless industry spent roughly \$25 billion on capex in 2002, a decline of 7 percent from the \$27 billion spent in 2001, but still 14 percent more than the \$22.3 billion spent in 2000, and almost twice as much, \$10 billion more, than was spent in 1999.²⁴⁹ In fact, in 2002, carriers spent more on capex than in any other year with the exception of 2001.²⁵⁰ As one analyst noted, “carriers are still investing heavily in their networks.”²⁵¹ The analyst attributed the recent slowdown in capex spending to smaller subscriber growth, near completion of network expansions and upgrades, and lower network equipment prices.²⁵² Another analyst attributed the carriers’ recent focus on profitability as contributing to the decline in capital spending.²⁵³

²⁴⁵ *Id.*

²⁴⁶ Jay Lyman, *Switching Cell Phone Providers – Why Bother?*, WIRELESS NEWSFACTOR, Oct. 15, 2002 (citing Roger Entner of Yankee Group).

²⁴⁷ 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.

²⁴⁸ Verizon Wireless says that capacity capex now represents more than 50 percent of the company’s total capex. Luiz Carvalho *et al.*, *Wireless Capex Conference Supports Thesis*, Morgan Stanley, Equity Research, Feb. 4, 2003, at 3. Sprint PCS also finds usage growth to be the main driver of capex. Luiz Carvalho *et al.*, *Wireless Capex Conference Supports Thesis*, Morgan Stanley, Equity Research, Feb. 4, 2003, at 2.

²⁴⁹ Simon Flannery, Luiz Carvalho *et al.*, *US Telecom Team Quarterly Results Preview and '03 Outlook*, Morgan Stanley, Equity Research – Industry Report, Jan. 13, 2003, at 19; Ric Prentiss *et al.*, *4Q02 Wireless Preview: Holiday Punch Has Indeed Gone Flat*, Raymond James & Associates, Equity Research, Jan. 21, 2003, at 2. Since 1996, capital spending on wireless networks has grown at nearly three times the rate of growth of spending on wireline. Health of the Telecommunications Sector: A Perspective from Investors and Economists, before the House Subcommittee on Telecommunications and the Internet, 108 Cong. (Feb. 5, 2003) (statement of Blake Bath, Managing Partner, Lehman Brothers).

²⁵⁰ Ric Prentiss *et al.*, *4Q02 Wireless Preview: Holiday Punch Has Indeed Gone Flat*, Raymond James & Associates, Equity Research, Jan. 21, 2003, at 2.

²⁵¹ Luiz Carvalho *et al.*, *Wireless Tracker: Cash Flow Matters Most*, Morgan Stanley, Equity Research, Dec. 11, 2002, at 6.

²⁵² *Id.*

²⁵³ *NextGen VII*, at 49. See also, Reinhardt Krause, *AT&T Wireless Says It’s Slashing Capital Spending By 40%*, INVESTOR’S BUSINESS DAILY, Jan. 29, 2003 (“By cutting capital spending, [AT&T Wireless] expects to become free cash flow positive in 2003”).

(vii) Technology Deployment

71. 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.²⁵⁴

72. U.S. mobile carriers have continued to deploy next generation network technologies over the past year.²⁵⁵ At the writing of the *Seventh Report*, T-Mobile had deployed GPRS across its entire network, AT&T Wireless and Cingular had deployed GPRS in portions of their respective networks, and Verizon Wireless had built out 1xRTT across portions of its network.²⁵⁶ During the past year, AT&T Wireless, Cingular, and Verizon Wireless have expanded their next-generation network deployments into additional markets. Furthermore, Sprint PCS, Monet Mobile Networks (“Monet Mobile”),²⁵⁷ Western Wireless, US Cellular, and Dobson initiated service over upgraded next-generation networks during 2002.²⁵⁸

73. During 2002, AT&T Wireless expanded its GSM/GPRS network from 16 cities covering 73 million POPs, or 26 percent of the U.S. population, to areas covering 181 million POPs, or 63 percent of the U.S. population.²⁵⁹ AT&T Wireless expects to expand its GSM/GPRS network to areas covering 74 percent of the U.S. population by the end of 2003.²⁶⁰ The company has also been installing EDGE equipment and expects to launch service using EDGE technology across its entire GSM/GPRS footprint by the end of 2003.²⁶¹ Furthermore, AT&T Wireless announced in December 2002 that it plans to launch

²⁵⁴ 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).

²⁵⁵ See Section II.C.1.b(x), Quality of Service, *infra*, for a discussion of the relationship between technology deployment and service quality.

²⁵⁶ See *Seventh Report*, at 13042-13044.

²⁵⁷ See Section II.C.3.c, CMRS Networks: Data-Only, *infra*, for a discussion of Monet Mobile’s data only service offered over its 1xEV-DO network.

²⁵⁸ Among the other major carriers, Nextel has overlaid its iDEN network with a packet network in order to offer data services but has not committed to deploying one of the two major next-generation technology migration paths. See Nextel Communications, Inc., SEC Form 10-K, Mar. 27, 2003, at 2, 6. Furthermore, ALLTEL is planning to upgrade its CDMA network to 1xRTT, but has not yet launched service using the technology. See Dan Meyer, *Regional Players to Use Customer Service to Outshine in Data Sell*, RCR WIRELESS NEWS, Oct. 14, 2002, at 8.

²⁵⁹ See *Seventh Report*, at 13043, note 400; AT&T Wireless Services, Inc., SEC Form 10-K, Mar. 25, 2003, at 3.

²⁶⁰ AT&T Wireless Services, Inc., SEC Form 10-K, Mar. 25, 2003, at 3.

²⁶¹ *Id.*

WCDMA in four U.S. markets – San Francisco, San Diego, Seattle, and Dallas – covering approximately 8 million POPs by the end of 2004.²⁶²

74. During 2002, Cingular Wireless expanded its GSM/GPRS coverage to portions of California, Connecticut, New York, and New Jersey, and, as of the end of 2002, its GSM/GPRS network was available to 50 percent of the company's covered POPs.²⁶³ The company plans to deploy GSM/GPRS to 90 percent of its POPs during 2003 and to the remaining 10 percent during 2004.²⁶⁴ Cingular expects to launch service over EDGE networks in selected markets during the third quarter of 2003 and to continue deploying EDGE during 2004.²⁶⁵

75. At the writing of the *Seventh Report*, Verizon Wireless had upgraded approximately 20 percent of its network coverage area to 1xRTT²⁶⁶ but has since completed 1xRTT upgrades in a total of 900 towns and cities.²⁶⁷ Verizon Wireless also announced in March 2003 that it expects to launch service over 1xEV-DO networks in Washington, D.C. and San Diego during the third quarter of 2003.²⁶⁸

76. In August 2002, Sprint PCS began offering service using 1xRTT technology, which the carrier deployed across its entire network footprint.²⁶⁹ Sprint PCS reportedly does not expect to build out 1xEV-DO technology but instead plans to wait until 1xEV-DV is available for commercial deployment,

²⁶² *AT&T Wireless, NTT DoCoMo Outline Plans for Targeted Rollout of W-CDMA Services*, BUSINESS WIRE, Dec. 25, 2003. AT&T Wireless had previously announced that it planned to launch service over WCDMA networks in 13 U.S. cities during 2004. *Id.* See also AT&T Wireless Services, Inc., SEC Form 10-K, Mar. 25, 2003, at 4.

²⁶³ Cingular Wireless, *Wireless Internet Availability* (visited Apr. 1, 2003) <http://www.cingularwireless.com/beyond_voice/wi_availability>; Cingular Wireless, LLC, SEC Form 10-K, Mar. 11, 2003, at 10; Sue Marek, *Cingular Gets Back to Basics*, WIRELESS WEEK, Mar. 1, 2003, at 12.

²⁶⁴ Cingular Wireless, LLC, SEC Form 10-K, Mar. 11, 2003, at 10.

²⁶⁵ Sue Marek, *Cingular Gets Back to Basics*, WIRELESS WEEK, Mar. 1, 2003, at 12; *Wireless Carriers in Americas Already Receiving Benefits of GSM/GPRS Technology*, PR NEWSWIRE, Feb. 18, 2003. Cingular Wireless has not established a timeline for installing WCDMA. In fact, the company has stated that it will need more spectrum to deploy WCDMA. See Kelly Carroll, *Cingular Backs Away From Wideband CDMA*, TELEPHONY, Nov. 5, 2001; Frank Marsala, *Implications of Cingular's Technology Announcement*, ROBERTSON STEPHENS, Oct. 31, 2001; Kelly Carroll, *Cingular Attaches Billions To Its EDGE Commitment*, TELEPHONY, Dec. 10, 2001; Kelly Carroll, *An Alternate Reality For 3G Wireless*, TELEPHONY, Oct. 15, 2001.

²⁶⁶ This portion of its network covered the Northeast, the San Francisco Bay Area, and Salt Lake City. See *Seventh Report*, at 13042.

²⁶⁷ *Verizon Wireless Expands Express Network in Spokane, Washington and Northern Idaho*, News Release, Verizon Wireless, Mar. 31, 2003; *CDG Comments*, at 3-4.

²⁶⁸ Dan O'Shea, *CTIA: Just Do It? Verizon Does*, TELEPHONY, Mar. 18, 2003; Dan Meyer, *Verizon to Deploy DO, Carriers Talk PTT, Wi-Fi*, RCR WIRELESS NEWS, Mar. 24, 2003, at 1.

²⁶⁹ *Sprint Introduces Clarity You Can See and Hear with Nationwide Availability of PCS Vision*, News Release, Sprint PCS, Aug. 8, 2002; *CDG Comments*, at 3-4.

possibly in 2005.²⁷⁰ On the other hand, one of Sprint PCS's affiliates, UbiquiTel, is running a trial of 1xEV-DO in Boise, ID and is expected to offer service over the network commercially in the future.²⁷¹

77. Western Wireless, which has used TDMA as its 2G technology, chose to upgrade its network to 1xRTT, and has launched service using 1xRTT technology in Terry, MT²⁷² and is running trials of 1xRTT service in Billings, MT and Midland, TX.²⁷³ In the fourth quarter of 2002, US Cellular upgraded its Chicago-area network to CDMA 1xRTT.²⁷⁴ Dobson is in the process of overlaying its TDMA network and that of its 50 percent owned subsidiary, American Cellular, with GSM/GPRS technology.²⁷⁵ During the first quarter of 2003, American Cellular began offering GSM/GPRS roaming service to Cingular customers over its New York network, and Dobson expects to begin offering GSM/GPRS service on a roaming basis and for its own subscribers in select markets by the end of 2003.²⁷⁶ Dobson expects to complete these upgrades across its entire network during 2004.²⁷⁷

(viii) Coverage by Technology Type

78. To date, 278 million people, or 97 percent of the total U.S. population, live in counties where operators offer digital mobile telephone service, using CDMA, TDMA/GSM, or iDEN (including their respective next generation technologies), or some combination of the three.²⁷⁸ These counties make up 71 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.²⁷⁹ We have also

²⁷⁰ Lynnette Luna, *Evolved CDMA Finds Its Legs in Small-Town America*, TELEPHONY, Dec. 2, 2002, at 42; Sue Marek, *U.S. Spotlight Shines on EV-DO*, WIRELESS WEEK, Apr. 15, 2003, at 26.

²⁷¹ Brad Smith, *Monet Makes Its Mark*, WIRELESS WEEK, Mar. 15, 2003, at 16; Lynnette Luna, *Evolved CDMA Finds Its Legs in Small-Town America*, TELEPHONY, Dec. 2, 2002, at 42.

²⁷² Kelly Carroll, *No-Name Town Gets High-Speed Access; Western Wireless Brings Mobile Internet to Rural Montana*, TELEPHONY, July 9, 2001; Chris Goldman, *Home on the Web – Western Wireless Brings 1X Data Service to a Small Montana Community*, WIRELESS REVIEW, Nov. 15, 2001.

²⁷³ Western Wireless Corporation, SEC Form 10-K, Mar. 27, 2003, at 4.

²⁷⁴ *U.S. Cellular Reports Fourth Quarter Results, Surpasses 4 Million Customer Mark*, News Release, US Cellular, Feb. 5, 2003. US Cellular acquired PrimeCo Communications LLC and its Chicago-area CDMA network and subscribers in 2002. See *Seventh Report*, at 13000.

²⁷⁵ *Q3 2002 Dobson Communications Corporation Earnings Conference Call – Final*, FD (FAIR DISCLOSURE) WIRE, Nov. 15, 2002 (quoting Everett Dobson, President, CEO and Chairman of Dobson Communications).

²⁷⁶ *Q1 2003 Dobson Communications Corporation Earnings Conference Call – Final*, FD (FAIR DISCLOSURE) WIRE, May 6, 2003 (citing Doug Stephens, COO of Dobson).

²⁷⁷ *Id.* (citing Bruce Knooihuizen, Executive Vice President of Dobson).

²⁷⁸ The broadband PCS-based and digital SMR-based coverage is estimated using counties, and the cellular-based coverage is estimated using CMAs. The caveats mentioned in Section I.B, Sources of Information, *supra*, and Section II.C.1.b(ix), Market Entry, *infra*, apply to this analysis as well.

²⁷⁹ See Appendix F, Maps 5-8, at F-6 – F-9.

prepared maps showing the extent of next generation network technology deployment.²⁸⁰

79. CDMA has been launched in at least some portion of counties containing 260 million people, or roughly 91 percent of the U.S. population, while TDMA/GSM has been launched in at least some portion of counties containing 265 million people, or almost 93 percent of the U.S. population.²⁸¹ To date, digital SMR operators have launched iDEN-based service in at least some portion of counties containing over 248 million people, or approximately 97 percent of the U.S. population.²⁸²

80. CDMA 1xRTT/1xEVDO has been launched in at least some portion of counties containing 260 million people, or roughly 91 percent of the U.S. population, while GPRS has been launched in at least some portion of counties containing 227 million people, or almost 80 percent of the U.S. population.²⁸³

(ix) Market Entry

81. To track the level of competition in the mobile telephone sector, the Commission compiles a list of counties with some level of coverage by mobile telephone providers. This data is based on publicly-available sources of information released by the operators such as news releases, filings with the SEC, coverage maps available on operators' Internet sites, and information filed with the Commission in proceedings or with applications.²⁸⁴

82. As previously discussed, there are several important caveats to note when considering these data. First, to be considered as "covering" a county, an operator need only be offering any service in a portion of that county. Second, multiple operators shown as covering the same county are not necessarily providing service to the same portion of that county. Consequently, some of the counties included in this analysis may have only a small amount of coverage from a particular provider. Third, the figures for POPs and land area in this analysis include all of the POPs and every square mile in a county considered to have coverage.²⁸⁵ Therefore, this analysis overstates the total coverage in terms of both geographic

²⁸⁰ See Appendix F, Map 9, at F-10.

²⁸¹ See Appendix D, Table 7, at D-10.

²⁸² *Id.*

²⁸³ *Id.*

²⁸⁴ The Commission has buildout rules for geographic area licenses, although they do not require operators to deploy networks such that the entire geographic area of a specific license receives coverage. For example, the construction requirements for 30 megahertz broadband PCS licenses state that an operator's network must serve an area containing at least one-third of the license area's population within five years of the license being granted and two-thirds of the population within 10 years. See 47 C.F.R. § 24.203(a). Similarly, the construction requirements for 10 and 15 megahertz broadband PCS licenses state that an operator must cover one-quarter of a license area's population, or provide "substantial service," within five years of being licensed. See 47 C.F.R. § 24.203(b). The details concerning exactly which geographic areas or portions of the population should be covered to meet these requirements are left to the operators. In addition, decisions about whether to increase coverage above these requirements are left to the operators. For information on the buildout requirements for cellular licenses, see 47 C.F.R. §§ 22.946, 22.947, 22.949, 22.951. For information on the buildout requirements for non-site based SMR licenses, see 47 C.F.R. §§ 90.665 and 90.685.

²⁸⁵ All population figures are based on the Bureau of the Census's 2000 county population.

areas and populations covered.

83. On the other hand, this county-by-county analysis reflects a significant improvement in accuracy. In past editions of this report, the Commission provided summaries of estimated coverage by BTAs. Starting with the *Fifth Report*, the Commission decided to re-estimate and enhance these coverage maps using county boundaries in an attempt to provide a more precise picture of network deployments. Moreover, while the newer broadband PCS and digital SMR entrants have less complete networks, the original cellular licenses have extensive networks that provide almost complete coverage of the entire land mass of the continental United States.²⁸⁶ Cellular licensees were originally awarded a geographical area (CMA) as a license area, but they only retained that portion of the CMA where they had built out and expanded their wireless networks.²⁸⁷

84. To date, 270 million people, or 95 percent of the total U.S. population, have three or more different operators (cellular, PCS, and/or digital SMR) offering mobile telephone service in the counties in which they live.²⁸⁸ However, these counties make up only 52 percent of the total land area of the United States, reflecting the nation's uneven population distribution.²⁸⁹ Over 236 million people, or 83 percent of the U.S. population, live in counties with five or more mobile telephone operators competing to offer service, while 72 million people, or about 25 percent of the population, live in counties with seven or more mobile telephone operators competing to offer service. While the growth in the percentage of U.S. population living in counties with three or more, four or more, five or more, and seven or more providers has slowed, the percentage of the population living in counties with six or more providers has grown 34 percent over the last year, up from a 14 percent growth rate between the *Sixth* and *Seventh Reports*.²⁹⁰ More than 200 million people, or 71 percent of the population, can now choose from among six or more different mobile telephone operators providing service somewhere in their counties.²⁹¹

(x) Quality of Service

85. Another variable that we examine as part of our assessment of the level of CMRS competition is the quality of service that customers experience.²⁹² In addition to competing on price, in a

²⁸⁶ See Appendix F, Maps 2-3, at F-3 – F-4. CTIA states – based on its analysis of a publicly-available software, GeoComm's Wireless Sourcedisk – that cellular service is available in zipcodes in which roughly 99 percent of the U.S. population lives. *CTIA Comments*, at 6.

²⁸⁷ See Amendment of Part 22 of the Commission's Rules to Provide for the Filing and Processing of Applications for Unserved Areas in the Cellular Service and to Modify other Cellular Rules, *First Report and Order and Memorandum Opinion and Order on Reconsideration*, 6 FCC Rcd 6185, 6196-6200 (1991). Initial cellular systems operators were given a five-year period during which to expand their systems within the CMAs in which they were licensees. *Id.*

²⁸⁸ See Appendix D, Table 5, at D-9. In this analysis, we include T-Mobile in California and Nevada, and Cingular in the New York City metro area, as competitors.

²⁸⁹ *Id.* We note that the land area of these counties, 1.9 million square miles, is roughly 60 percent larger than the combined land area of the 15 members of the European Union (1.2 million square miles).

²⁹⁰ See Appendix D, Table 10, at D-11.

²⁹¹ *Id.*

²⁹² Service quality can refer to many different factors in providing service to a customer. The various components of service quality include: network access, call maintenance and completion, applications, voice

competitive market, firms also compete on the basis of service quality. Evidence from the CMRS marketplace shows that carriers compete in terms of services quality.²⁹³ As discussed below, market forces have also created an incentive for numerous third parties to provide information to consumers seeking information on the quality of individual carriers' services.

86. Sections II.C.1.b(vii), Technology Deployment and II.C.1.b(ix), Market Entry, *supra*, as well as similar sections in previous reports, discuss upgrades that carriers have made to their networks that have improved service quality.²⁹⁴ For instance, carriers' aggressive rollout of digital technology has enabled better voice quality and additional calling features for consumers, as well as higher capacity for operators, thereby allowing more customers to access the network and use their phones at the same time.²⁹⁵ Industry analysts emphasize that carriers are still working to upgrade their networks and that their future capital expenditures will be "largely related to capacity increases and network quality improvements."²⁹⁶ Another analyst stated that "carriers are still spending heavily in improving the quality of their networks."²⁹⁷ In a report released in April 2003, the General Accounting Office ("GAO") reported that many mobile telephone carriers strive for a 98 percent call-completion rate, meaning dialed calls would go through and not be dropped before they were completed at least 98 percent of the time on

quality, data integrity and throughput, billing, and customer care. For purposes of this report, we are limiting our discussion of "service quality" or "call quality" to network access, call maintenance and completion, and voice quality. We also note that the reliability of a particular wireless call or application may involve the reliability of the wireline network as well as the reliability of the wireless connection. Furthermore, the type of handset a subscriber uses can also affect his or her network access and voice quality.

²⁹³ See Section II.C.1.b(v), Churn, *supra*.

²⁹⁴ In the *NOI*, the Commission requested additional information on service quality and sought comment on the relationship between service quality and competition. While the Commission received little information from commenters on this issue, both Dobson and NTCA stated that rural customers have access to the same, high level of service quality that is available to consumers in urban areas. NTCA stated, "Even if rural customers are not served by multiple carriers, they will still demand access to the same services being provided to urban customers. ... [M]any rural customers have access to the same state-of-the-art wireless technologies available to their urban counterparts. Consumers in rural America are receiving superior wireless service from ... NTCA members." National Telecommunications Cooperative Association, *NOI Comments*, at 3, 4 (filed Jan. 27, 2003) ("*NTCA Comments*"). Dobson stated, "[R]ural carriers ... are not lagging behind in providing digital networks and additional services to their customers." *Dobson Comments*, at 5.

²⁹⁵ Steven R. Yanis *et al*, *Wireless World – The Mobile Telephone Industry*, Banc of America Securities, Equity Research, April 2002, at 249.

²⁹⁶ *Wireless 411*, at 6. UBS Warburg also stated, "Carriers are also increasingly spending capex dollars on advanced technologies to improve capacity as subscriber usage increases. For example, in a December 2002 news release, Cingular noted that it has also boosted its network capacity by installing Adaptive Multi-Rate ("AMR") speech channels. Cingular believes AMR translates into higher spectral efficiency, allowing the company to carry more calls per base station. In the release, Cingular said that, 'As a result (of implementing AMR), network capacity is expected to double and service quality will improve.' CDMA carriers such as Verizon Wireless and Sprint PCS also invested in capacity-enhancing technologies. In addition to their moves to cdma2000 1XRTT, ... CDMA carriers invest in such items as smart antennae, which can increase capacity by using multiple antennas to provide more accurate directional targeting." *Id.*, at 80.

²⁹⁷ Luiz Carvalho, *Wireless Tracker: Results Speak the Loudest*, Morgan Stanley, Equity Research, Mar. 17, 2003, at 8.

average.²⁹⁸

87. In addition to the digital and next generation network upgrades that carriers are making in order to improve call quality and network capacity, some carriers have focused their marketing campaigns on distinguishing their products on the basis of quality, instead of on other factors such as price or the availability of advanced features. Verizon Wireless's "Can You Hear Me Now?" advertising campaign, for example, has attempted to emphasize the carrier's network availability and reliability. Analysts indicate that these types of efforts have been beneficial for carriers, as those who have emphasized service quality have at times been more successful in gaining subscribers than those with a negative quality perception. For example, one analyst reported that Verizon Wireless "has been able to post strong subscriber figures largely as a result of the popularity of its America's Choice pricing plans ... and its 'Can You Hear Me Now?' advertising campaign, which highlighted the quality of the company's national network."²⁹⁹ Another analyst stated in February 2003 that it believed the company would "continue to invest in its network so as to continue to leverage customer perception of a quality and coverage advantage."³⁰⁰ This analyst also forecast that T-Mobile would see successful sales during the 2002 holiday season due to a variety of factors, including "improved network quality in selected markets."³⁰¹ On the other hand, analysts have noted that a negative impression of a carrier's service quality can be detrimental to its market share.³⁰²

88. In addition to the information presented above on carriers' network upgrades and quality-focused marketing efforts, other data suggests that most consumers are content with the level of mobile telephone service quality that they currently receive. Based on a survey it conducted in November 2002, GAO estimated that "about 83 percent of mobile telephone consumers were satisfied with their call quality."³⁰³ GAO also estimated that "about 47 percent of adult mobile phone users believed their call

²⁹⁸ *FCC Should Include Call Quality in Its Annual Report on Competition in Mobile Phone Services*, General Accounting Office, GAO-03-501, Apr., 2003, at 23 ("GAO Report").

²⁹⁹ *Wireless 411*, at 27.

³⁰⁰ *NextGen VII*, at 59.

³⁰¹ Linda J. Mutschler, *Wireless Store Visits*, Merrill Lynch, Equity Research, Dec. 13, 2002, at 4.

³⁰² *Id.*, at 6 ("[T]he main reasons for [Sprint] PCS's declining market share position have been issues with customer care and dropped/blocked calls"). Another analyst reported that Western Wireless experienced an increased churn rate in the second quarter of 2001 "as a result of poor network quality." The analyst added, "Minutes of use surged on the company's network, and Western, at the time, had ... old analog equipment and had not migrated subscribers quickly enough to digital technology to alleviate the network congestion." Steven R. Yanis *et al*, *Wireless World – The Mobile Telephone Industry*, Banc of America Securities, Equity Research, April 2002, at 235.

³⁰³ *GAO Report*, at 27. To conduct its survey, GAO "contracted with an international market research firm to administer 26 questions as part of a nationwide, multipurpose, Random Digit Dialing telephone survey of adults conducted between November 8 and 10, 2002. ... Five hundred fifty-two of the 1,027 survey respondents had mobile phones and answered at least some of the 25 questions in addition to the preliminary screener question." GAO estimates "that for the survey questions that applied to all of the respondents who used mobile phones (417 or more) the 95 percent confidence intervals [yield margins of error of] plus or minus 8 percentage points." GAO explained possible nonsampling errors with the survey's methodology: "As with any survey, differences in the wording of questions, the sources of information available to respondents, and the types of people who do not respond may have led to errors that we could not assess." *Id.*, at 40. Consumers Union also reported that "[i]n a survey conducted of 22,000 visitors to Consumer Reports' web site regarding wireless telephone quality of service

quality was improving, while about 5 percent believed that their call quality was getting worse.”³⁰⁴ GAO also reported that “[d]espite the many mobile phone customers who appeared to be satisfied with their overall call quality, a number of survey respondents reported that they were experiencing specific problems.”³⁰⁵ For example, “about one-third of customers could not complete 10 percent or more of their calls because they were in a cell where the carrier did not provide service.”³⁰⁶ About 12 percent reported that such a problem occurred at least one-third of the time.³⁰⁷ In addition, just over 20 percent of respondents reported problems “getting a call through because [of a] fast busy signal or a message that says the call failed” or problems “with a call being cut off or dropped” at least 10 percent of the time.³⁰⁸ When examining consumer opinions, it is important to keep in mind that consumer perceptions of service quality can change independently of actual changes in network performance, as consumers’ expectations evolve.

89. It is also apparent that wireless consumers are demanding more information about mobile carriers’ individual service quality levels, and that numerous third parties have been responding to this demand by compiling and reporting such information.³⁰⁹ There are 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.³¹⁰

c. Pricing Data and Trends

90. As for the last few years, equity analysts and other industry observers continue to describe wireless price competition in the United States as “intense,” “fierce,” and “ultra-competitive.”³¹¹ While it

and customer satisfaction, approximately one-third of respondents said they were unhappy with the quality of their cellular service.” No additional information about the survey or its methodology is available. Consumers Union, Notice of *Ex Parte* presentation in Docket No. 02-379, Jun. 16, 2003.

³⁰⁴ *GAO Report*, at 27-28. The remaining 48 percent “believed that call quality had not changed since they acquired their phones.” *Id.*

³⁰⁵ *Id.*, at 28.

³⁰⁶ *Id.*, at 28.

³⁰⁷ *Id.*, at 42.

³⁰⁸ *Id.*, at 42.

³⁰⁹ See FCC, *What You Should Know About Wireless Phone Service*, at 8, available at <<http://www.fcc.gov/cgb/wirelessphone.pdf>>.

³¹⁰ *Id.*; *Complete Cell Phone Guide*, CONSUMER REPORTS, Feb. 2003, at 11-27.

³¹¹ Colette Fleming *et al.*, *3Q02 Wireless 411 – Outlook*, UBS Warburg, Equity Research, Jan. 23, 2003, at 1; Paul Marsch *et al.*, *Deutsche Telekom*, Morgan Stanley, Equity Research, Oct. 17, 2002, at 2 (“the ultra-competitive US wireless market”); Cannon Carr *et al.*, *Avoiding the Hotel California: An Equity /High Yield Wireless Weekly*, CIBC World Markets, Dec. 23, 2002, at 2 (“fierce price competition”). In fact, many equity analysts view the intense price competition as a problem, at least from an investor’s perspective. See, e.g., Linda J. Mutschler *et al.*, *Wireless Preview: What About 3Q02?*, Merrill Lynch, Equity Research, Oct. 8, 2002, at 5 (“the continuing pricing pressure is worrisome, and, in our view, could disrupt the stable ARPU trend that we have seen up to this point”);

is difficult to identify sources of information that track mobile telephone prices in a comprehensive manner,³¹² these claims are supported by a number of reports and other available data indicating that the cost of mobile telephony service continues to fall. One journalist opined in October 2002 that “there has never been a cheaper time to sign up for cellphone service.”³¹³

91. According to one economic research and consulting firm, Econ One, mobile telephone prices in the 25 largest U.S. cities declined roughly 2.9 percent in 2002.³¹⁴ The average cost of monthly service³¹⁵ – which was calculated across four typical usage plans (50, 200, 500 and 800 minutes) – dropped from \$36.77 in December 2001 to \$35.70 in December 2002.³¹⁶ Costs dropped the most in Tampa (-7.0 percent), Chicago (-6.0 percent), St. Louis (-5.4 percent), Detroit (-4.6 percent) and Pittsburgh (-4.4 percent), while prices increased 1.6 percent in Portland and 0.6 percent in Denver.³¹⁷ As mentioned in the *Seventh Report*, Econ One compared usage plans of 30, 150, 300, and 600 minutes during 2001 and found the greatest price decline was for 600 minutes of airtime; furthermore, usage levels of 150 and 300 minutes saw more modest reductions, while the monthly cost of 30 minutes of airtime increased 5.9 percent.³¹⁸

92. 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”).³¹⁹ Cellular CPI data is published on a national basis only.³²⁰ From 2001 to

and Cannon Carr and Gregor Dannacher, *Can Wireline Cannibalization Save Wireless ARPUs in 2003?*, CIBC World Markets, Dec. 11, 2002, at 5 (“Pricing Trends Worrisome, But Volumes Have Made Up For It”).

³¹² See *Fourth Report*, at 10164-10165.

³¹³ Jane Spencer, *Price Cuts by Cellphone Firms Add Up to Consumer Savings*, WALL STREET JOURNAL, Oct. 1, 2002.

³¹⁴ *Econ One Survey: Wireless Costs Continue to Fall*, News Release, Econ One, Jan. 9, 2003. The survey is based on an analysis of pricing plan data collected from carriers’ websites. *Transcript*, at 78.

³¹⁵ This does not include any additional costs for roaming or long distance.

³¹⁶ *Econ One Survey: Wireless Costs Continue to Fall*, News Release, Econ One, Jan. 9, 2003. The analysis assumes a 70 percent peak/30 percent off-peak split in the kind of minutes used.

³¹⁷ *Id.* We would need additional data to determine whether prices are different in urban versus rural areas. For a discussion of Econ One’s 2001 study comparing prices in urban and rural areas, see Section II.C.1.e(ii), Rural Rollout, *infra*, and *Seventh Report*, at 13023.

³¹⁸ See *Seventh Report*, at 13013. Econ One did not provide similar data for 2002.

³¹⁹ See Appendix D, Table 8, at D-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

2002, the annual Cellular CPI decreased by 1.0 percent while the overall CPI increased by 1.6 percent. The Cellular CPI has declined almost 33 percent since 1997 when BLS began tracking it.

93. As a third pricing indicator, some analysts believe average revenue per minute (“RPM”) is a good proxy for mobile pricing.³²¹ 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.³²² Using its estimates of industry-wide ARPU and MOUs, CTIA’s survey indicates that RPM fell 9 percent between December 2001 and December 2002. Since 1994, RPM has fallen from \$0.47 in December 1994 to \$0.11 in December 2002, a decline of 76 percent.³²³

(i) Developments in Pricing Plans

94. The continued rollout of differentiated pricing plans also indicates a competitive marketplace. In the mobile telephone sector, we observe independent pricing behavior, in the form of continued experimentation with varying pricing levels and structures, for varying service packages, with various available handsets and policies on handset pricing. AT&T Wireless’s Digital One Rate (“DOR”) plan, introduced in May 1998, is one notable example of an independent pricing action that altered the market and benefited consumers.³²⁴ Today all of the nationwide operators offer some version of DOR pricing plan which customers can purchase a bucket of MOUs to use on a nationwide or nearly nationwide network without incurring roaming or long distance charges.

95. Another trend in mobile telephone pricing has been the introduction of on-network, or “on-net,” national pricing plans. These plans are similar to DOR plans, with the exception that subscribers incur roaming charges when they use their phones off the carrier’s network (“off-net”). Such plans are usually cheaper, or include more minutes, than the initial type of DOR plans.³²⁵ The advantage of the on-net plan to the carrier, of course, is that it allows a carrier to recover the cost of its subscribers roaming onto other carriers’ networks, an expense which the carrier would otherwise bear with a DOR pricing

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.

³²⁰ *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>>.

³²¹ *See Seventh Report*, at 13013.

³²² 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 236, *supra*.

³²³ *See* Appendix D, Table 9, at D-11.

³²⁴ *See AT&T Launches First National One-Rate Wireless Service Plan*, News Release, AT&T Corp., May 7, 1998.

³²⁵ For a comparison of Verizon Wireless’ America Choice and National SingleRate (*i.e.*, its DOR plan), *see* Verizon Wireless’s website, at www.verizonwireless.com.

plan.³²⁶ Sprint PCS, which permits off-net roaming, has allowed free on-net national roaming with its pricing plans for many years. In January 2002, Verizon Wireless began to offer its own on-net national plans, under the name “America’s Choice.”³²⁷ Verizon Wireless was soon followed by AT&T Wireless’s “National Network” plans in April,³²⁸ and then Cingular’s “Preferred Nation” plans in September.³²⁹ We believe that such pricing plans, broadly similar across operators, are the results of competitive market forces and competitive conduct.

(ii) Roaming

96. 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.³³⁰ This source of revenue is particularly important to many rural and smaller carriers.³³¹

97. CTIA reported that roaming revenues for the mobile telephony industry were virtually unchanged over the past year, from \$3.94 billion in 2001 to \$3.90 billion in 2002.³³² Roaming revenues as a percentage of total service revenue continued to decline, however, from 6.1 percent reported in 2001 to 5.1 percent in 2002.³³³ CTIA attributes this decline to the growth of DOR plans and the extended calling areas established by many of the larger carriers.³³⁴ It may also be the result of declining per-minute roaming rates.³³⁵

³²⁶ For a comparison of on-net and off-net plans, see Linda Mutschler *et al.*, *Wireless Pricing: What Are They Thinking*, Merrill Lynch, Equity Research, Aug. 1, 2002.

³²⁷ *Verizon Wireless New National Rate Plan Provides Superior Value To Frequent-Calling Travelers*, News Release, Verizon Wireless, Jan. 31, 2002.

³²⁸ Linda Mutschler *et al.*, *Wireless Pricing: A Look at Recent Pricing Trends – and Potential Implications*, Merrill Lynch, Equity Research, Apr. 29, 2002, at 3.

³²⁹ Linda Mutschler *et al.*, *Wireless Pricing: Cingular Starts On-Net Roaming National Plans*, Merrill Lynch, Equity Research, Sept. 5, 2002, at 1. Neither T-Mobile’s on-net national plans nor any of Nextel plans allow off-net roaming. See Linda Mutschler *et al.*, *Wireless Pricing Nextel Introduces New Plans*, Merrill Lynch, Equity Research, Nov. 8, 2002, at 2.

³³⁰ 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.

³³¹ See *Wireless 411*, at 47 (Table 20: Roaming Revenues as a Percentage of Total Service Revenues).

³³² See Appendix D, Table 1, at D-2.

³³³ *Id.*

³³⁴ *Dec 2002 CTIA Survey*, at 75.

³³⁵ A number of nationwide carriers have been able to negotiate lower roaming rates with their affiliates and other smaller carriers, as well as among themselves. See, e.g., Linda J. Mutschler *et al.*, *Sprint PCS*, Merrill Lynch,

(iii) Prepaid Service

98. In the United States, most mobile telephony subscribers pay their phone bills after they have incurred charges (known as postpaid service). Prepaid service, in contrast, requires customers to pay for a fixed amount of minutes prior to making calls. Although prepaid plans are considered a good way to increase penetration rates,³³⁶ they typically produce lower ARPU's and higher churn rates in comparison to postpaid subscribers.³³⁷ One provider of "prepaid platform services" states that prepaid subscribers use an average of 97 minutes a month, compared to almost 500 for the average subscriber of a nationwide carrier.³³⁸

99. Analysts estimate that 5 to 7 percent of U.S. wireless phone users subscribed to prepaid plans in 2002, a slight drop from what the Commission found in the *Seventh Report*.³³⁹ At the end of 2002, Verizon Wireless's subscriber base was approximately 6 percent prepaid, AT&T Wireless's was 6.5 percent, and Cingular Wireless's was 6 percent. T-Mobile had the highest percentage of prepaid subscribers of the major carriers, 14 percent, but that was half its rate from a year earlier.³⁴⁰

100. In addition to or in place of traditional prepaid offerings, a number of carriers have introduced prepaid plans that maintain financial ties to the prepaid customer to help reduce churn, including Sprint PCS's ClearPay,³⁴¹ T-Mobile's SmartAccess, and AT&T's GoPhone programs.³⁴² Moreover, Sprint PCS and Nextel have partnered with third-party resellers to market prepaid offerings

Equity Research, Feb. 6, 2003, at 4; *Dobson Reports Slightly Higher Revenues*, RCR WIRELESS NEWS, Nov. 18, 2002, at 1; Western Wireless Corporation, SEC Form 10-K405, filed Mar. 29, 2002, at 4. *See also*, Section I.A.1.a(i)(b), Joint Ventures, *supra*.

³³⁶ *See, e.g.*, Paul Wuh *et al.*, *Week in Wireless*, Goldman Sachs, Equity Research, Jun. 7, 2002, at 2. Prepaid programs are considered to have been the primary driver of the rapid penetration gains in Europe over the past couple of years. Linda J. Mutschler *et al.*, *The Next Generation VI: Wireless in the US*, United States Telecom Services-Wireless/Cellular, Merrill Lynch, Mar. 8, 2002, at 16.

³³⁷ *See Seventh Report*, at 13015.

³³⁸ Paul Kagan Associates, Inc., *Will 2003 Be The Year of Profitable Prepaid*, WIRELESS MARKET STATS, Jan. 21, 2003, at 3 (citing the Boston Communications Group, Inc.); *see* Section II.C.1.b(iii), Minutes-of-Use, *supra*.

³³⁹ Paul Kagan Associates, Inc., *Will 2003 Be The Year of Profitable Prepaid*, WIRELESS MARKET STATS, Jan. 21, 2003, at 3 (6 percent of the nationwide carriers' subscribers are prepaid); *NextGen VII*, at 27 (5 percent); Dan Meyer, *Carriers Take a Second Look at Prepaid*, RCR WIRELESS NEWS, Feb. 24, 2003, at 7 (7 percent, citing wireless industry consulting firm Fasttrack Wireless Inc.). *See also*, *Seventh Report*, at 13015.

³⁴⁰ Linda Mutschler *et al.*, *Wireless Store Visits: First Quarter Subscriber Growth Looking Solid*, Merrill Lynch, Equity Research, Mar. 31, 2003, at 4.

³⁴¹ For a discussion of the ClearPay program, *see Seventh Report*, at 13015-16.

³⁴² Dan Meyer, *Carriers Take a Second Look at Prepaid*, RCR WIRELESS NEWS, Feb. 24, 2003, at 7. For example, AT&T Wireless's GoPhone customers, though not required to sign a contract or provide a deposit, are automatically charged a set fee each month to a credit card, debit card, or bank account. *AT&T Wireless Introduces GoPhone*, News Release, AT&T Wireless, May 5, 2003.

aimed at the youth portion of the population.³⁴³

d. Wireless/Wireline Competition

101. Once solely a business tool, wireless phones are now a mass-market consumer device.³⁴⁴ The overall wireless penetration rate (defined as the number of wireless subscribers divided by the total U.S. population) in the United States is now at 49 percent.³⁴⁵ Industry survey firm Telephia estimated that 53 percent of the total population in 44 major metropolitan areas subscribed to wireless service at the end of 2002, with some areas much higher, including Greenville, SC (71 percent), St. Louis (69 percent), Raleigh, NC (65 percent), Orlando (65 percent), Atlanta (64 percent), Washington DC (64 percent) and Boston (63 percent).³⁴⁶ In addition, one study found that 56 percent of households in the 27 largest U.S. markets use wireless phone service.³⁴⁷ Merrill Lynch estimated that, as of June 2002, more than 55 percent of Americans between the ages of 15 and 59 had wireless phones, including 71 percent between the ages of 20 and 34, 69 percent between 35 and 39, 68 percent between 40 and 44, and 65 percent between 45 and 49.³⁴⁸

(i) Wireless Substitution

102. 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.³⁴⁹ There is much evidence, however, that consumers are substituting wireless service for traditional wireline communications. At a recent Congressional hearing on the health of the telecommunications industry, for example, Blake Bath, managing director of Lehman Brothers, pointed out that while in 1996 wireless made up 5 percent of the sector’s revenues, it now accounts for 30 percent.³⁵⁰ Robert Crandall of the

³⁴³ See Section II.C.2, Resellers, *infra*.

³⁴⁴ See *Sixth Report*, at 13381.

³⁴⁵ See note 214, *supra*.

³⁴⁶ *U.S. Mobile Phone Penetration Reaches 53% of Total Population in December 2002*, News Release, Telephia, Feb. 11, 2003.

³⁴⁷ *Wireless Phone Penetration Among U.S. Households Slows Down as Fewer First-Time Subscribers Enter the Marketplace*, News Release, J.D. Power and Associates, Sept. 25, 2002.

³⁴⁸ Linda Mutschler *et al.*, *Initiation Report: From Top to Bottom Line - Part I*, Merrill Lynch, Equity Research, Sept. 19, 2002, at 19. In addition, there is some evidence that wireless penetration is inversely related to household income. According to a 2001 survey conducted by the Energy Information Administration (EIA), a statistical agency of the U.S. Department of Energy, the percent of housing units having cell phones increases with household income: household income less than \$15,000 (23 percent of households with cell phones); \$15,000 – \$29,999 (38 percent); \$30,000 – \$49,999 (54 percent); \$50,000 – \$74,999 (71 percent); \$75,000 or more (82 percent). Energy Information Administration, *2001 Residential Energy Consumption Survey* (visited May 19, 2003) <<http://www.eia.doe.gov/emeu/recs/appliances/appliances.html>>.

³⁴⁹ See *Seventh Report*, at 13017.

³⁵⁰ *Health of the Telecommunications Sector: A Perspective from Investors and Economists, before the House Subcommittee on Telecommunications and the Internet*, 108th Cong. (Feb. 5, 2003) (statement of Blake Bath, Managing Partner, Lehman Brothers).

Brookings Institute, also speaking at the hearing, claimed that wireless “has siphoned enormous amounts of traffic from the wireline network.”³⁵¹ One analyst estimates that wireless has now displaced about 30 percent of total wireline minutes.³⁵² For the average household, wireless represents 27 percent of total telecommunications expenditures.³⁵³

103. The long distance, local, and the payphone segments of wireline telecommunications have all been losing business to wireless substitution. Long distance volumes and revenues are down at AT&T, MCI, and Sprint as customers shift to wireless services to make their calls.³⁵⁴ Verizon, SBC, and BellSouth saw business and consumer access lines fall 3.6, 4.1, and 3.2 percent, respectively, in 2002, for a total decrease of 5.5 million lines, with wireless substitution being a significant factor.³⁵⁵ Similarly, the number of payphones has declined from 2.7 million in the mid-1990s to about 1.9 million today, in large part due to wireless phones.³⁵⁶ Even the prepaid calling card business is suffering, as consumers are now “utilizing their wireless phones for the same reasons they once used prepaid phone cards.”³⁵⁷

104. Certainly, this is due to the declining cost and widespread use of wireless service. In fact, a number of analysts argue that wireless service is cheaper than wireline. According to Blake Bath, “[w]ireless pricing is currently below that of wireline.”³⁵⁸ Merrill Lynch claims that, for many wireless customers making a long distance call in the evening “using a wireless phone would actually be cheaper than using the fixed line phone in most cases.”³⁵⁹ UBS Warburg agrees:

Why use a pay phone, a calling card, or a hotel phone when prices are

³⁵¹ *Health of the Telecommunications Sector: A Perspective from Investors and Economists, before the House Subcommittee on Telecommunications and the Internet, 108th Cong. (Feb. 5, 2003) (statement of Robert Crandall, Senior Fellow, The Brookings Institute).*

³⁵² Cannon Carr and Gregor Dannacher, *Can Wireline Cannibalization Save Wireless ARPU in 2003?*, CIBC World Markets, Dec. 11, 2002, at 8. According to the CEO of Verizon, Ivan Seidenberg, wireless accounts for 30 percent of all voice minutes. Jeffrey Bartash, *Verizon CEO Urges Regulatory Relief*, CBS.MARKETWATCH.COM, Sept. 19, 2002.

³⁵³ Based on a survey of the telecommunications bills of 32,000 households for the third quarter of 2002. *TNS Telecoms Data ranks Verizon the Third Largest Long Distance Provider in the U.S., Surpassing Sprint*, News Release, TNS Telecoms, Jan. 7, 2003. The breakdown: Local (26 percent); Local Toll (2 percent); Long Distance (8 percent); Wireless (27 percent); Cable/Satellite (27 percent); Internet (11 percent). *Id.*

³⁵⁴ Sarah Z. Sleeper, *Who Needs Home Telephones? More Users Going All Wireless and That's Cutting Into Revenue For Local Bells and Long-Distance Firms*, INVESTOR'S BUSINESS DAILY, Aug. 8, 2002, at 1.

³⁵⁵ Reinhardt Krause, *Local Bells Losing Second Lines as Users Go Broadband, Wireless*, INVESTOR'S BUSINESS DAILY, Feb. 11, 2003, at A01.

³⁵⁶ Yuki Noguchi, *Requiem for the Payphone: As Cell Phone Use Increases, an Icon gradually Dies*, WASHINGTON POST, Dec. 30, 2002, at E1.

³⁵⁷ *Wireless Threatens Growth for U.S. Prepaid Calling Cards*, News Release, IDC, Dec. 23, 2002.

³⁵⁸ *Health of the Telecommunications Sector: A Perspective from Investors and Economists, before the House Subcommittee on Telecommunications and the Internet, 108th Cong. (Feb. 5, 2003) (statement of Blake Bath, Managing Partner, Lehman Brothers).*

³⁵⁹ *NextGen VII*, at 40.

generally higher on a per-minute basis relative to wireless? Also, given that a large number of night and weekend minutes are now regularly included in wireless pricing schemes . . . , it is often cheaper to use your wireless phone while in your home.³⁶⁰

(ii) Wireless Alternatives

105. An increasing number of mobile wireless carriers offer service plans designed to compete directly with wireline local telephone service. The largest of such providers, Leap, under its “Cricket” brand, offers mobile telephone service in 40 markets in 20 states.³⁶¹ At the end of the third quarter of 2002, Leap had roughly 1.5 million customers.³⁶² Leap’s service allows subscribers to make unlimited local calls and receive calls from anywhere for about \$30 per month.³⁶³ Leap claims that 26 percent of its customers do not have a wireline phone at home.³⁶⁴ As discussed above, Leap states that its bankruptcy filing will not interrupt its operations or result in employee layoffs.³⁶⁵

106. Other companies offering unlimited local calling plans include: Triton PCS in Virginia, North Carolina, South Carolina, Georgia, and Tennessee (with more than 200,000 subscribers to its unlimited calling plan);³⁶⁶ Qwest in Arizona, Colorado, Idaho, Minnesota, Montana, Nebraska, New Mexico, Utah, and Wyoming;³⁶⁷ ALLTEL in Arizona, New Mexico, North Carolina, Nebraska, and Arkansas;³⁶⁸ MetroPCS in California, Florida, and Georgia;³⁶⁹ Northcoast PCS in Ohio;³⁷⁰ First Cellular of Southern Illinois in Illinois;³⁷¹ Kiwi PCS in North Carolina;³⁷² Rural Cellular in Vermont, New Hampshire, New

³⁶⁰ *Wireless 411*, at 54.

³⁶¹ *Leap Reports Results for Third Fiscal Quarter of 2002*, News Release, Leap, Nov. 13, 2002.

³⁶² *Id.*

³⁶³ The monthly fee, paid in advance, varies slightly by service area. *See also, Seventh Report*, at 13018, note 225.

³⁶⁴ *Leaping Over Landline: Leap Leads Wireless Displacement Trend*, News Release, Leap Wireless, Jun. 24, 2002.

³⁶⁵ *See* Section I.A.1.a(i)(c), *Restructurings, supra*.

³⁶⁶ SunCom, *SunCom UnPlan “FREE” Zones* (visited Mar. 28, 2003) <http://www.suncom.com/maps/suncom_unplan_maps.html>; Linda Mutschler *et al.*, *Triton PCS Holdings, Inc.*, Merrill Lynch, Equity Research, Mar. 12, 2003, at 2.

³⁶⁷ Qwest, *Q by Qwest* (visited Apr. 9, 2003) <<http://www.qwestwireless.com/qxq/coverage/>>.

³⁶⁸ Conversation with ALLTEL sales representative, Mar. 26, 2003.

³⁶⁹ *See* MetroPCS, *Service & Phone* (visited Apr. 9, 2003) <<http://www.metropcs.com/coverage.shtml>>.

³⁷⁰ *See* Northcoast PCS, *Service Plans* (visited Apr. 9, 2003) <<http://www.Northcoastpcs.com/NewFiles/Service%20Plans.html>>.

³⁷¹ *See* First Cellular, *Southern Illinois Unlimited* (visited Apr. 9, 2003) <http://www.firstcellular.com/wireless_clear_connect_d.htm>.

³⁷² *See* Kiwi PCS, *Welcome!* (visited Apr. 9, 2003) <<http://www.kiwipcs.com>>.

York, Kansas, Minnesota, Maine, North Dakota, and South Dakota,³⁷³ and Ntelos in Virginia.³⁷⁴ In addition, for around \$40-\$60 per month, many carriers offer regional or national calling plans with 500 or more “anytime” minutes and over 3000 night and weekend minutes.³⁷⁵

e. Geographical Comparisons: Urban vs. Rural

107. Since the release of the *Sixth Report*, the Commission has attempted to obtain a better understanding of the state of competition below the national level, in particular in rural areas. The primary difficulty for the Commission in this task is the lack of data specific to rural markets. At its Public Forum held in February 2002, the Wireless Telecommunications Bureau asked participants to address this issue.³⁷⁶ The Commission continued this inquiry in its *NOI*, where the Commission invited comments on a range of rural issues. In our analysis below, we have attempted to incorporate commenters’ suggestions.

(i) Definition of Rural

108. As the Department of Education stated in 1994, “few issues bedevil analysts and planners . . . more than the question of what actually constitutes ‘rural.’”³⁷⁷ The difficulties that this question brings are evidenced by the fact that within the federal government, the term rural has been defined in many different ways. The variety of definitions reflects the numerous purposes for which the definitions are used throughout the federal government.³⁷⁸

109. The Commission does not have a statutory definition of what constitutes a rural area. The Commission has used RSAs as a proxy for rural areas for certain purposes, such as the current cellular cross-interest rule and the former CMRS spectrum cap, stating that “other market designations used by the Commission for CMRS, such as [EAs], combine urbanized and rural areas, while MSAs and RSAs are defined expressly to distinguish between rural and urban areas.”³⁷⁹ In its *NOI*, the Commission asked the public to comment on how it should define rural for purposes of this report.³⁸⁰

³⁷³ See Rural Cellular, *Welcome To Rural Cellular Corporation* (visited Apr. 9, 2003) <<http://www.ruralcellular.com/>>.

³⁷⁴ See Ntelos, *nTown* (visited Apr. 9, 2003) <http://www.ntelos.com/P/pdr_ntown.html>.

³⁷⁵ For a sampling of pricing plans, see Linda Mutschler *et al.*, *Wireless Pricing: What Are They Thinking.*, Merrill Lynch, Equity Research, Aug. 1, 2002; Colette Fleming *et al.*, *AT&T Wireless Group, Inc.*, UBS Warburg, Equity Research, Feb. 12, 2003.

³⁷⁶ See *Public Forum Presentations* <<http://wireless.fcc.gov/cmrs-crforum.html#pres>>.

³⁷⁷ Joyce D. Stern, *The Condition of Education in Rural Schools*, U.S. Department of Education (Jun 1994) [cited in National Center for Education Statistics, *Urban\ Rural Classification Systems* (visited Apr. 4, 2002) <<http://nces.ed.gov/surveys/ruraled/definitions.asp>>].

³⁷⁸ See *Seventh Report*, at 13021.

³⁷⁹ Biennial Regulatory Review, Spectrum Aggregation Limits for Wireless Telecommunications Carriers, *Report and Order*, 15 FCC Rcd 9219, 9256 at note 203 (1999).

³⁸⁰ *NOI*, at 24937.

110. A number of commenters advocated the continued use of population density to define rural. Fred Williamson and Associates (“FWA”), representing a consortium of small wireline telcos in Oklahoma and Kansas, stated that “[p]opulation density is usually utilized to define ruralness.”³⁸¹ The South Dakota Telecommunications Association (“SDTA”) agreed that population density is the best way to define ruralness, but advocated 25 persons per square mile as the proper breakpoint, rather than the 100 persons per square mile the Commission used in the *Seventh Report*.³⁸² The Rural Telecommunications Group (“RTG”) said that the Commission should continue to use population density as its “predominant factor,” although it supported the Commission’s current use of a range of measures.³⁸³ Moreover, RTG said that it was “premature” for the Commission to develop a comprehensive definition of rural due to the lack of sub-national data.³⁸⁴ NTCA advocated the use of RSAs, for “consistency and practicality.”³⁸⁵ As in the Public Forum, some *NOI* commenters questioned whether the urban/rural distinction is currently meaningful in the context of mobile telephony.³⁸⁶

(ii) Rural Rollout

111. In consideration of commenters’ suggestions and given our existing data, we continue to believe that our analysis of market entry data using a variety of criteria – EA nodal versus EA non-nodal counties,³⁸⁷ CMAs, and population density – is, at the moment, the best way to gain some insight into the competitive differences within the different geographic areas of the United States.³⁸⁸ However, we also continue to explore additional methods for analyzing rural rollout. For example, in this report we have examined an alternative population density breakpoint for the rural versus urban split at the suggestion of commenters.

EA Nodal vs. Non-Nodal Counties

112. Each EA consists of one or more counties that are “Economic Nodes” and the surrounding counties that are economically related to it.³⁸⁹ An EA may have more than one economic node. The counties that are economic nodes are metropolitan areas or similar areas that serve as the EA’s center(s)

³⁸¹ Fred Williamson and Associates, *NOI Comments*, at 5 (filed Jan. 27, 2003) (“*FWA Comments*”).

³⁸² *SDTA Reply Comments*, at 4.

³⁸³ Rural Telecommunications Group, *NOI Comments*, at 4-5 (filed Jan. 27, 2003) (“*RTG Comments*”).

³⁸⁴ *RTG Comments*, at 4-5.

³⁸⁵ *NTCA Comments*, at 6.

³⁸⁶ See *Seventh Report*, at 13021-2; *Dobson Comments*, at 4 (“the status of competition should be assessed market-by-market, and not according to an arbitrary definition of ‘rural’ and an artificial distinction between rural and urban markets”).

³⁸⁷ See discussion in Rural Rollout, *infra*.

³⁸⁸ FWA found that the Commission’s findings with regards to the number of wireless competitors in rural areas in the *Seventh Report* tracked well with the level of competition found in the exchanges of the telcos that FWA represents. *FWA Comments*, at note 1.

³⁸⁹ See Section II.C.1.b(ii), Regional Penetration Rates, *supra*.

of economic activity.³⁹⁰ As a proxy for urban and rural geographic areas, we have looked at counties that make up economic nodes, i.e. nodal counties, versus those counties that do not make up economic nodes, i.e. non-nodal counties. In comparing those two sets of counties, we find the non-nodal counties have an average of 3.2 mobile competitors, while the nodal counties have an average of 5.7 competitors.

MSAs vs. RSAs

113. In comparing competitive entry in counties that make up RSAs compared to counties that make up MSAs, we find that RSA counties have an average of 3.3 mobile competitors, while MSAs have an average of 5.7 competitors.

Population Density

114. In comparing competitive entry in counties with population densities of 100 persons per square mile or less to those with densities greater than 100, we find that the less densely populated counties have an average of 3.3 mobile competitors, while the more densely populated counties have an average of 5.6 competitors.

115. If, as one commenter suggested, we use 25 persons per square mile as the breakpoint, we find that the less densely populated counties have an average of 2.7 mobile competitors, while the more densely populated counties have an average of 4.5 competitors. However, we note that only 14 million people live in counties with 25 persons per square mile or less, while 61 million people live in counties with 100 persons per square mile or less.³⁹¹ The 2000 Census found that 59 million persons were “rural.”³⁹² Thus, counties with population densities of 25 persons per square mile appear to contain only a small subset of the rural population.

116. Consistent with the Commission’s findings in the *Seventh Report*, these three exercises of defining urban versus rural (EA Nodal vs. Non-Nodal Counties / MSAs vs. RSAs / Population Density) continue to provide remarkably similar estimates of the average number of competitors in urban versus rural markets.³⁹³ On average, rural markets have slightly more than three providers, while urban markets have between five and six providers. Even using a narrow definition of rural markets, we find that customers have access to between 2 and 3 competitors.

117. Some participants and commenters have argued that the total number of carriers serving an

³⁹⁰ Of the 3,141 counties in the nation in 1995, 836 were counties that made up the 310 metropolitan areas as defined by the Office of Management and Budget in June 1993. The 310 metropolitan areas consisted of 240 metropolitan statistical areas, 59 primary metropolitan statistical areas (PMSAs), and 11 New England county metropolitan areas (NECMAs). In parts of the United States remote from metropolitan areas, 38 non-metropolitan counties were each identified as a node. Kenneth P. Johnson, *Redefinition of the BEA Economic Areas*, SURVEY OF CURRENT BUSINESS, Feb. 1995, at 75.

³⁹¹ FCC internal analysis.

³⁹² U.S. Census Bureau, *American Factfinder*, Census 2000 Summary File 3 (SF 3) – Sample Data (P5 – Urban and Rural) <<http://factfinder.census.gov/>>.

³⁹³ The Rural Utilities Service, which offers government subsidized loans to carriers serving rural areas, will not approve loans to more than one applicant to provide telephone or broadband service within the same rural community. 7 C.F.R. § 1735.51(c); 60 Fed. Reg. 4690 (Jan. 30, 2003).

area is not the best measure of the level of competition in that area because only one or two carriers may be economically sustainable in that area.³⁹⁴ For example, RTG stated, “the Commission must ... seriously consider the possibility that there may be areas that are so remote and the cost to provide coverage so high that only one service provider may be economically viable.”³⁹⁵

118. Furthermore, FWA claimed that “there is sufficient competition among wireless providers in ILEC service areas.”³⁹⁶ Dobson said that “[r]ural CMRS carriers face significant competitive pressures,”³⁹⁷ and argued that the best measure of competition is not the number of competitors in a market, but rather the pressure carriers feel to offer services and products at competitive prices to customers.³⁹⁸ NTCA said that “many rural customers have access to the same state-of-the-art wireless technologies available to their urban counterparts.” The most recently released data provided by Econ One, which was also included in the *Seventh Report*, showed that the average price of mobile telephone service in rural areas appears to be very similar to the average price in urban areas.³⁹⁹ Indeed, at least one *NOI* commenter noted that nationwide and urban price trends have acted to constrain prices in rural areas, even where the total number of operators may be lower.⁴⁰⁰

119. Moreover, some commenters claim that rural areas are experiencing a significant level of wireless substitution for wireline service. In a survey of its wireless subscribers within its RSAs, Western Wireless found that 23 percent of respondents considered their wireless phone to be their primary phone.⁴⁰¹ FWA reports that the telcos it represents are experiencing access line declines, in part due to customers utilizing wireless service as the primary residential service.⁴⁰² FWA also reports that the toll revenues of its clients are declining, in some cases as much as 30 percent, due to customers’ use of wireless instead of wireline toll services.⁴⁰³

Conclusion

120. Based on our rollout analysis and information provided by commenters and participants at the

³⁹⁴ See Section, II.C.1.e, Geographical Comparisons: Urban vs. Rural, *infra*.

³⁹⁵ *RTG Comments*, at 6.

³⁹⁶ *FWA Reply Comments*, at 2.

³⁹⁷ *Dobson Comments*, at 2.

³⁹⁸ *Id.*, at 6.

³⁹⁹ See *Seventh Report*, at 13022-13024.

⁴⁰⁰ Dobson stated, “Clearly, if price is an indicator of the level of competition, the price reductions spawned by wireless competition in urban markets have come to rural areas.” *Dobson Comments*, at 3. Dobson also explained at the Public Forum that “small market carriers ... are subject to the same competitive pressures of large market carriers. Because of national advertising and the Internet, consumers all over the country are educated about nationwide rate plans and services enabled by digital technology.” *Transcript*, at 115.

⁴⁰¹ Western Wireless Corporation, *NOI Comments*, at 5 (filed Feb. 3, 2003).

⁴⁰² *FWA Comments*, at 7.

⁴⁰³ *Id.*

Public Forum, we conclude that CMRS providers are competing effectively in rural areas. While it appears that, on average, a smaller number of operators are serving rural areas than urban areas, this difference does not necessarily indicate that effective CMRS competition does not exist in rural areas. On the contrary, data and statements presented by Public Forum participants and *NOI* commenters provide evidence that, despite the differing structure of rural markets, effective CMRS competition does exist in rural areas.⁴⁰⁴

121. We note, however, that in 2001, the Commission retained the cellular cross-interest rule in RSAs to ensure that mergers and acquisitions do not diminish competition, concluding that “it appears that a combination of interests in cellular licensees in rural areas would more likely result in a significant reduction in competition.”⁴⁰⁵ Nevertheless, the Commission recognized that there may be RSAs in which such cross interests would not create a significant likelihood of substantial competitive harm, and created a waiver process.⁴⁰⁶

2. Resellers

122. Resellers offer service to consumers by purchasing airtime at wholesale rates from facilities-based providers and reselling it at retail prices.⁴⁰⁷ According to information provided to the FCC in its ongoing local competition and broadband data gathering program, the resale sector accounts for approximately 5 percent of all mobile telephone subscribers.⁴⁰⁸ With the exception of Tracfone Wireless Inc., which serves more than 2 million customers with prepaid offerings,⁴⁰⁹ there appear to be few large resellers of wireless service.⁴¹⁰ As reported in the *Seventh Report*, WorldCom, which at one time claimed to be the largest reseller of postpaid wireless services in the United States with nearly 2 million customers,⁴¹¹ exited the resale business in 2002.⁴¹²

123. Two nationwide operators have partnered with third party resellers to market prepaid

⁴⁰⁴ See Section II.C.1.e, Geographical Comparisons: Urban vs. Rural, *infra*.

⁴⁰⁵ *Spectrum Cap Order*, at 22708-22709. See also, *Rural NOI*, at 25561.

⁴⁰⁶ *Spectrum Cap Order*, at 22709-22710. See also, *Rural NOI*, at 25561.

⁴⁰⁷ Interconnection and Resale Obligations Pertaining to Commercial Mobile Radio Services, *First Report and Order*, 11 FCC Rcd 18455, 18457 (1996).

⁴⁰⁸ See Appendix D, Table 2, at D-3.

⁴⁰⁹ Dan Meyer, *Carriers Take a Second Look at Prepaid*, RCR WIRELESS NEWS, Feb. 24, 2003, at 7; Bill Menezes, *Box Phones Expand Inroads to Middle America*, WIRELESS WEEK, Feb. 15, 2003, at 22. In 2001, General Motor Corp. claimed that its telematics system OnStar was the country’s largest reseller of “cellular service.” See *Seventh Report*, at 13025, note 269. See also, Section II.C.3.g, Telemetry and Telematics, *infra*.

⁴¹⁰ Verizon Wireless reported that as of June 30, 2002, approximately 1.4 million of its 30.3 subscribers purchased service through 80 different resellers, with only 22 percent being through WorldCom. Verizon Wireless, LLC, SEC Form S-4, at 13, 59 (filed Oct. 9, 2002).

⁴¹¹ WorldCom, Inc., Petition Pursuant to 47 U.S.C. Sec.160 For Forbearance From the Commercial Mobile Radio Service Number Portability Obligation, WT Docket No. 01-184, *Comments*, at 1 (filed Sept. 21, 2001).

⁴¹² See *Seventh Report*, at 13025.

offerings aimed at the youth portion of the population. Virgin Mobile USA (“Virgin Mobile”), a joint venture between Sprint PCS and Richard Branson’s Virgin Group, LLC, was launched in July 2002, targeting its prepaid offerings at the youth market.⁴¹³ The venture has gained more than 350,000 subscribers through January 31, 2003.⁴¹⁴ Similarly, Nextel, in conjunction with an Australia-based company, is offering a prepaid service targeted at the teenage market.⁴¹⁵ The service, under the “Boost Mobile” brand name, is available in California and Nevada.⁴¹⁶

3. Mobile Data

a. Introduction

124. For purposes of this report, mobile data service is considered to be the delivery of non-voice information to a mobile device. Two-way mobile data services include not only the ability to receive non-voice information on an end-user device but to send it from an end-user device to another mobile or landline device using wireless technology. While mobile data constituted only 1.7 percent of mobile telephone carriers’ total ARPU and revenue during 2002, the consumer adoption of various data products is growing.⁴¹⁷ One analyst estimates there were 11.9 million mobile telephone users who subscribed to some type of mobile data service at the end of 2002, up from 7.6 million at the end of 2001.⁴¹⁸ The estimated number of data-only mobile users grew from 1.1 million at the end 2001 to 2.3 million at the end of 2002.⁴¹⁹ Another analyst estimates that 20 percent of all mobile telephone subscribers used text messaging services during the fourth quarter of 2002.⁴²⁰

⁴¹³ See Virgin Mobile USA, LLC, *NOI Response*, at 2 (filed Feb. 5, 2003) (“*Virgin Mobile Comments*”); *Virgin Mobile USA and MTV Networks to Blow the Roof Off Cellular Content*, News Release, Virgin Mobile, July 24, 2002. For a detailed discussion of the venture, see *Seventh Report*, at 13026.

⁴¹⁴ *Virgin Mobile USA Off to Strong Start*, News Release, Virgin Mobile, Feb. 5, 2003. See also, *Virgin Mobile Comments*.

⁴¹⁵ *Boost Mobile to Launch Wireless Phone Service to Youth Market; September Launch in California and Nevada Test Markets; Differentiated Service to Run on Nextel National Network*, News Release, Nextel, Aug. 15, 2002.

⁴¹⁶ *Boost Mobile And Roxy/Quicksilver Extend Brand Reach With New Roxy Wireless Phone*, News Release, Boost Mobile, Nov. 19, 2002.

⁴¹⁷ *Morgan Stanley Wireless Data Report*, at 3.

⁴¹⁸ *Id.* In the *Seventh Report*, the Commission stated, based on data reported by Kagan and Yankee Group, that there were approximately 8 to 10 million users of mobile Internet services on all devices at the end of 2001. See *Seventh Report*, at 13038.

⁴¹⁹ *Morgan Stanley Wireless Data Report*, at 3. Cingular Wireless reported it had 5 million customers “actively using” its mobile data services as of the end of 2002, up from 2 million data customers at the end of 2001. Approximately 4.2 million of the 5 million were accessing data services over Cingular’s cellular/PCS networks, and the rest were served by its Mobitex network. Cingular Wireless, LLC, SEC Form 10-K, Mar. 11, 2003, at 3, 5.

⁴²⁰ *Young Adults Set to Upgrade Phones, Drive Usage of Mobile Messaging Applications in New Year*, News Release, Telephia and Harris Interactive, Dec. 17, 2002. See Section II.C.3.d(ii), Text Messaging, *infra*, for a discussion of text messaging.

125. 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 to 70 kbps.⁴²¹ As of March 2003, 265 million people, or 93 percent of the U.S. population lived in counties where GPRS, 1xRTT, and or 1xEV-DO networks had been deployed.⁴²²

126. While the sections above discuss the spectrum bands, networks, trends, and metrics related to mobile telephone carriers,⁴²³ this section focuses solely on mobile data services. Sections II.C.3.b and II.C.3.c, *infra*, first provide an overview of the spectrum bands and networks that are used to provide data-only commercial mobile services.⁴²⁴ Section II.C.3.d then describes each of the individual non-voice CMRS services, including details on what each service entails, pricing information, and available data on usage, subscribership, and ARPU.⁴²⁵ This is followed by a discussion of the major types of mobile data devices and device features.⁴²⁶ The mobile data section concludes with an overview of Wi-Fi technology and deployment, and significant developments related to the telemetry and telematics sectors.⁴²⁷

127. As mentioned above, in the *NOI* the Commission requested information from commenters on mobile data, including details on the nature of individual mobile data services, on mobile data service availability and pricing, and on Wi-Fi deployment.⁴²⁸ The mobile data-related information received in the comments consisted of information on next generation networks that various providers use and plan to use to offer mobile data services at higher data transfer speeds.⁴²⁹ While many of the other issues raised in the *NOI* were not directly addressed in the comments, we have been able to gather information on mobile data services, deployment, and pricing from several publicly-available sources, including providers' web sites and news releases, company SEC filings, newspaper and periodical articles, NRUF data, and reports by securities analysts and other research and consulting firms. Given the various sources we have used to examine this segment of the CMRS industry, we believe the multitude of mobile data services, service providers, pricing plans, and devices available to consumers provides evidence that competition for the provision of mobile data products is developing successfully. The numerous, new mobile data products also represent service innovations that CMRS providers are offering in order to compete with each other; hence, the existence of these service offerings provides further evidence that the CMRS industry is competitive.

⁴²¹ See Section II.C.1.b(vii), Technology Deployment, *supra*.

⁴²² See Section II.C.1.b(viii), Coverage by Technology Type, *supra*.

⁴²³ See Sections II.A, Spectrum Allocation; II.B, Network Overview; and II.C.1, Mobile Telephony Overview and Analysis, *supra*.

⁴²⁴ See Sections II.C.3.b, CMRS Spectrum: Data-Only; and II.C.3.c, CMRS Networks: Data-Only, *infra*.

⁴²⁵ See Section II.C.3.d, Services, Content, and Applications, *infra*.

⁴²⁶ See Section II.C.3.e, Devices, *infra*.

⁴²⁷ See Sections II.C.3.f, Wi-Fi, and II.C.3.g, Telemetry and Telematics, *infra*.

⁴²⁸ *NOI*, at 24942-24948.

⁴²⁹ *3G Americas Comments*; *CDG Comments*. This information is discussed in Section II.B.2, Network Technology, *supra*.

b. CMRS Spectrum: Data-Only

128. Section II.A above discussed the spectrum that mobile telephone carriers use to offer both voice and data CMRS services.⁴³⁰ Two additional spectrum bands – paging and narrowband PCS – are used by licensees to offer CMRS services that consist only of data communications, yet are still interconnected.

129. Spectrum designated for commercial paging is spread across several non-contiguous bands: 35-36 MHz, 43-44 MHz, 152-159 MHz, 454-460 MHz, and 929-931 MHz.⁴³¹ Each license consists of between 20 and 50 kilohertz⁴³² and is designed for one-way communications that alert users and provide them the phone number of the person trying to reach them.⁴³³ The Commission first allocated paging spectrum in 1949 and licensed the spectrum on a site-by-site basis through the mid-1990s.⁴³⁴ It began auctioning additional paging licenses on a geographic area basis using EAs and MEAs in 2000.⁴³⁵ The Commission completed its third paging auction, in which 96 bidders purchased 2,832 of 10,202 available licenses, on May 28, 2003.⁴³⁶

130. Narrowband PCS spectrum is located in the 901-902 MHz, 930-931 MHz, and 940-941 MHz bands and allows licensees to offer a limited array of two-way data services such as text messaging.⁴³⁷ The Commission first auctioned narrowband PCS spectrum in 1994.⁴³⁸ Licenses consisted of between 50 and 100 kilohertz each and were offered on both a nationwide and regional basis.⁴³⁹ The Commission is scheduled to begin two auctions of additional narrowband PCS spectrum on September 24, 2003.⁴⁴⁰ The

⁴³⁰ See Section II.A, Spectrum Allocation, *supra*.

⁴³¹ FCC, *Paging (Lower) Bandplan*, <<http://wireless.fcc.gov/auctions/data/bandplans/pagingLwrband.pdf>>; FCC, *929 and 931 MHz Paging Bandplan*, <<http://wireless.fcc.gov/auctions/data/bandplans/auc26bnd.pdf>>.

⁴³² *Id.*

⁴³³ See Section II.C.3.d(i), *Paging, infra*, for a further discussion of paging services.

⁴³⁴ Revision of Part 22 and Part 90 of the Commission's Rules to Facilitate Future Development of Paging Systems, Implementation of Section 309(j) of the Communications Act – Competitive Bidding, *Notice of Proposed Rulemaking*, 11 FCC Rcd 3108, 3109-3110 (1996).

⁴³⁵ See 929 and 931 MHz Paging Auction Closes, *Public Notice*, DA 00-508 (rel. Mar. 6, 2000); *Seventh Report*, at 13050-13051.

⁴³⁶ Lower and Upper Paging Bands Auction Closes, *Public Notice*, DA 03-1836 (rel. May 30, 2003).

⁴³⁷ Implementation of Section 309(j) of the Communications Act – Competitive Bidding Narrowband PCS, PP Docket No. 93-253, *Third Memorandum Opinion and Order and Further Notice of Proposed Rulemaking*, 10 FCC Rcd 175 (1994).

⁴³⁸ Announcing the High Bidders in the Auction of Ten Nationwide Narrowband PCS Licenses; Winning Bids Total \$617,006,674, *Public Notice*, PNWL 94-4 (Aug. 2, 1994).

⁴³⁹ *Id.*; Announcing the High Bidders in the Auction of 30 Regional Narrowband PCS Licenses; Winning Bids Total \$490,901,787, *Public Notice*, PNWL 94-27 (rel. Nov. 9, 1994).

⁴⁴⁰ Narrowband PCS Spectrum Auction Revised Inventory and Start Date for Auction No. 50, *Public Notice*, DA 03-372 (rel. Feb. 7, 2003); Auction of Regional Narrowband PCS Licenses Scheduled for September 24, 2003, *Public Notice*, DA 03-1065 (rel. Apr. 3, 2003).

first auction will consist of licenses covering 48 MTAs and ranging in size from 50 to 200 kilohertz.⁴⁴¹ The second auction will include six, 62.5 kilohertz regional narrowband PCS licenses that will be auctioned in a combinatorial bidding format.⁴⁴²

c. CMRS Networks: Data-Only

131. In addition to the networks discussed in Section II.B, *supra*, 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.⁴⁴³ Some paging carriers also operate data networks using narrowband PCS spectrum, which allow them to offer two-way messaging services. Narrowband PCS networks use the ReFLEX technology protocol, which can transmit data at speeds ranging from 3.2 to 25 kbps.⁴⁴⁴ ReFLEX networks have been deployed in areas covering over 90 percent of the U.S. population.⁴⁴⁵

132. In addition, several mobile telephone carriers, including AT&T Wireless and Verizon Wireless, operate 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 kbps.⁴⁴⁶ These carriers are in the process of upgrading their networks with next generation technologies and migrating many of their CDPD customers to these next generation networks.⁴⁴⁷

133. One U.S. carrier, Monet Mobile, currently offers data-only service using its CDMA1xEV-DO network and broadband PCS spectrum. In October 2002, the carrier began providing mobile Internet access service at speeds ranging from 300 to 700 kbps in Duluth, MN.⁴⁴⁸ It has since launched the service in six additional markets: Sioux Falls, SD; Fargo and Grand Forks, ND; Moorhead and Cloquet, MN; and Eau Claire, WI.⁴⁴⁹

⁴⁴¹ Narrowband PCS Spectrum Auction Revised Inventory and Start Date for Auction No. 50, *Public Notice*, DA 03-372 (rel. Feb. 7, 2003).

⁴⁴² Auction of Regional Narrowband PCS Licenses Scheduled for September 24, 2003, *Public Notice*, DA 03-1065 (rel. Apr. 3, 2003).

⁴⁴³ See Section II.C.3.d(i), *Paging, infra*, for a discussion of traditional paging services.

⁴⁴⁴ WebLink Wireless, *ReFLEX Wireless Data Technology*, 2000, at 18-19, <<http://www.weblinkwireless.com/aboutweblinkwireless/whitepapers/ReFLEX2.PDF>>.

⁴⁴⁵ *Id.*, at 15.

⁴⁴⁶ See *Seventh Report*, at 13046.

⁴⁴⁷ *Q3 2002 @Road Conference Call – Final*, FD (FAIR DISCLOSURE) WIRE, Oct. 24, 2002 (quoting Tom Hoster, Chief Financial Officer of @Road).

⁴⁴⁸ *Monet Mobile Networks Launches Nation’s First Commercial CDMA2000 1xEV-DO, High-speed, Mobile Internet Service*, News Release, Monet Mobile, Oct. 29, 2002.

⁴⁴⁹ Monet Mobile, *Coverage Area* (visited Mar. 8, 2003) <http://www.monetmobile.com/showcontent.asp?contentname=cons_coveragearea>.

134. 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 at speeds ranging from 8.6 to 14.4 kbps.⁴⁵⁰ Cingular Wireless’s network, known as the Mobitex network, is available in 99 of the 100 largest U.S. metropolitan areas and covers 200 million people, or 90 percent of the U.S. metropolitan population.⁴⁵¹ Motient’s ARDIS two-way data network provides coverage in 520 U.S. towns and cities containing 220 million people.⁴⁵²

d. Services, Content, and Applications

135. Non-voice services are beginning to play an increasingly important role in the CMRS industry. Providers have created and have begun offering a variety of specific mobile data services, some of which are focused on entertainment, while others are aimed at maintaining a constant yet remote connection to work and office life.⁴⁵³ The mobile data services currently available include paging, text messaging, information alerts, ring tones, games, exchanging digital photos, web browsing, e-mail, and access to files stored on corporate servers. The following sections discuss these individual mobile data services and include details on what each service entails, service-specific pricing information, and available data on usage and subscribership levels.⁴⁵⁴

136. Pricing for mobile data services varies by service, by provider, and, in some cases, by device and by network technology. Some mobile telephone carriers offer certain mobile data services on an *a la carte* basis in addition to monthly voice service. For example, most carriers allow customers to use and pay for text messaging without purchasing other mobile data services. Verizon Wireless also sells a selection of mobile data applications *a la carte* through its “Get It Now” collection of data services, which includes ring tones, e-mail, games, and digital photo sharing.⁴⁵⁵ These services are sold on a per-use or monthly basis, thereby allowing mobile voice customers to purchase them individually without paying for a monthly mobile Internet access service plan.⁴⁵⁶ Other carriers have taken a different approach to mobile data pricing. For example, AT&T Wireless, T-Mobile, and Cingular Wireless mobile voice customers who wish to add certain mobile data capabilities, such as e-mail, photo sharing, and games, must first

⁴⁵⁰ See *Seventh Report*, at 13045.

⁴⁵¹ Cingular Wireless, LLC, SEC Form 10-K, Mar. 11, 2003, at 5; Cingular Wireless, *Mobitex Data Map* (visited Mar. 8, 2003) <http://www.cingular.com/business/mobitex_map>. Cingular Wireless reports there were 817,000 Mobitex users at the end of 2002. Cingular Wireless, LLC, SEC Form 10-K, Mar. 11, 2003, at 5.

⁴⁵² Motient, *Network Coverage* (visited Mar. 8, 2003) <<http://www.motient.com/Content/NetworkCoverage/Overview/networkoverview.htm>>.

⁴⁵³ See Appendix E, Table 2, at E-3.

⁴⁵⁴ See Sections II.C.3.d(i), Paging through II.C.3.d(x), Location-Based Services, *infra*.

⁴⁵⁵ Verizon Wireless reported 8.5 million downloads of Get It Now applications by its customers within the first six months of the launch of Get It Now. *In Just Six Months, Get It Now Proves Itself as an Over Achiever*, News Release, Verizon Wireless, Apr. 30, 2003.

⁴⁵⁶ Verizon Wireless, *Get It Now* (visited Mar. 21, 2003) <<http://www.verizonwireless.com/ics/plsql/getitnow.intro>>.

subscribe to a monthly, megabyte (“MB”)-based mobile Internet access package.⁴⁵⁷ With these plans, customers pay a monthly fee for a certain number of MB to use each month to download the applications of their choice. Prices for carriers’ entry level MB-based data plans run between \$7 and \$10 per month.⁴⁵⁸ Finally, Sprint PCS charges \$15 per month, in addition to monthly voice service, for unlimited use of a variety of mobile data services discussed in detail below.⁴⁵⁹

137. The mobile data pricing options discussed above are generally marketed to customers wishing to use mobile data services on their mobile handsets as add-ons to voice service. Many providers also offer monthly mobile Internet access service packages designed for customers who wish to connect to wireless networks primarily or exclusively for data, not voice, use. These customers typically access the Internet through a laptop computer with a wireless modem card or mobile phone attached, through a PDA with a built-in wireless modem or a wireless modem card attached, or via a smartphone.⁴⁶⁰ Data-centered pricing plans give subscribers a set number of MB to use each month for mobile Internet access. The plans range from one MB for approximately \$7 per month, to 20 MB for \$34.99 to \$55 per month, to unlimited MB for around \$100 per month.⁴⁶¹ With these plans, customers connect to carriers’ next generation GPRS or 1xRTT networks, which offer data transfer speeds of 30 to 70 kbps.

138. Some providers, including Cingular and AT&T Wireless, do not make a distinction on their MB-based pricing plans between accessing the mobile Internet from a mobile phone and accessing it from

⁴⁵⁷ AT&T Wireless, *mMode Plans* (visited Jan. 27, 2003) <<http://www.attws.com/mmode/plans/>>; T-Mobile, *T-Zones Pricing* (visited Jan. 24, 2003) <<http://www.t-mobile.com/tzones/addonpricing.asp>>; Cingular Wireless, *Wireless Internet Pricing* (visited Jan. 23, 2003) <http://www.cingular.com/beyond_voice/wi_pricing>. AT&T Wireless reports that its mMode subscribers are able to access 260 sites, more than 150 games, and 2,000 ring tones and graphics, and mMode is available in all of the areas where AT&T Wireless has deployed its GSM/GPRS network. AT&T Wireless Services, Inc., SEC Form 10-K, Mar. 25, 2003, at 2, 8.

⁴⁵⁸ Cingular charges \$6.99 per month for one MB, AT&T Wireless charges \$7.99 per month for one MB, and T-Mobile charges \$9.99 per month for 10 MB. AT&T Wireless, *mMode Plans* (visited Jan. 27, 2003) <<http://www.attws.com/mmode/plans/>>; T-Mobile, *T-Zones Pricing* (visited Jan. 24, 2003) <<http://www.t-mobile.com/tzones/addonpricing.asp>>; Cingular Wireless, *Wireless Internet Pricing* (visited Jan. 23, 2003) <http://www.cingular.com/beyond_voice/wi_pricing>.

⁴⁵⁹ Sprint PCS’s monthly mobile data plan is called Vision. Sprint PCS Vision, *How Can I Use It?* (visited Jan. 28, 2003) <<http://www.pcsvision.com/howcan.html>>; Sprint PCS, *PCS Service Plans: Select Your Plan* (visited Jan. 28, 2003) <<http://www1.sprintpcs.com/explore/servicePlansOptionsV2/PlansOptions.jsp>>. Sprint PCS was serving 1.3 million Vision customers as of the end of March 2003. *Q1 2003 Sprint FON Group Earnings Conference Call – Final*, FD (FAIR DISCLOSURE) WIRE, Apr. 21, 2003 (Len Lauer, President of Sprint PCS).

⁴⁶⁰ As discussed in the *Seventh Report*, smartphones are devices that combine the voice capabilities of mobile telephones with the data and personal information management functions of PDAs. Compared to traditional mobile handsets, smartphones generally have larger screens, more advanced graphics and processing capabilities, more memory, a more advanced or user-friendly operating system, some form of QWERTY keypad, and the ability to synch data with a desktop computer. See *Seventh Report*, at 13047.

⁴⁶¹ Verizon Wireless, *Express Network: Pricing* (visited Jan. 17, 2003) http://www.verizonwireless.com/express_network/exp_terms.html; Cingular Wireless, *Wireless Internet Pricing* (visited Jan. 23, 2003) http://www.cingular.com/beyond_voice/wi_pricing; T-Mobile, *T-Mobile Internet* (visited Jan. 24, 2003) http://www.t-mobile.com/tmobile_internet/rates.asp; AT&T Wireless, *mMode Plans* (visited Jan. 27, 2003) <http://www.attws.com/mmode/plans/>; Sprint PCS, *PCS Service Plans: Select Your Plan* (visited Jan. 28, 2003) <http://www1.sprintpcs.com/explore/servicePlansOptionsV2/PlansOptions.jsp>.

a laptop attached to a mobile phone; they offer one set of MB-based pricing plans and customers can choose which device to use to consume their MB. Cingular's highest level MB-based pricing plan consists of 13 MB for \$49.99 per month, while AT&T Wireless's includes 8 MB for \$19.99 per month.⁴⁶² T-Mobile, on the other hand, offers one MB-based plan for Internet access via a mobile phone; another set of MB-based plans for access via a smartphone, a PDA, or a mobile phone attached to a laptop; and a third set for access via a wireless modem card attached to a laptop or PDA.⁴⁶³

139. In addition to mobile telephone carriers, other mobile data providers offer mobile Internet access plans for use on PDAs and laptop computers. Companies such as Earthlink, Inc. ("Earthlink"), GoAmerica, Inc. ("GoAmerica"), Research In Motion, Inc. ("RIM"), and Monet Mobile offer enterprise-focused data services – such as e-mail, web, and corporate server access – using either unlimited use or MB-based monthly pricing plans.⁴⁶⁴

140. We discuss the various ways in which providers price mobile data services in order to offer insight into the nature of this segment of the CMRS industry and to illustrate the numerous options available to consumers from competing firms. The service packages described above, as well as most of the individual mobile data services described below, have developed so recently, many just in the past year, that it is difficult to make historical comparisons about them, and there is limited information on the trends related to the pricing or packaging of these services.

(i) Paging

141. Traditional paging service consists of one-way data communications sent to a mobile device that alerts the user when it arrives. The communication typically consists of a phone number for the user to call, and can also contain other text-based information. Paging services are offered by paging carriers as well as by mobile telephone carriers. Paging carriers sell paging and messaging, but not voice, services using paging and narrowband PCS networks and spectrum, and paging/messaging devices or units. Using NRUF data, we estimate there were 14.1 million paging units in service at the end of 2002, down 22 percent from 18 million units at the end of 2001.⁴⁶⁵ Arch Wireless Communications, Inc. ("Arch Wireless") and Metrocall, Inc. ("Metrocall") are the largest paging carriers.⁴⁶⁶ Other major paging

⁴⁶² Cingular Wireless, *Wireless Internet Pricing* (visited Jan. 23, 2003) <http://www.cingular.com/beyond_voice/wi_pricing>; AT&T Wireless, *mMode Plans* (visited Jan. 27, 2003) <<http://www.attws.com/mmode/plans/>>.

⁴⁶³ T-Mobile, *T-Zones Pricing* (visited Jan. 24, 2003) <<http://www.t-mobile.com/tzones/addonpricing.asp>>.

⁴⁶⁴ See Appendix E, Table 1, at E-2.

⁴⁶⁵ NRUF data for year-end 2002. See Section II.C.1.b(i), Subscriber Growth, *supra*, for a description of this source. Many traditional paging carriers also offer advanced messaging services, such as e-mail and information updates, which are discussed in below in their respective subsections.

⁴⁶⁶ As mentioned in the *Seventh Report*, Arch Wireless filed for bankruptcy in December 2001 and Metrocall filed in June 2002. See *Seventh Report*, at 13050. Both companies have since emerged from bankruptcy, Arch Wireless in May 2002 and Metrocall in October 2002. Jonathan Berke, *Arch Wireless Out of Ch. 11*, DAILY DEAL, May 30, 2002; Yuki Noguchi, *Out of Bankruptcy, Into Uncertainty; Smaller Metrocall Expects to Lose More Paging Customers, Retain Core Clientele*, THE WASHINGTON POST, Oct. 10, 2002, at E5.

carriers include SkyTel Communications, Inc. and WebLink Wireless, Inc (“WebLink”).⁴⁶⁷

142. Mobile telephone carriers also offer paging services using cellular and broadband PCS spectrum, as most digital mobile telephone handsets include a paging component and/or Caller ID feature that allows users to view the phone number of the person who has called them. While paging carriers have faced competition from these types of features offered by mobile telephone carriers, traditional paging devices are generally less expensive, and paging networks have a more powerful signal strength which allows them to provide better underground and in-building coverage.⁴⁶⁸ Arch Wireless stated in July 2002 that, because of these advantages, the company expects paging to remain a viable service in the future, but one that will serve a smaller market sector consisting mainly of commercial customers such as medical and emergency personnel and large industrial companies.⁴⁶⁹ Metrocall commented in October 2002 that it planned to focus on serving the same type of customers.⁴⁷⁰

(ii) Text Messaging

143. Text messaging, also called Short Messaging Service (“SMS”), provides the ability for mobile telephone users to exchange short text messages with other mobile handsets and with e-mail addresses.⁴⁷¹ Text messages are limited to a maximum message length ranging from 120 to 500 characters.⁴⁷²

⁴⁶⁷ SkyTel Communications, Inc. is a wholly owned subsidiary of WorldCom that was acquired on October 1, 1999. See *Fifth Report*, at 17720-17721. In July 2002, just prior to its bankruptcy filing, WorldCom announced that it planned to exit the wireless business and eventually sell off SkyTel. Dan Meyer, *WorldCom Plans Wireless Exit*, RCR WIRELESS NEWS, July 8, 2002, at 1; Jim Krane, *Long-distance Giant WorldCom Files for Biggest Bankruptcy in U.S. History*, THE ASSOCIATED PRESS, July 22, 2002. As noted in the *Seventh Report*, WebLink filed for bankruptcy in May 2001. See *Seventh Report*, at 13050. The company emerged from bankruptcy in September 2002, and in January 2003, WebLink announced that it had agreed to be acquired by Leucadia National Corp, a financial services holding company. Karen Brown, *WebLink Re-Emerges, Broadens Message*, WIRELESS WEEK, Sept. 16, 2002, at 16; *WebLink Finds a Buyer*, COMMUNICATIONS TODAY, Jan. 17, 2003.

⁴⁶⁸ See *Seventh Report*, at 13051; John Sullivan, *Motorola’s Exit: Death Knell Or New Dawn For Paging Market?*, WIRELESS DATA NEWS, Dec. 19, 2001.

⁴⁶⁹ Presentation of Arch Wireless, Federal Communications Commission, July 25, 2002 (quoting C. Edward Baker, Jr., Chairman and CEO).

⁴⁷⁰ Yuki Noguchi, *Out of Bankruptcy, Into Uncertainty; Smaller Metrocall Expects to Lose More Paging Customers, Retain Core Clientele*, THE WASHINGTON POST, Oct. 10, 2002, at E5 (quoting Vincent D. Kelly, Chief Financial Officer of Metrocall).

⁴⁷¹ E-mail users can send a text message to a mobile handset using an e-mail address consisting of the recipient’s 10 digit phone number and the carrier’s name, such as 1234567890@carriername.com. Most carriers also offer the ability to send text messages from their websites.

⁴⁷² See *Seventh Report*, at 13051. SMS also can be used to deliver information updates to mobile users. This service is discussed in Section II.C.3.d(ii), Text Messaging, *infra*. Mobile telephone carriers have also been linking their text messaging services with popular television shows and movies. For example, AT&T Wireless enabled its customers to text in their votes for their favorite performers on “American Idol,” and Verizon Wireless allowed its customers to vote for the Most Valuable Player during the National Basketball Association All-Star Game. Ken Spencer Brown, *Message Technology Gets “American Idol” Showcase*, INVESTOR’S BUSINESS DAILY, Feb. 14, 2003, at A5.

144. Two-way text messaging was introduced in the United States by T-Mobile in May 2000.⁴⁷³ By the end of 2001, the six nationwide mobile telephone carriers, as well as other mobile data providers, were offering the service.⁴⁷⁴ During December 2001 and the first quarter of 2002, mobile telephone carriers introduced inter-carrier interoperability of SMS, allowing subscribers to exchange text messages with other carriers' customers.⁴⁷⁵

145. SMS traffic increased dramatically during 2002. An estimated one billion text messages were sent in the United States during June 2002, up from 30,000 sent during June 2001.⁴⁷⁶ One analyst estimates that 20 percent of all U.S. mobile telephone subscribers either sent or received a text message during the fourth quarter of 2002, up from 12 percent during the fourth quarter of 2001.⁴⁷⁷ An estimated 28 percent of SMS users were "frequent users," meaning they sent or received a message at least once a day.⁴⁷⁸ Among adults aged 12 and older, another analyst estimated 19 percent had used text messaging services as of February 2003, and 72 percent of this group both sent and received messages.⁴⁷⁹ Among young adults aged 18 to 24, approximately 45 percent used text messaging during the fourth quarter of 2002, up from 22 percent during the fourth quarter of 2001.⁴⁸⁰ Many carriers and analysts have attributed the growth in text messaging in large part to the introduction of inter-carrier interoperability.⁴⁸¹

146. Pricing plans for text messaging vary by carrier. However, most carriers offer subscribers the option of paying for text messages on a per-message basis, or purchasing a package of text messages for a monthly fee.⁴⁸² Per-message fees range from 5 to 10 cents to send, and zero to 10 cents to receive.⁴⁸³

⁴⁷³ See *Seventh Report*, at 13051.

⁴⁷⁴ *Id.*, at 13051-13052.

⁴⁷⁵ *Id.*, at 13052. A recent study by Keynote Systems, a company that tests the performance of Internet technologies, found that approximately 5 percent of all sent text messages are never received. Susan Stellin, *Compressed Data; Some Text Messages Just Disappear, a Study Finds*, THE NEW YORK TIMES, Jan. 20, 2003, at C3 (citing Keynote Systems).

⁴⁷⁶ Thomas E. Wheeler, President of CTIA, Presentation at CTIA Wireless I.T. & Internet 2002, Las Vegas, NV, Oct. 16, 2002. Cingular Wireless reports that its subscribers sent 211 million text messages during December 2002, up four-fold from 54 million messages sent during January 2002. Sue Marek, *Cingular Gets Back to Basics*, WIRELESS WEEK, Mar. 1, 2003, at 12. In addition, AT&T Wireless reports it had 3 million paying SMS customers as of year-end 2002. AT&T Wireless Services, Inc., SEC Form 10-K, Mar. 25, 2003, at 2.

⁴⁷⁷ *Young Adults Set to Upgrade Phones, Drive Usage of Mobile Messaging Applications in New Year*, News Release, Telephia and Harris Interactive, Dec. 17, 2002.

⁴⁷⁸ *Id.*

⁴⁷⁹ Tobi Elkin, *18% Would Rather Give Up TVs Than Wireless Phones*, ADAGE, Feb. 24, 2003 (citing Upoc and Frank N. Magid and Associates).

⁴⁸⁰ *Young Adults Set to Upgrade Phones, Drive Usage of Mobile Messaging Applications in New Year*, News Release, Telephia and Harris Interactive, Dec. 17, 2002.

⁴⁸¹ Denny Strigl, President and CEO of Verizon Wireless, Presentation at Goldman Sachs Telecom Issues Conference, New York, NY, May 6, 2002.

⁴⁸² In both cases, the fees for text messaging would be in addition to a subscriber's monthly voice service plan.

Monthly packages of between 100 and unlimited text messages range from approximately \$3 to \$8 per month.⁴⁸⁴

147. In addition to text messaging, many carriers offer instant messaging (“IM”) services for mobile users. Instant messaging services, such as America Online (“AOL”) Instant Messenger (“AIM”), MSN Messenger, and Yahoo! Messenger, enable users to exchange messages with multiple users in a chat-style atmosphere. IM users are identified by their IM screen name instead of their phone number or e-mail address, and are able to tell whether people from their “buddy list” – a list of other IM users with whom the initial user communicates – are also online. With IM services, mobile users can exchange messages with other IM users regardless of whether they are on a personal computer (“PC”) or a mobile phone. However, the various IM services are not interoperable; therefore, AIM users can communicate only with other AIM users and not with MSN or Yahoo! Messenger users.

148. Many of the major mobile telephone carriers, including Nextel, Verizon Wireless, T-Mobile, and AT&T Wireless, offer access to AIM.⁴⁸⁵ Some carriers also offer access to Yahoo! or MSN Messenger.⁴⁸⁶ IM exchanges are often included in carriers’ text messaging pricing plans, where one IM message is counted as one text message. Nextel offers AIM separately from text messaging and charges \$5 per month for unlimited AIM use.⁴⁸⁷

(iii) Ring Tones and Personalized Graphics

149. Over the past year, mobile telephone carriers began offering their customers a number of new, entertainment-oriented applications and services to download and use on their mobile handsets. These include ring tones, personalized graphics, games, and the ability to take and exchange digital

⁴⁸³ See Appendix E, Table 1, at E-2. Verizon Wireless also offers text messaging for its prepaid voice customers for 5 cents to send and 5 cents to receive. Verizon Wireless, *Mobile Messenger Service: Overview* (visited Jan. 17, 2003) <<http://www.verizonwireless.com/jsp/mobilemessenger/index.jsp>>.

⁴⁸⁴ Cingular and Verizon Wireless both charge \$2.99 per month to send or receive 100 messages, while AT&T Wireless charges \$4.99 per month to send 100 messages and received messages are free. Prices for a package of 500 messages range from \$2.99 per month with T-Mobile to \$9.99 per month with Cingular, and Verizon Wireless charges \$7.99 per month for 600 messages. See Appendix E, Table 1, at E-2. For all carriers, overage fees are the same as per message fees. Nextel charges \$7.50 per month for unlimited text messaging. Nextel, *Nextel Mobile Messaging* (visited Feb. 4, 2003) <<http://www.nextel.com/services/mobilemessaging/index.shtml>>. Cingular also offers an advanced text messaging service using its Mobitex network for subscribers using RIM devices. The service, called Interactive Messaging PLUS, enables users to send messages as faxes or text-to-voice messages and to receive confirmation that their messages have been delivered and read. Cingular Wireless, *Interactive Messaging* (visited Jan. 24, 2003) <<http://www.cingular.com/business/implus>>. Interactive Messaging PLUS costs \$16.99 per month for 100 kB, or 100,000 characters; \$24.99 per month for 200 kB, or 200,000 characters; and \$29.99 per month for 500 kB, or 500,000 characters. Overage charges are 20, 10, and 5 cents per kB, respectively. *Id.*

⁴⁸⁵ See Appendix E, Table 1, at E-2.

⁴⁸⁶ *Id.*

⁴⁸⁷ Nextel, *Nextel Mobile Messaging* (visited Feb. 4, 2003) <<http://www.nextel.com/services/mobilemessaging/index.shtml>>. Nextel also offers an integrated mobile messaging package that gives users unlimited text messaging, AIM use, and wireless web access for \$10 per month. *Id.*

photos.⁴⁸⁸ Ring tone services offer users the ability to download pieces of music, ranging from popular songs to simple jingles to classical music, which play when the phone rings. Some downloadable ring tones are polyphonic, meaning they can play up to 16 different sounds, instead of only one, simultaneously. Users can also associate specific songs with specific incoming calls. With the personalized graphics services, subscribers can download wallpaper and screen savers for their handset screens, as well as images that can be set to correspond to particular incoming calls.

150. There is evidence that ring tones have gained in popularity over the past year. One leading U.S. ring tone provider,⁴⁸⁹ Moviso LLC (“Moviso”), reported it had 1.5 million downloads during December 2002, up from 79,000 during January 2002.⁴⁹⁰ Ring tone sales generated an estimated \$1 billion in global revenue during 2002, and royalties paid to artists or music rights holders totaled \$71 million, up 58 percent from the previous year.⁴⁹¹ Verizon Wireless reports that ring tones are the company’s most frequently downloaded application, and that most of its ring tone customers download its most expensive package, a package of 10 songs for \$9.99.⁴⁹²

151. Pricing for ring tones and graphics varies by carrier. Some carriers require that users subscribe to a monthly mobile Internet or text messaging package before the carriers will enable them to download these applications. For example, Sprint PCS includes access to ring tones and graphics in its \$15 per month mobile Internet service plan, Vision, but users must pay additional fees to download certain songs and images.⁴⁹³ Cingular customers who subscribe to a text messaging or mobile Internet

⁴⁸⁸ See Sections II.C.3.d(iv), Games and II.C.3.d(v), Multimedia Messaging Services, *infra*, for a discussion of games and services allowing users to exchange digital photos and video files.

⁴⁸⁹ Ring tone providers aggregate and secure the rights to replay music, and then convert it into a downloadable format, while mobile telephone carriers provide the network and interface over which the music is downloaded by end users.

⁴⁹⁰ Christopher Stern, *Lords of the Ring-a-Lings*, NEWSBYTES, Dec. 25, 2002 (“*Stern article*”). Moviso and Modtones are the two leading U.S. ring tone providers. *Id.*

⁴⁹¹ *Music Industry Sees Profit in Playing the Wireless Market*, CTIA Daily News, Feb. 12, 2003 (citing DOW JONES NEWSWIRES); Gordon Masson and Juliana Koranteng, *Labels Hope to Dial Up Wireless Windfall*, BILLBOARD, Jan. 25, 2003, at 1. Ring tone revenues are shared among carriers, ring tone providers, and music producers who must – in the cases where the music is under copyright protection – pay royalties to artists or other entities that hold various rights to a song. *Stern article*. The range of ring tones and graphics available to mobile users varies by carrier and depends largely the providers and/or music labels with whom the carrier has an agreement. In some cases, carriers contract directly with music labels. Verizon Wireless customers can choose ring tones offered by three different providers, ModTones, Moviso, and Matsui Comtek Corp. Verizon Wireless, *Shop Get It Now: Get Tones* (visited Jan. 22, 2003) <http://www.verizonwireless.com/ics/plsql/getitnow_shop.app?p_type=get%20tones>. AT&T Wireless and Sprint PCS mobile Internet subscribers can download music produced by Warner Music Group’s labels. AT&T Wireless, *mMode Features – How to Access Warner Music* (visited Jan. 27, 2003) <<http://www.attws.com/mmode/features/music/howTo.jhtml#warner>>. *Sprint and Warner Music Group Offer America’s First Wireless Streaming Music Clip Subscription Service and Collection of Official Artist Branded Animated and Voice Ringers on PCS Vision(SM) Phones*, News Release, Sprint PCS, Jan. 8, 2003.

⁴⁹² *Stern article* (citing John Johnson, a spokesman for Verizon Wireless).

⁴⁹³ Sprint PCS Vision, *Ringers* (visited Jan. 28, 2003) <<http://www.pcsvision.com/ringers.html>>; Sprint PCS Vision, *Screens* (visited Jan. 28, 2003) <<http://www.pcsvision.com/screens.html>>.

package, and T-Mobile customers who subscribe to the company's monthly "T-Zones" mobile Internet and content package, receive access to downloadable songs and graphics, but must also pay a per-song fee for each ring tone or image.⁴⁹⁴ Individual ring tone prices range from \$0.99 with Cingular, AT&T Wireless, and T-Mobile, to \$1.49 with Verizon Wireless.⁴⁹⁵ Sprint PCS's Vision ring tones range from \$1.00 for polyphonic tones to \$3.99 for samples of new and pre-released music.⁴⁹⁶ In some cases, carriers may include the ability to download a set number of ring tones at no additional cost beyond the monthly cost for voice service.

(iv) Games

152. In addition to text messaging, music, and graphics, another entertainment application that all of the six nationwide carriers and some smaller operators began offering over the past year was mobile gaming. One analyst estimates that 7 million U.S. mobile telephone subscribers used mobile phones to play games during 2002.⁴⁹⁷

153. Various card, casino, sports, action, adventure, trivia, and puzzle games are available for users to download and play locally on their handsets or, in some cases, against other players connected to the network. Some are based on movies and television shows, such as the Lord of the Rings and Top Gun interactive adventure games. However, different carriers offer a different selection of games. Some games are available from more than one carrier. For example, both Nextel and Verizon Wireless offer, among other games, Bowling by JAMDAT and ESPN's 2 Minute Drill.⁴⁹⁸ T-Mobile and AT&T Wireless

⁴⁹⁴ Cingular Wireless, *Ringtones & Graphics* (visited Jan. 22, 2003) <<http://mww.moviso.com/cingular/app?class=Cingular&proc=GetMakeInfo>>; T-Mobile, *Download Zone Overview* (visited Jan. 24, 2003) <<http://www.t-mobile.com/tzones/downloadzone.asp>>.

⁴⁹⁵ Cingular Wireless, *Ringtones & Graphics* (visited Jan. 22, 2003) <<http://mww.moviso.com/cingular/app?class=Cingular&proc=GetMakeInfo>>; AT&T Wireless, *Ring Tones How To* (visited Jan. 27, 2003) <http://www.attws.com/personal/txt_msg/personalization/ringTones/howTo.jhtml>; T-Mobile, *Download Zone Overview* (visited Jan. 24, 2003) <<http://www.t-mobile.com/tzones/downloadzone.asp>>; Verizon Wireless, *Shop Get It Now: Get Tones* (visited Jan. 22, 2003) <http://www.verizonwireless.com/ics/plsql/getitnow_shop.app?p_type=get%20tones>. Verizon Wireless also sells packages of ring tones. Ring tones from ModTones cost \$1.49 for one song, \$6.49 for five, and \$9.99 for 10. Ring tones from Ringster by Moviso cost \$1.49 for one and \$6.99 for six. Ring tones from MyTonz by Matsui Comtek Corp cost \$1.49 for one, \$3.99 for three, and \$7.99 for seven. *Id.*

⁴⁹⁶ *Sprint and Warner Music Group Offer America's First Wireless Streaming Music Clip Subscription Service and Collection of Official Artist Branded Animated and Voice Ringers on PCS Vision(SM) Phones*, News Release, Sprint PCS, Jan. 8, 2003.

⁴⁹⁷ *Handango Launches Phone Fusion Gift Card for Mobile Phone Games*, News Release, Handango, Jan. 27, 2003 (citing research firm IDC).

⁴⁹⁸ Verizon Wireless, *Get It Now: Get Games* (visited Jan. 22, 2003) <http://www.verizonwireless.com/ics/plsql/getitnow_shop.app?p_type=get%20games> ("*Get Games*"); Nextel, *Nextel iDEN Update – Games* (visited Feb. 7, 2003) <<http://www.idenupdate.com/DRHM/servlet/ControllerServlet?Action=DisplayProductListPageMOT&SiteID=idenuptd&categoryID=2005&resultsPerPage=10>> ("*Nextel Games*"). Users can download games over the air or via a wireline Internet connection with a cable connected to the handset. *Id.* The games offered through Verizon Wireless's Get It Now service were created by various application developers, including JAMDAT, COM2US Corporation, and Nuvo Studios. *See Get Games.*

both offer Top Gun.⁴⁹⁹ As with many of the other applications described above, the ability to download and play games is limited to specific handset models; furthermore, certain game features may be available only on certain models.⁵⁰⁰

154. Most carriers offer a per-use, per-month, or unlimited use fee for each game. In the example given above, Verizon Wireless and Nextel both charge \$5.99 for unlimited lifetime use of Bowling by JAMDAT, and Verizon Wireless also offers it for \$2.49 per month.⁵⁰¹ All of the games offered by Nextel are for permanent, unlimited use, and per-game costs range from \$4.00 to \$14.00.⁵⁰² Cingular charges a \$0.99 per use fee for all of its games.⁵⁰³ Other carriers, such as T-Mobile and AT&T Wireless, do not charge an additional fee for games but require that users subscribe to a monthly, MB-based mobile Internet access plan in order to access games, and the kilobytes (“kB”) used to download games are then deducted from the monthly allotment.⁵⁰⁴ If customers choose to play a networked game, they must remain online and will continue to consume kB as they are playing.

(v) Multimedia Messaging Services

155. Over the past year, carriers introduced the ability to exchange photo, video, animation, and audio files using a mobile phone. These services are often collectively called multimedia messaging services (“MMS”) because customers are using another medium instead of, or in addition to, text to communicate or convey a message.

156. With mobile photo services, users can take, send, download, and view digital images using their mobile handsets. They are able to send photos to other handsets with image-viewing capabilities or to any landline e-mail address. Some carriers also offer the option of posting images on a photo sharing web site such as Snapfish.⁵⁰⁵ Users can save photos to use as backgrounds on their handset screens or for

⁴⁹⁹ T-Mobile, *T-Zones Mobile Web Overview* (visited Jan. 24, 2003) <<http://www.t-mobile.com/tzones/service.asp>> (“*T-Zones Overview*”); AT&T Wireless, *mMode Games* (visited Jan. 27, 2003) <<http://www.attws.com/mmode/features/games/mmodeGames.jhtml>>. AT&T Wireless offers games to its mMode users created by a variety of application developers, including JAMDAT, nGame, and Mobliss. Other carriers may have no overlap with other carriers in their game product line.

⁵⁰⁰ See, for example, Sprint PCS, *Games* (visited Feb. 10, 2003) <<http://www.pcsvision.com/games.html>>.

⁵⁰¹ *Get Games; Nextel Games*.

⁵⁰² *Nextel Games*. A few games are free. *Id.*

⁵⁰³ Cingular Wireless, *Games* (visited Feb. 10, 2003) <http://www.cingular.com/beyond_voice/games>. Cingular offers both interactive and downloadable games, including Trivia, Hangman, Blackjack, and others. All of the games are text-based and can be accessed by any handset that is text messaging capable. Users must have a My Wireless Window login from a Text Messaging or Wireless Internet account in order to access games. *Id.*

⁵⁰⁴ *T-Zones Overview*; AT&T Wireless, *mMode Games* (visited Jan. 27, 2003) <<http://www.attws.com/mmode/features/games/mmodeGames.jhtml>>. Games available from T-Mobile include The Love Game, Club KO, and Top Gun. *T-Zones Overview*. See Section II.C.3.d, Services, Content, and Applications, *supra*, for a discussion of MB-based pricing plans.

⁵⁰⁵ Verizon Wireless, *Shop Get It Now: Get Pix* (visited Jan. 22, 2003) <http://www.verizonwireless.com/ics/plsql/getitnow_shop.app?p_type=get%20pix>; AT&T Wireless, *mMode Pix* (visited Jan. 27, 2003) <<http://www.attws.com/mmode/features/mModePix/>>.

Picture Caller ID.⁵⁰⁶ At least one carrier has begun offering its customers the ability to download and view video clips sent by friends or family or to view live video from cameras at various public locations.⁵⁰⁷ Some carriers also enable customers to send selected songs and animation clips to other mobile users to convey a message.⁵⁰⁸

157. MMS services are generally available only on certain mobile handset models. Services involving taking and sending photos, for instance, require handsets with built-in or attachable digital cameras. As of April 2003, at least six major carriers, including five of the six nationwide carriers and ALLETEL, and their affiliates were offering MMS.

158. In order to access MMS services, many carriers – including Cingular, AT&T Wireless, and T-Mobile – require that users first subscribe to a monthly mobile Internet access plan in addition to voice service, and the kB used to upload and download digital photo and video files are deducted from the subscriber's monthly allotment of MB.⁵⁰⁹ Verizon Wireless, on the other hand, allows its customers to access individual MMS services without a monthly MB-based mobile Internet access subscription. Its customers can instead pay for unlimited monthly use of one of its individual MMS applications, such as Snapfish, exego, or Logitech, at prices ranging from \$2.99 to \$5.99 per month.⁵¹⁰ Sprint PCS includes the ability to take and send digital photos in its \$15 per-month Vision package.⁵¹¹

(vi) Information Alerts

159. Many mobile data providers offer their text messaging users the ability to receive short, text-based, customized information alerts, including news updates, weather forecasts, sports scores, stock quotes, horoscopes, and traffic information, on their mobile devices. Users specify on their carrier's web site which content they would like to receive and must own a text messaging-capable handset. The range

⁵⁰⁶ AT&T Wireless, *mMode Pix* (visited Jan. 27, 2003) <<http://www.attws.com/mmode/features/mModePix/>>.

⁵⁰⁷ As of February 2003, users of the mobile video service, Logitech, could view public cameras placed in a variety of scenic locations such as beaches, as well as along major roads in the New York City metro area. Logitech, Inc., *Logitech Mobile Video* (visited Jan. 22, 2003) <<http://mobilevideo.logitech.com>>; *Verizon's Get It Now Customers Can Now Get Video on Their Phones*, CTIA Daily News, Feb. 3, 2003 (citing WIRELESS NEWSFACTOR). Logitech users can have text messages sent to them when certain cameras are turned on. Logitech, Inc., *Logitech Mobile Video* (visited Jan. 22, 2003) <<http://mobilevideo.logitech.com>>.

⁵⁰⁸ *FunMail Adds Cartoons to Text Messages*, CTIA Daily News, Jan. 29, 2003 (citing WIRELESS NEWSFACTOR).

⁵⁰⁹ Cingular Wireless, *Photo Messaging* (visited Jan. 23, 2003) <http://www.cingular.com/beyond_voice/photo_messaging>; T-Mobile, *T-Zones Camera Phones* (visited Jan. 24, 2003) <<http://www.t-mobile.com/tzones/cameraphones/>>; AT&T Wireless, *mMode Pix* (visited Jan. 27, 2003) <<http://www.attws.com/mmode/features/mModePix/>>.

⁵¹⁰ Verizon Wireless, *Shop Get It Now: Get Pix* (visited Jan. 22, 2003) <http://www.verizonwireless.com/ics/plsql/getitnow_shop.app?p_type=get%20pix>; Logitech, *Logitech Mobile Video* (visited Jan. 22, 2003) <<http://mobilevideo.logitech.com>>. Snapfish costs \$2.99 per month or \$.99 for a one day purchase, exego costs \$5.99 per month, and Logitech costs \$4.99 per month. Users must have a handset enabled for Verizon Wireless's Get It Now service. *Id.* These prices are in addition to the monthly cost of voice service.

⁵¹¹ Sprint PCS Vision, *Pictures* (visited Jan. 28, 2003) <<http://www.pcsvision.com/pictures.html>>.

of available content is based on the number and type of content providers with whom the carrier has an agreement. For example, Verizon Wireless offers information alerts from Forbes.com, ABC News, Astrology.com, Fox Sports, the Weather Channel, USA Today, and TV Guide.⁵¹² Pricing for information alerts is generally the same as for text messaging.⁵¹³ Some carriers require the purchase of a monthly text messaging package in order to register to receive information updates, and one information update is then counted as one text message.⁵¹⁴

(vii) Web Browsing

160. In contrast to information alerts, which push content to mobile users, wireless web services enable users to pull web-based information and applications from the Internet to their mobile devices. Subscribers who connect to the Internet via a wireless modem card attached to a laptop can surf the entire web using common PC browsers, such as Internet Explorer or Netscape. Users connecting via PDAs or some smartphone models are typically able to access most web sites, although some web pages may be difficult to view given the smaller screen size and other constraints of such devices.⁵¹⁵

161. With mobile telephone handsets, web browsing is generally limited to the web sites offered by the content providers with whom a carrier has a content agreement. Therefore, most mobile telephone carriers allow wireless web users to access a variety of popular web sites and applications on their mobile handsets but do not allow access to the entire web. While the specific sites available to users vary by carrier, most carriers offer at least one version of the following: news and traffic updates; weather reports; sports scores; stock quotes and financial data; movie, flight, and restaurant information; and horoscopes. Other applications available to wireless web users include shopping on sites such as Amazon.com, search engines and portals, and downloadable recipes. The content is typically text-based. One analyst estimates that, as of February 2003, 21 percent of web-enabled mobile phone users, or 7.5 percent of all mobile telephone subscribers, were using their phones to browse the Internet.⁵¹⁶

⁵¹² Verizon Wireless, *Mobile Messenger: Send a Message* (visited Feb. 5, 2003) <http://www.vtext.com/customer_site/jsp/messaging_lo.jsp>. Verizon Wireless also allows subscribers to its Mobile Web service to receive information alerts from MSN's web content. Verizon Wireless, *Welcome to Mobile Web* (visited Jan. 17, 2003) <<http://www.verizonwireless.com/mobileweb/index.html>>.

⁵¹³ Verizon Wireless and T-Mobile users can register to receive customized information updates, and the price to receive an update is the same as the price to receive a text message. See Verizon Wireless, *Mobile Messenger Service: Information Alerts* (visited Jan. 17, 2003) <<http://www.verizonwireless.com/jsp/mobilemessenger/alerts.jsp>>; T-Mobile, *Alerts* (visited Jan. 24, 2003) <<http://www.t-mobile.com/alerts/>>.

⁵¹⁴ Cingular users who purchase a monthly text messaging package receive a "My Wireless Window" login and can access a variety of applications, including the ability to receive customized information alerts. Received alerts are then deducted from the monthly allotment of text messages. Cingular Wireless, *Text Messaging Pricing* (visited Jan. 23, 2003) <http://www.cingular.com/beyond_voice/tm_pricing>.

⁵¹⁵ See Section II.C.3.e, Devices, *infra*.

⁵¹⁶ Tobi Elkin, *18% Would Rather Give Up TVs Than Wireless Phones*, ADAGE, Feb. 24, 2003 (citing Upoc and Frank N. Magid and Associates). Mobile web browsing usage increased dramatically during the beginning of the conflict and war with Iraq. The top 15 mobile news sites saw their traffic increase an average of 41 percent on March 18, 2003, and sites such as Yahoo! and MSNBC saw their traffic rise two to three time normal levels on March 19, 2003. *People Flock to Web, Text Messages as Conflict with Iraq Heats Up*, CTIA Daily News, Mar. 20, 2003 (citing REUTERS).

162. The ways in which carriers charge for wireless web browsing parallels the ways in which they charge for many of the other mobile data services they offer. For example, the carriers who use per-MB pricing plans to offer a selection of mobile data services to their mobile telephone customers generally include web browsing in that selection, and then deduct the kB used for web browsing from their subscribers' monthly allotment of MB.⁵¹⁷ Sprint PCS includes web browsing in its package of services available through its \$15 per month Vision mobile data plan.⁵¹⁸ In addition to offering MB-based pricing plans, some carriers also sell web browsing for a flat monthly fee, and the minutes used for web access are deducted from a subscriber's monthly bucket of voice minutes.⁵¹⁹ Finally, some carriers, such as Verizon Wireless with its Get It Now service, sell individual web applications on an *a la carte* basis.⁵²⁰

(viii) E-mail

163. Most mobile data providers currently offer users the ability to access e-mail messages while mobile. E-mail is distinguishable from text messaging in that e-mail services do not have the maximum character limits that text messaging services do.⁵²¹ Moreover, mobile e-mail services allow users to access or to receive automatically messages sent to their pre-existing work or personal e-mail accounts. Some mobile e-mail services allow users to access existing, web-based or POP3⁵²² e-mail accounts provided by web portals such as Yahoo! or MSN or by ISPs such as Earthlink. Other mobile e-mail services give users direct access to their corporate or office-based e-mail accounts. Some mobile e-mail services are "pushed" or always-on, meaning users will receive their messages whenever their device is turned on, while other e-mail services are "pulled" and require users to dial-up periodically in order to receive their messages.⁵²³

164. Many providers offer both the ability to send and receive messages from a POP3 account as

⁵¹⁷ AT&T Wireless, *mMode Features Content* (visited Jan. 27, 2003) <<http://www.attws.com/mmode/features/content/>>; *T-Zones Overview*.

⁵¹⁸ Sprint PCS Vision, *How Can I Use It?* (visited Jan. 28, 2003) <<http://www.pcsvision.com/howcan.html>>; Sprint PCS, *PCS Service Plans: Select Your Plan* (visited Jan. 28, 2003) <<http://www1.sprintpcs.com/explore/servicePlansOptionsV2/PlansOptions.jsp>>.

⁵¹⁹ Cingular Wireless, *Wireless Internet Pricing* (visited Jan. 23, 2003) <http://www.cingular.com/beyond_voice/wi_pricing>; Verizon Wireless, *Mobile Web: Pricing* (visited Jan. 17, 2003) <http://www.verizonwireless.com/mobileweb/mw_pricing.html>.

⁵²⁰ Verizon Wireless, *Shop Get It Now: Get Going* (visited Jan. 22, 2003) <http://www.verizonwireless.com/ics/plsql/getitnow_shop.app?p_type=get%20going>; Verizon Wireless, *Shop Get It Now: Get Fun* (visited Jan. 22, 2003) <http://www.verizonwireless.com/ics/plsql/getitnow_shop.app?p_type=get%20fun>.

⁵²¹ See Section II.C.3.d(ii), Text Messaging, *supra*.

⁵²² POP3 (Post Office Protocol 3) e-mail servers attached to the Internet are independent of the transport mechanism used to access them. Therefore, POP3 e-mail account subscribers can access their e-mail messages from any Internet connection anywhere in the world. See Harry Newton, *NEWTON'S TELECOM DICTIONARY: 16TH EXPANDED & UPDATED EDITION*, CMP Books, July 2000, at 692.

⁵²³ See *Seventh Report*, at 13056.

well as the ability to access corporate e-mail accounts. Mobile telephone carriers frequently include POP3 e-mail access as one of many available applications in a mobile Internet access package. For example, subscribers to any of T-Mobile's standard, MB-based T-Zones mobile Internet packages can access POP3 email accounts from their handsets.⁵²⁴ Subscribers to one of Verizon Wireless' web browsing service plans can access an MSN Hotmail email account.⁵²⁵

165. Carriers typically charge an additional fee to enable users to access messages from a corporate email account on a mobile handset. For example, subscribers to Cingular Wireless's Xpress Mail Network Edition can have messages from a Microsoft Exchange or Lotus Notes corporate email account forwarded to a GPRS mobile handset or Handspring, Inc. ("Handspring") Treo for an additional \$10 per month beyond the price of mobile Internet access.⁵²⁶ AT&T Wireless's mMode mobile Internet access subscribers can also have Microsoft Exchange or Lotus Notes e-mail messages forwarded to a mobile device for an additional \$2.99 per month beyond the price of mobile Internet access.⁵²⁷

166. BlackBerry e-mail service, which was created by RIM, allows users to receive pushed e-mail messages automatically from an existing corporate e-mail account on one of RIM's mobile devices.⁵²⁸ Users can also send, forward, and delete messages, and view attachments. BlackBerry service is sold directly by RIM as well as by some mobile telephone carriers, such as T-Mobile and Cingular, and by other mobile data providers, including GoAmerica and Earthlink.⁵²⁹ The basic BlackBerry e-mail service typically costs \$39.99 per month for unlimited access. Additional applications for RIM devices, such as web browsing, corporate server access, and in some cases voice, can be purchased for an additional monthly fee.⁵³⁰ As of March 1, 2003, there were 534,000 total BlackBerry users, and approximately 10,000 organizations had integrated BlackBerry into their corporate e-mail systems.⁵³¹

⁵²⁴ T-Mobile, *T-Zones Pricing* (visited Jan. 24, 2003) <<http://www.t-mobile.com/tzones/addonpricing.asp>>.

⁵²⁵ Verizon Wireless, *Mobile Web: Pricing* (visited Jan. 17, 2003) <http://www.verizonwireless.com/mobileweb/mw_pricing.html>.

⁵²⁶ Cingular Wireless, *Xpress Mail Network Edition* (visited Jan. 24, 2003) <http://www.cingular.com/business/xpress_mail_ne>. The \$10 per month Xpress Mail Network Edition fee is in addition to the monthly cost of a Wireless Internet Express, MB-based mobile Internet access plan. *Id.*

⁵²⁷ AT&T Wireless, *mMode Features Office Online* (visited Jan. 27, 2003) <<http://www.attws.com/mmode/features/msg/office/index.jhtml>>.

⁵²⁸ *See Seventh Report*, at 13057.

⁵²⁹ T-Mobile, *RIM BlackBerry 6710* (visited Jan. 24, 2003) <http://www.t-mobile.com/products/handhelds/blackberry_6710/rate_info.asp>; Cingular Wireless, *Xpress Mail BlackBerry* (visited Jan. 23, 2003) <http://www.cingular.com/business/xpress_mail_blackberry>; GoAmerica, *Service Plans RIM OS* (visited Feb. 5, 2003) <<http://www.goamerica.net/serviceplans/pricing-chart-rims.html>>; EarthLink, *EarthLink BlackBerry Wireless Email Solution - Order* (visited Feb. 5, 2003) <<https://www.earthlink.net/cgi-bin/rimorder.cgi>>.

⁵³⁰ *Id.*

⁵³¹ *Research In Motion Reports Fourth Quarter and Year-end Results for Fiscal 2003*, News Release, RIM, Apr. 3, 2003. The number of BlackBerry users is the total regardless of the provider from which the subscriber purchases service.

(ix) Corporate Server Access

167. Several mobile data providers offer – either directly to individual consumers or to enterprise customers to implement for their employees – the ability to access on a mobile device company intranets and files stored on corporate servers. For example, Cingular customers who purchase the operator’s Data Connect service in addition to a basic mobile Internet access plan can establish a Virtual Private Network (“VPN”) connection to their office server to retrieve files and intranet applications from a laptop or PDA with a data-capable handset attached.⁵³² In addition, RIM offers its BlackBerry Enterprise Server customers an add-on product, called Mobile Data Service (“RIM MDS”), which allows these customers’ employees to access, on their RIM devices, files and intranet applications stored on corporate servers. RIM MDS also enables these users to automatically receive files and information on a “pushed” basis instead of having to first dial in to the corporate server.⁵³³ As mentioned in the *Seventh Report*, Microsoft Corp. (“Microsoft”) became a leading facilitator of mobile corporate server access with its releases of the Pocket PC 2002 PDA operating system and the Pocket PC 2002 Phone Edition smartphone operating system in late 2001 and early 2002. Both operating system editions allow users of Pocket PC 2002 devices to establish a secure VPN connection over the wireless Internet to retrieve e-mail messages and files that are stored on corporate servers.⁵³⁴

(x) Location-Based Services

168. The Commission’s Enhanced 911 rules (“E911”) provide that starting on October 1, 2001, wireless carriers were required to begin the process of providing automatic location identification (“ALI”) for 911 calls, upon request by public safety answering points (“PSAPs”).⁵³⁵ Carriers have begun deploying the technology for ALI, called E911 Phase II.⁵³⁶ The Commission has granted limited waivers allowing delays in initial deployment of Phase II by the major national wireless carriers, based on compliance with specific, detailed deployment benchmarks.⁵³⁷ Similarly, somewhat later initial

⁵³² Cingular Wireless, *Data Connect* (visited Jan. 23, 2003) <http://www.cingular.com/business/data_connect>.

⁵³³ Technical White Paper, *BlackBerry Corporate Data Access*, Research in Motion, 2002, <http://www.blackberry.net/products/pdfs/BlackBerry_Corporate_Data_Access.pdf>.

⁵³⁴ See *Seventh Report*, at 13058.

⁵³⁵ Under Phase I of the E911 rules, wireless carriers offering cellular-type voice service must provide a PSAP the telephone number of the wireless caller and the location of the cell site receiving the call. 47 C.F.R. § 20.18(d). Under Phase II, the carrier must provide a precise location for the caller, by latitude and longitude. 47 C.F.R. § 20.18(e). To obtain E911, PSAPs must meet certain conditions, primarily that they be able to receive and use the information and request E911 service with at least six months notice. 47 C.F.R. § 20.18(j).

⁵³⁶ See FCC, *Phase II Automated Location Identification Reports* <<http://www.fcc.gov/911/enhanced>>.

⁵³⁷ Revision of the Commission’s Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems, *Fourth Memorandum Opinion and Order*, 15 FCC Rcd 17442 (2000). The Commission also granted individual waivers to five national wireless carriers in a series of orders released in October 2001. See, e.g., Revision of the Commission’s Rules To Ensure Compatibility with Enhanced 911 Emergency Calling Systems Request for Waiver by AT&T Wireless Services, Inc., *Order*, 16 FCC Rcd 18253 (2001). For more information regarding the Commission’s wireless 911 rules and orders, see <<http://www.fcc.gov/911/enhanced>>.

deployment schedules were also set for smaller carriers.⁵³⁸ In addition, proceedings to enforce the Phase II rules and compliance plans have been undertaken by the FCC's Enforcement Bureau, in some cases leading to consent decrees that established revised Phase II deployment schedules.⁵³⁹

169. Wireless carriers may comply with the Phase II requirements using any of several location technologies or combinations of technologies.⁵⁴⁰ For example, carriers may employ network-based technologies, which require upgrades to carrier networks, or handset-based technologies, which require upgrades to both handsets and carrier networks. Currently, wireless carriers are primarily deploying one of two location technologies, depending upon the carrier's air interface technology. Nationwide CDMA carriers Sprint PCS and Verizon Wireless, and iDEN carrier Nextel are using Assisted GPS ("A-GPS"), a technology that requires handsets upgraded to include Global Positioning System ("GPS") location capability in addition to network components.⁵⁴¹ GSM carrier T-Mobile, as well as AT&T Wireless and Cingular Wireless, which operate with TDMA/GSM networks, are deploying or planning to deploy a network-based technology called Time Difference of Arrival ("TDOA"), which triangulates the location of handsets based on the arrival times of signals from the handset at three or more network cell sites equipped with location measurement equipment.⁵⁴² TDOA does not require changes to handsets.

170. Phase II E911 deployment began in the fall of 2001 in the state of Rhode Island and in individual counties in Illinois and Indiana. Sprint PCS began distributing location-capable handsets, with A-GPS technology, in October 2001, Verizon in December 2001, and Nextel in October 2002. By the end of 2002, Sprint PCS reported selling a total of 5.8 million A-GPS-enabled handsets (including 50 percent of all handsets sold in the fourth quarter of 2002) and 12 different handset models. Verizon Wireless reported offering 10 different A-GPS-enabled handset models, and Nextel said it was selling two such handsets.⁵⁴³ Each carrier had also deployed network equipment and upgrades needed to provide A-GPS. Carriers employing the network-based TDOA technology also report substantial Phase II deployments. AT&T Wireless had deployed TDOA equipment at 3,292 cell sites by the end of 2002 and

⁵³⁸ Revisions of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems: Phase II Compliance Deadlines for Non-Nationwide CMRS Carriers, *Order to Stay*, 17 FCC Rcd 14841 (2002).

⁵³⁹ See, e.g., Cingular Wireless LLC, File No. EB-02-TS-003, *Order*, FCC 03-129 (rel. Jun. 12, 2003); AT&T Wireless Services, Inc., File No. EB-02-TS-002, *Order*, DA 03-1776 (rel. May 23, 2003). See generally, FCC, *Wireless 911 and E911 Violations*, <<http://www.fcc.gov/eb/E911/Violations.html>>.

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

⁵⁴¹ Sprint PCS Sixth Quarterly E911 Implementation Report at 1, filed May 1, 2003; Verizon Wireless Sixth Quarterly Enhanced 911 Report at 1, filed May 1, 2003; Nextel Communications, Inc. Phase I and Phase II E911 Quarterly Report at 1, filed May 1, 2003. See generally, FCC, *Phase 2 Waiver Compliance Reports*, <<http://www.fcc.gov/911/enhanced/reports/phase2-waiver.html>>.

⁵⁴² AT&T Wireless Quarterly Report, filed Feb. 3, 2003; Cingular Wireless Fifth Quarterly E911 Implementation Report for GSM Networks, filed Feb. 3, 2003; T-Mobile USA, Inc. Sixth Semi-Annual Report on E911 Phase II Implementation Plan, filed Apr. 1, 2003. In some cases, TDOA network equipment is supplemented by another network-based technology called Angle of Arrival ("AOA"), particularly in rural areas.

⁵⁴³ Verizon E911 Status Report at 3, filed Jan. 31, 2003; Nextel Communications, Inc. Phase I and Phase II E911 Quarterly Report, filed Feb. 3, 2003 at 3.

Cingular Wireless at more than 2,400 sites.⁵⁴⁴

171. As a result of these individual carrier deployments, the overall deployment of Phase II expanded substantially in 2002.⁵⁴⁵ While deployment of Phase II capability by wireless carriers is now well underway, actual implementation has been slowed by a variety of issues, including carrier delays that have resulted in enforcement actions against three of top six wireless carriers, interconnection and pricing of necessary wireline carrier facilities and services, and delays in upgrades to PSAP facilities and equipment necessary for the PSAP to receive and use location information (in some cases related to funding issues).⁵⁴⁶

172. In addition to E911, ALI can be used for a variety of other commercial location-based services such as driving directions, mobile yellow pages, and the location of retailers, restaurants, or movie theaters.

173. Carriers' abilities to obtain and transmit precise location information in fulfillment of the Commission's E911 rules may trigger privacy considerations. In 1999, Congress adopted the Wireless Communications and Public Safety Act ("911 Act") to encourage the use of wireless services and to promote public safety by providing protection to users' location information and specifying the conditions for the release of such information. Specifically, Section 5 of the 911 Act amended Section 222 of the Communications Act that governs carriers' use or disclosure of customer proprietary network information ("CPNI"). Under the 911 Act, the disclosure or use of wireless location information without the express prior authorization of the customer is restricted, except in specified emergency situations to respond to a wireless user's emergency call or in the transmission of automatic crash data.

e. Devices

174. Mobile users can access data services through a variety of devices, including those that also have voice capabilities, such as mobile telephone handsets and smartphones, as well as devices that only offer data capabilities, such as pagers, two-way messaging devices, PDAs, and wireless modem cards.⁵⁴⁷

⁵⁴⁴ AT&T Wireless Quarterly Report, filed Feb. 3, 2003 at 3; Cingular Wireless LLC Third Quarterly E911 Implementation Report for TDMA, AMPS, and TDMA/AMPS Networks, filed Feb. 3, 2003, at 2.

⁵⁴⁵ Major wireless carriers report providing operational Phase II capability to between 99 and 261 of the nation's approximately 5,000 primary PSAPs. Sprint PCS Fifth Quarterly E911 Implementation Report at 5, filed Feb. 1, 2003 (121 PSAPs with Phase II); Verizon E911 Status Report at 3, filed Jan. 31, 2003 (261 PSAPs with Phase II); Nextel Communications, Inc. Phase I and Phase II E911 Quarterly Report, filed Feb. 3, 2003 at 3 (99 PSAPs with Phase II); AT&T Wireless Quarterly Report at 3, filed Feb. 3, 2003 (124 PSAPs with Phase II). For more information on PSAPs, see National Emergency Number Association, *9-1-1 Fast Facts*, <http://www.nena9-1-1.org/PR_Pubs/911fastfacts.htm>.

⁵⁴⁶ See Report on Technical and Operational Issues Impacting the Provision of Wireless Enhanced 911 Services by Dale N. Hatfield, WT Docket No. 02-46 (filed Oct. 15, 2002). For further information on this proceeding, see FCC, *Enhanced 911*, <<http://www.fcc.gov/911/enhanced/>>. See also, FCC, *Phase 2 Waiver Compliance Reports*, <<http://www.fcc.gov/911/enhanced/reports/phase2-waiver.html>>.

⁵⁴⁷ See Appendix E, Table 3, at E-5. While there are several mobile device manufacturers, most smartphones and PDAs use one of two major operating systems: Palm Inc.'s PalmOS or Microsoft's Pocket PC. In addition to producing approximately 50 percent of all PDAs sold, Palm also licenses its PalmOS operating system to other handheld device and mobile telephone handset manufacturers, including Handspring, Sony, Samsung, and Kyocera. One of the major sources of demand for PalmOS products has been the multitude of software and applications

Some PDAs can establish a mobile Internet connection with a built-in wireless modem while others require the attachment of a wireless modem card or a mobile phone. Laptop users can access the Internet while mobile by attaching a wireless modem card or mobile telephone to their computers. One analyst estimates that, as of the end of 2002, 84 percent of all mobile data devices were mobile telephone handsets or smartphones, and 16 percent were other, non-voice devices.⁵⁴⁸ This is a change from the end of 2001 when an estimated 87 percent of all mobile data devices were telephone-based, and 13 percent were non-voice devices.⁵⁴⁹

175. During 2002, equipment manufacturers released a number of new wireless modem cards and smartphones that connect to mobile telephone carriers' higher speed, next generation GPRS and 1xRTT networks. For example, the major wireless modem card manufacturers, Novatel Wireless, Inc. ("Novatel Wireless") and Sierra Wireless, Inc. ("Sierra Wireless"), have released tri-band GSM/GPRS modem cards that can be used with PCs and some Pocket PC models and which connect to GSM/GPRS networks operating in the 900 MHz, 1800 MHz, and 1900 MHz bands.⁵⁵⁰ These companies have also released wireless modem cards that work with CDMA 1xRTT networks.⁵⁵¹ Most wireless modem cards made prior to 2002 connected to the Internet via CDPD networks.⁵⁵²

176. Equipment providers and mobile operators also launched several new smartphone devices during 2002 that work on next generation networks. For example, RIM released a new model, the BlackBerry 6710, that works on GSM/GPRS networks and is available from T-Mobile.⁵⁵³ The 6710 allows users to access RIM's BlackBerry e-mail service as well as make voice calls. RIM has released a CDMA 1xRTT BlackBerry model as well, the 6750, which Verizon Wireless began selling in April

developed by third-party companies that can be downloaded on to PalmOS devices at little or no additional expense. The second major PDA operating system, Pocket PC, is similar to Microsoft Windows, and all Pocket PC devices include handheld versions of most of the Microsoft Office desktop software applications, including Outlook, Word, Excel, PowerPoint, and Internet Explorer. In February 2002, Microsoft released an operating system made specifically for smartphones called Microsoft Pocket PC 2002 Phone Edition. *See Seventh Report*, at 13048-13049, 13058.

⁵⁴⁸ *Morgan Stanley Wireless Data Report*, at 3.

⁵⁴⁹ *Id.*

⁵⁵⁰ Novatel Wireless, *PC Card Modems* (visited Mar. 21, 2003) <<http://www.novatelwireless.com/pcproducts/index.html>>; Sierra Wireless, *The Sierra Wireless AirCard Series: Wireless Type II PC Cards* (visited Mar. 21, 2003) <<http://www.sierrawireless.com/ProductsOrdering/pccards.html>>.

⁵⁵¹ *Id.*

⁵⁵² *See Seventh Report*, at 13046. *See also* Section II.C.3.c, CMRS Networks: Data-Only, *supra*.

⁵⁵³ RIM, *BlackBerry 6710 Wireless Handheld* (visited Mar. 21, 2003) <<http://www.blackberry.net/products/handhelds/blackberry6710.shtml>>; T-Mobile, *Handhelds and PDAs* (visited Mar. 21, 2003) <<http://www.t-mobile.com/products/handhelds/default.asp>>. RIM's non-voice devices use either Cingular's Mobitex network or Motient's dedicated data network. *See Seventh Report*, at 13045. RIM also released a new model, the BlackBerry 6510, that works with Nextel's iDEN network and includes push-to-talk service. RIM, *BlackBerry 6510 Wireless Handheld* (visited Mar. 21, 2003) <<http://www.blackberry.net/products/handhelds/blackberry6510.shtml>>.

2003.⁵⁵⁴ Since the publication of the *Seventh Report*, Sprint PCS, T-Mobile, and AT&T Wireless have begun selling next-generation smartphones that run Microsoft's Pocket PC Phone Edition operating system and are made by manufacturers such as Toshiba and Siemens.⁵⁵⁵ In addition, Handspring unveiled both GPRS and 1xRTT versions of its Treo smartphone, which runs the Palm operating system.⁵⁵⁶ T-Mobile and Cingular sell the GPRS version of the Treo, while Sprint PCS sells the 1xRTT version.⁵⁵⁷ Palm has also developed its own smartphone device, the Tungsten W, which allows users to make voice calls using a hands-free earpiece and runs on AT&T Wireless's GSM/GPRS network.⁵⁵⁸ T-Mobile also began offering a new smartphone, the Sidekick, which is marketed to mainstream consumers rather than enterprise customers and features a rotatable screen, a thumb QWERTY keypad, and an attachable camera.⁵⁵⁹ T-Mobile offers Sidekick-specific service plans that include 1000 text or AIM messages per month as well as unlimited access for one year to the following mobile services: web browsing, POP3 e-mail access, and digital photo sharing.⁵⁶⁰

177. The CMRS industry has witnessed a convergence of mobile voice and mobile data devices, and many of the same mobile data services are currently available on many different types of devices. Nevertheless, device categories are limited in the data services they are capable of offering, and not all services are available on all types of devices. For example, wireless modem cards cannot provide voice functionality. Mobile phone handsets and pagers do not allow corporate server access. Furthermore, within the general categories of devices, specific device models vary in the types of services they can provide. As mentioned above, customers must first own a phone or other device capable of accessing a specific service or set of services before they can purchase and use such service(s). For example, most of the mobile phone handsets sold today are capable of text messaging, but only a limited number are capable of newer, more advanced services such as interactive games. It is estimated that 35 percent of all mobile phones in use as of February 2003 were capable of web browsing, up from 21 percent in

⁵⁵⁴ *Multi-Tasking Just Got Easier with Verizon Wireless' Express Network and the BlackBerry 6750*, News Release, Verizon Wireless, Apr. 30, 2003.

⁵⁵⁵ Sprint PCS, *PCS Phones* (visited Mar. 21, 2003) <<http://www1.sprintpcs.com/explore/PhonesAccessories/Phones.jsp>>; T-Mobile, *Handhelds and PDAs* (visited Mar. 21, 2003) <<http://www.t-mobile.com/products/handhelds/default.asp>>; AT&T Wireless, *Siemens SX56 Pocket PC Phone* (visited Mar. 21, 2003) <<http://www.attws.com/business/data/individual/siemens/>>.

⁵⁵⁶ *Event Brief of Q3 2003 Handspring, Inc. Earnings Conference Call – Final*, FD (FAIR DISCLOSURE) WIRE, Apr. 15, 2003 (citing Donna Dubinsky, CEO of Handspring). Handspring reported that there were 180,000 Treo users (installed base) as of March 2003. *Id.*

⁵⁵⁷ T-Mobile, *Handhelds and PDAs* (visited Mar. 21, 2003) <<http://www.t-mobile.com/products/handhelds/default.asp>>; Sprint PCS, *PCS Phones* (visited Mar. 21, 2003) <<http://www1.sprintpcs.com/explore/PhonesAccessories/Phones.jsp>>.

⁵⁵⁸ *AT&T Wireless to Offer Palm's Tungsten W in the U.S.*, CTIA Daily News, Feb. 19, 2003 (citing IDG NEWS SERVICE); Palm, *Tungsten W* (visited Mar. 21, 2003) <<http://www.palm.com/products/handhelds/tungsten-w/>>.

⁵⁵⁹ T-Mobile, *Handhelds and PDAs* (visited Mar. 21, 2003) <<http://www.t-mobile.com/products/handhelds/default.asp>>.

⁵⁶⁰ T-Mobile, *T-Mobile Sidekick Plans* (visited Jan. 24, 2003) <<http://www.t-mobile.com/plans/sidekick/?bInOverride=False>>.

November 2002.⁵⁶¹ And, in order to take and send digital photos, users must have devices with built-in or attachable digital cameras.

178. Even in the cases where multiple device models offer the same service, a range of factors specific to individual device models influences how users experience that service, including the size and resolution of the device's screen and whether it is color or black and white, the type of keypad, the operating system, the battery life, and the storage and processing power.

179. One feature that equipment manufacturers have begun to add to many new models of mobile devices is Bluetooth connectivity. Bluetooth is a technology used to establish wireless connectivity between electronic devices that are up to 10 meters apart.⁵⁶² It eliminates the need for cables to connect various devices, such as mobile phones, PDAs, computers, printers, and digital cameras, to one another. One analyst estimates that 35 million Bluetooth chipsets had been shipped worldwide as of the end of 2002, up from 10 million at the end of 2001.⁵⁶³ In addition, the Bluetooth Special Interest Group ("SIG") estimates that mobile telephones constitute two-thirds of all Bluetooth-enabled products.⁵⁶⁴

f. Wi-Fi

180. 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.⁵⁶⁵ 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.⁵⁶⁶ The industry estimates there were between

⁵⁶¹ *Eighteen Percent of U.S. Users Can't Live Without Their Wireless Phones*, CTIA Daily News, Feb. 24, 2003 (citing Upoc and Frank N. Magid and Associates).

⁵⁶² *See Seventh Report*, at 13061. Bluetooth operates in the 2.4 GHz unlicensed band and transmits data at speeds close to one Mbps. *Id.*

⁵⁶³ *Strong Growth for Bluetooth Chipsets in Spite of Economy*, News Release, In-Stat/MDR, Jan. 14, 2003.

⁵⁶⁴ A.J. Hesselink, *Bluetooth Exec Sees Tech in Most Cell Phones in 5 Yrs*, WALL STREET JOURNAL, Jun. 17, 2003 (citing Bluetooth SIG). The Bluetooth SIG is a trade association that promotes the development of Bluetooth. Its members include Intel Inc., Microsoft, and Nokia Corp. *Id.*

⁵⁶⁵ 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")

⁵⁶⁶ *See Seventh Report*, at 13062-13063; *Grok Technology, 3 Rivers Connect Install Wireless Internet Network in Oakland, Pa.*, CTIA Daily News, Dec. 6, 2002 (citing PITTSBURGH BUSINESS TIMES). Private Wi-Fi networks – typically not open to the public – have also been deployed in locations such as homes, office buildings, hospitals, and schools.

3,000 and 4,000 Wi-Fi hot spots at the end of 2002.⁵⁶⁷ Over the past year, several major hotel and restaurant chains, including McDonalds, Schlotzsky's Deli, Hilton Hotels & Resorts, Starwood Hotels, Marriott International, InterContinental Hotels, and Omni Hotels, have announced that they plan to make Wi-Fi access available to their customers in some or all of their locations.⁵⁶⁸

181. While Wi-Fi itself is not a CMRS service,⁵⁶⁹ it has begun to play an increasingly important role in the CMRS industry, and many CMRS providers, as discussed below, 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.⁵⁷⁰

182. There are several emerging 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 McDonald's, that offer Wi-Fi in order to sell their primary product.⁵⁷¹ 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.⁵⁷² 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.

⁵⁶⁷ *Wireless Leaders Debate the Role of Wi-Fi*, CTIA Daily News, Mar. 19, 2003 (quoting John Marston, Vice President of Business Development at Toshiba); Sky Dayton, CEO of Boingo Wireless, speech at CTIA Wireless 2003 Keynote Session, New Orleans, LA, Mar. 18, 2003.

⁵⁶⁸ *McDonald's to Offer Wi-Fi Wireless Internet Access*, CTIA Daily News, Mar. 11, 2003 (citing BLOOMBERG, WALL STREET JOURNAL); *Warchalking Symbols to Mark Free Wireless Internet Access at Scholotzsky's Delis*, CTIA Daily News, Nov. 11, 2002 (citing 802.11 PLANET, ZDNET NEWS); *Hilton Hotels & Resorts to Introduce Wi-Fi Internet Access Services*, CTIA Daily News, Mar. 12, 2003 (citing MacCentral, atnewyork.com); *Starwood and Intel to Provide Wireless net Access in U.S. Hotels*, CTIA Daily News, Feb. 13, 2003 (citing CNET NEWS.COM); *Marriott to Launch Wireless Internet Access at 400 Hotels*, CTIA Daily News, Dec. 19, 2002 (citing WALL STREET JOURNAL); *InterContinental Hotels to Test Wi-Fi Technology*, CTIA Daily News, Mar. 11, 2003 (citing WALL STREET JOURNAL); *Omni Hotels to Offer Free In-Room Wi-Fi Networks Access*, CTIA Daily News, Feb. 20, 2003 (citing 802.11 PLANET). For additional examples of Wi-Fi offerings, see *OSP-OET White Paper*, at 38-39.

⁵⁶⁹ See 47 C.F.R. §§ 20.3, 20.9 for a discussion of commercial mobile radio services.

⁵⁷⁰ See, e.g., Stephen Lawson, *Cisco to Ship Wi-Fi Mobile Phone in June, Device Will Work Only Within Facilities*, INFOWORLD, Apr. 16, 2003.

⁵⁷¹ *OSP-OET White Paper*, at 37.

⁵⁷² *Id.*

183. Over the past year, several mobile telephone carriers have entered the hot spot operation business through acquisitions, partnerships, or independent deployments. In November 2001, T-Mobile acquired hot spot operator, MobileStar, and has since expanded Wi-Fi access to 1,800 Starbucks coffee shops and 100 American, United, and Delta Airlines' airport lounges.⁵⁷³ T-Mobile expects to begin offering integrated pricing and billing of its Wi-Fi high-speed Internet access and GPRS voice and data services during the second half of 2003.⁵⁷⁴ During the first quarter of 2003, AT&T Wireless and Verizon Wireless announced that they had signed roaming agreements with hot spot operator, Wayport.⁵⁷⁵ Wayport operates Wi-Fi access points in 10 airports and more than 525 hotels.⁵⁷⁶ AT&T Wireless has begun reselling Wayport's Wi-Fi access service under the brand name GoPort.⁵⁷⁷ AT&T Wireless has also independently deployed Wi-Fi access in the Denver International Airport and plans to deploy the service at the Philadelphia International Airport; these locations have become or will become part of Wayport's hot spot network.⁵⁷⁸ Verizon Wireless plans to begin reselling Wayport service and to offer complementary access between Wi-Fi networks and its wide area CDMA network in the third quarter of 2003.⁵⁷⁹ Furthermore, Sprint PCS has announced that it is pursuing Wi-Fi/mobile network integration and has invested in hot spot aggregator, Boingo.⁵⁸⁰ Hot spot aggregators do not deploy Wi-Fi infrastructure but instead aggregate disparate hot spots in order to allow their subscribers to roam to all of the hot spots under its umbrella. As of March 2003, Boingo offered Wi-Fi access in over 1,100 hot spots.⁵⁸¹

184. In addition to Wi-Fi involvement by mobile telephone carriers, Intel, IBM, and AT&T

⁵⁷³ *T-Mobile USA Expands Wireless Net Service at U.S. Airports*, CTIA Daily News, Oct. 30, 2002 (citing the WALL STREET JOURNAL).

⁵⁷⁴ Dan O'Shea, *A Marriage of Convenience: Where Wi-Fi & Mobile Merge*, TELEPHONY, Mar. 17, 2003, at 6; *T-Mobile USA to Allow Bundling of Hot Spot Service*, RCR WIRELESS NEWS, May 12, 2003, at 21.

⁵⁷⁵ Dan O'Shea, *CTIA: Just Do It? Verizon Does*, TELEPHONY, Mar. 18, 2003; *AT&T Jumps on the Wi-Fi Bandwagon*, MOBILE BUSINESS ADVISOR, Mar/Apr, 2003; Elizabeth V. Mooney, *Wayport Expands Wi-Fi Network with AT&T Wireless Agreement*, RCR WIRELESS NEWS, Feb. 3, 2003, at 12.

⁵⁷⁶ *Wayport Announces Agreement with CNN Airport Network to Provide High-Speed Wi-Fi Wireless Internet Access at Airports*, PR NEWswire, Mar. 4, 2003; Wayport, *Welcome to Wayport* (visited Mar. 27, 2003) <<http://www.wayport.com/>>.

⁵⁷⁷ *AT&T Jumps on the Wi-Fi Bandwagon*, MOBILE BUSINESS ADVISOR, Mar/Apr, 2003; AT&T Wireless, *Wi-Fi From AT&T Wireless* (visited Mar. 27, 2003) <<http://www.attws.com/business/data/individual/goport/>>.

⁵⁷⁸ Elizabeth V. Mooney, *Wayport Expands Wi-Fi Network with AT&T Wireless Agreement*, RCR WIRELESS NEWS, Feb. 3, 2003, at 12; *Mobile Communications Diary*, MOBILE COMMUNICATIONS REPORT, Feb. 3, 2003.

⁵⁷⁹ Dan O'Shea, *CTIA: Just Do It? Verizon Does*, TELEPHONY, Mar. 18, 2003; Dan Meyer, *Verizon to Deploy DO, Carriers Talk PTT, Wi-Fi*, RCR WIRELESS NEWS, Mar. 24, 2003, at 1.

⁵⁸⁰ *Reception for Wi-Fi Mixed Among Carriers at CTIA Show*, Communications Daily, Mar. 19, 2003 (citing Len Lauer, President of Sprint PCS); Bob Brewin, *Start-Up Advances Public Access Wireless LAN Prospects*, COMPUTERWORLD, Jan. 7, 2002, at 7; Dan O'Shea, *Wireless LAN: Carriers Draw the Line on Mobile/Wi-Fi Integration*, TELEPHONY, Apr. 7, 2003, at 7.

⁵⁸¹ Boingo, *Location Directory* (visited Mar. 27, 2003) <<http://www.boingo.com/search.html>>.

announced in December 2002 that they had created a new company, Cometa Networks, which plans to begin deploying Wi-Fi access points throughout the top 50 U.S. cities during 2003.⁵⁸² The founding companies expect Cometa to equip 20,000 locations with Wi-Fi access by 2005.⁵⁸³ And, in May 2003, Verizon began offering Wi-Fi access at 150 pay phones in New York City.⁵⁸⁴ The company plans to eventually expand the service to 1,000 pay phones throughout New York City.⁵⁸⁵

g. Telemetry and Telematics

185. Telemetry and telematics both involve the use of wireless technology to transfer data between systems and devices. Wireless telemetry is the monitoring of mobile or fixed equipment in a remote location. The most common example of wireless telemetry is the remote monitoring of utility meters by utility and energy companies, called automatic meter reading (“AMR”). With telematics systems, a person in a remote location can access information using various wireless technologies. Telematics is most often used to describe vehicle navigation systems, such as OnStar, where drivers and passengers employ GPS technology to obtain directions, track their location, and obtain assistance when a vehicle is in an accident.

186. Location-based services first appeared in vehicles as navigational devices using GPS technology to determine the vehicle’s location.⁵⁸⁶ However, OnStar, a wholly owned subsidiary of General Motors, Inc. (“GM”) formed in 1996, employs both GPS technology and terrestrial wireless networks. The basic, original OnStar service connects drivers to a live OnStar operator who pinpoints the location of the vehicle and provides verbal driving directions.⁵⁸⁷ OnStar also offers a variety of other in-vehicle communication and location-based, telematics services, including remote access to a vehicle’s horn, door locks, and headlights; automatic alerting of public safety officials if an airbag is deployed; roadside assistance; mobile telephone service; and e-mail and Internet access.⁵⁸⁸ As of February 2003, OnStar had more than 2 million subscribers and was available in 60 vehicle models.⁵⁸⁹

⁵⁸² *Cometa Networks Formed to Provide National Wireless Internet Access*, News Release, Cometa Networks, Dec. 5, 2002.

⁵⁸³ Jim Krane, *IBM, AT&T and Intel Form New Company to Provide High-Speed Wireless Internet Access*, THE ASSOCIATED PRESS, Dec. 5, 2002; Matthew Boyle, *The Really, Really Messy Wi-Fi Revolution*, FORTUNE, May 12, 2003, at 86. Cometa’s business plan is to resell its network to mobile carriers, cable operators, and other telecommunications companies who wish to offer high-speed wireless Internet access to their individual and business customers. *Id.*; *Cometa Networks Formed to Provide National Wireless Internet Access*, News Release, Cometa Networks, Dec. 5, 2002.

⁵⁸⁴ *Verizon Launches Free High-Speed Wi-Fi Internet Access in New York City for Verizon Online Customers*, News Release, Verizon, May 13, 2003. The service is available at no additional charge to customers who use Verizon as their landline ISP and have compatible laptops or PDAs. *Id.*

⁵⁸⁵ *Verizon Turns N.Y. Pay Phones into Wi-Fi Hot Spots*, CTIA Daily News, May 14, 2003 (citing NEW YORK TIMES, USA TODAY, WASHINGTON POST).

⁵⁸⁶ *See Seventh Report*, at 13064.

⁵⁸⁷ *Id.*

⁵⁸⁸ *Id.*

⁵⁸⁹ *OnStar to Increase Product Availability of Its Safety, Security and Information Services*, News Release, OnStar, Feb. 19, 2003; OnStar, *About Us: Backgrounder* (visited Apr. 2, 2003)

187. As mentioned above, wireless telemetry systems are used mainly for AMR, but can also be used to monitor a variety of other fixed and mobile machines, including health care equipment, HVAC systems, gas and oil pipelines, vending machines, alarm systems, parking meters, streetlights, smoke/fire detectors, factory process systems, and photocopiers. Businesses and consumers can also employ wireless telemetry systems to remotely monitor the location and status of vehicles. A few examples of this include LoJack, corporate fleet tracking, and remote engine diagnostic systems. LoJack is a system used to recover stolen vehicles. Consumers can purchase the LoJack VHF transponder unit for their vehicles, and the LoJack Corporation and law enforcement agencies maintain the system used to track the location of vehicles in the case that they are stolen.⁵⁹⁰ Over 40,000 stolen vehicles equipped with LoJack have been recovered by U.S. law enforcement agencies.⁵⁹¹

188. The largest AMR telemetry provider is Itron, Inc. (“Itron”).⁵⁹² As of the end of 2002, 1,100 utility companies used Itron’s wireless telemetry technology to collect and analyze meter data at 24 million gas, electric, and water meters.⁵⁹³ Many mobile data providers, including WebLink, Arch Wireless, and Cingular Wireless, offer a variety of telemetry services, either directly to end users or through other telemetry providers who create and maintain telemetry systems for end users but rely on the networks of mobile data providers.⁵⁹⁴ At least one paging company has stated that telemetry services represent a future business opportunity for paging carriers, but that greater demand from utility companies for wireless technologies must exist in order to generate higher equipment volume and lower per-unit equipment costs.⁵⁹⁵ In addition, Aeris.net (“Aeris”) and NumereX Corp. lease capacity on mobile telephone networks to offer telemetry products. Aeris sells the use of its network to other telemetry service providers.⁵⁹⁶

4. Satellite Operators

189. As of year-end 2002, a number of carriers were providing mobile satellite services (“MSS”)

<<http://onstar.internetpressroom.com/pressroom.cfm>>; OnStar, *About Us: Fast Facts* (visited Apr. 2, 2003) <<http://onstar.internetpressroom.com/pressroom.cfm>>. The number of subscribers includes the owners of GM models who receive the service free for one year whether they use it or not. *Id.*

⁵⁹⁰ *See Seventh Report*, at 13064.

⁵⁹¹ *Id.*

⁵⁹² *Id.*, at 13065.

⁵⁹³ Itron, Inc., SEC Form 10-K, Mar. 27, 2003, at 1.

⁵⁹⁴ WebLink Wireless, Inc., SEC Form 10-Q, Aug. 19, 2002 (WebLink had 6836 telemetry units in service as of Jun. 30, 2002); Arch Wireless, *Developer Information – Arch Telemetry Program* (visited Apr. 2, 2003) <<http://content.arch.com/developer/ArchTelemetryProgramOverview.html>>; Cingular Wireless, *Custom Solutions* (visited Apr. 2, 2003) <http://www.cingular.com/business/custom_solutions>.

⁵⁹⁵ Presentation of Arch Wireless, Federal Communications Commission, July 25, 2002 (quoting C. Edward Baker, Jr., Chairman and CEO); *See Seventh Report*, at 13065.

⁵⁹⁶ *See Seventh Report*, at 13065.

in the United States.⁵⁹⁷ For example, both Globalstar Telecommunications LTD. (“Globalstar”) and Iridium Satellite LLC. (“Iridium Satellite”) are using Big LEO⁵⁹⁸ MSS licenses to offer mobile voice services.⁵⁹⁹ Inmarsat Ltd. (“Inmarsat”) and Mobile Satellite Ventures (“MSV”), the successor to Motient Services Inc. which had previously entered into a joint venture with Mobile Satellite Ventures (Canada) Inc. and the Canadian licensee of the L-band MSS satellite MSAT-1 (TMI Corporation), were also providing voice and data communications via satellite at year-end 2002. The companies offer voice and data services in fixed and mobile environments. The mobile environment consists of a laptop-sized or larger terminal that can be transported from one location to another. Another company, ICO, launched one satellite to operate in the 2 GHz MSS band in 2001, but has not launched commercial service.

190. In 2001, two MSS licensees made proposals to the FCC to integrate terrestrial components with their networks using assigned MSS frequencies to augment signals in areas where the satellite signal is blocked, particularly in urban areas and inside buildings.⁶⁰⁰ In response to those filings, the Commission released an NPRM seeking comment on different proposals for authorizing the provision of

⁵⁹⁷ In order to place a satellite telephony call, an “outbound” communication from an MSS mobile phone is transmitted up to the satellite, using “service link” frequencies. The satellite then retransmits the signal back down to the earth, using “feeder link” frequencies, to a gateway ground station, where the call is interconnected with terrestrial networks, such as the PSTN. The return or “inbound” communication works the exact opposite way. The communication from the terrestrial network is transmitted from the gateway earth station up to the satellite, and then retransmitted by the satellite back down to the MSS mobile telephone. In systems with inter-satellite links, the inbound and outbound communications may be transmitted through multiple satellites in order to complete the connection between the originating mobile telephone and the receiving gateway ground station.

⁵⁹⁸ The Big LEO (low-earth orbit) band MSS allocation consists of an uplink at 1610-1626.5 MHz and a downlink at 2483.5-2500 MHz and is sometimes referred to as the 1.6/2.4 GHz band.

⁵⁹⁹ Iridium Satellite LLC, Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Band; Amendment of Section 2.106 of the Commission’s Rules to Allocate Spectrum at 2 GHz for Use by the Mobile Satellite Service, IB Docket No. 01-185, ET Docket No. 95-18, *Comments*, at 1 (filed Oct. 22, 2001). Globalstar, L.P. and L/Q Licensee, Inc., Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Band; Amendment of Section 2.106 of the Commission’s Rules to Allocate Spectrum at 2 GHz for Use by the Mobile Satellite Service, IB Docket No. 01-185, ET Docket No. 95-18, *Comments*, at 1 (filed Oct. 22, 2001). On February 15, 2002, Globalstar sought Chapter 11 bankruptcy protection. *Globalstar, Creditors Finalize Agreement On Debt Restructuring and New Business Model*, News Release, Globalstar L.P., Feb. 15, 2002. On April 28, 2003, Globalstar and ICO Global Communications (Holdings) Limited (“ICO”) announced that ICO won approval in U.S. bankruptcy court in Delaware to buy a majority stake in Globalstar for \$55 million, giving ICO a 54 percent ownership stake in Globalstar. *U.S. Court Approves ICO Investment in Globalstar*, REUTERS, Apr. 28, 2003.

⁶⁰⁰ ICO filed a Letter from Lawrence H. Williams and Suzanne Hutchings, ICO Global Communications (Holdings) Ltd., to Chairman Michael K. Powell, Federal Communications Commission, IB Docket No. 99-81 (filed Mar. 8, 2001); *see also* Letter from Cheryl A. Tritt, Counsel to ICO Services Limited to Magalie Roman Salas, Secretary, Federal Communications Commission, IB Docket 99-81 (April 20, 2001). MSV filed Application of Motient Services Inc., File Nos. SAT-LOA-19980702-00066, SAT-AMD-20001214-00171 & SAT-AMD-20010302; *See Public Notice*, Report No. SAT-00066 at 2 (rel. Mar. 19, 2001). MSV later indicated that it would seek to use the same ancillary terrestrial component (“ATC”) network with its current-generation MSS system. *See* Letter from Carson E. Agnew, President and Chief Operating Officer, and Peter D. Karabinis, Chief Technical Officer, Mobile Satellite Ventures, to Marlene H. Dortch, Secretary, Federal Communications Commission, IB Docket 01-185 at 1 (filed Dec. 16, 2002).

terrestrial service on MSS frequencies.⁶⁰¹ On February 10, 2003, the Commission released a Report and Order and Notice of Proposed Rulemaking permitting MSS providers in three frequency bands, 2 GHz,⁶⁰² Big LEO, and L-Band,⁶⁰³ to provide an ancillary terrestrial component (“ATC”) to their satellite systems.⁶⁰⁴ An MSS licensee will be permitted to provide service using an ATC provided that the MSS licensee: (1) has launched and operates its own satellite facilities; (2) provides substantial satellite service to the public; (3) provides integrated ATC; (4) observes existing satellite geographic coverage requirements; and (5) limits ATC operations only to the authorized satellite footprint.⁶⁰⁵ The Commission concluded that permitting MSS ATCs in this manner should: (1) increase the efficiency of spectrum use through MSS network integration and terrestrial reuse and permit better coverage in areas that MSS providers could not otherwise serve; (2) reduce costs, eliminate inefficiencies and enhance operational ability in MSS systems; (3) provide additional communications that may enhance public protection; and (4) strengthen competition in the markets served by MSS.⁶⁰⁶

191. Mobile Satellite Ventures (“MSV”) filed comments in response to the NOI, indicating that its current service offerings are not competitive with terrestrial-based mobile voice and data services because of the inability of MSS carriers to provide service in urban environments. MSV stated that the inability of MSS providers to serve urban environments by offering a terrestrial component has prevented them from developing a critical mass of customers.⁶⁰⁷ Nevertheless, in our Report and Order released on February 10, 2003, providing for the authorization of MSS ATC, we noted that terrestrial CMRS and MSS ATC are expected to have different prices, coverage, product acceptance and distribution. Therefore, the two services appear, at best, to be imperfect substitutes for one another that would be operating in predominately different market segments.⁶⁰⁸ We will continue to monitor this sector as it develops.

5. International Comparisons

a. Performance

192. The *Seventh Report* and previous reports compared mobile market performance in the United

⁶⁰¹ Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Band, IB Docket No. 01-185, *Notice of Proposed Rulemaking*, 16 FCC Rcd 15532 (2001).

⁶⁰² The 2 GHz MSS band refers to the 1990-2025 MHz uplink (Earth-to-space transmissions) and 2165-2200 MHz downlink (space-to-Earth transmissions) frequencies originally allocated in the United States.

⁶⁰³ The L-Band has MSS allocations at 1525-1559 MHz (downlink) and 1626.5-1660.5 MHz (uplink).

⁶⁰⁴ See Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz bands; Review of the Spectrum Sharing Plan Among Non-Geostationary Satellite Orbit Mobile Satellite Service Systems in the 1.6/2.4 GHz Bands, *Report and Order and Notice of Proposed Rulemaking*, 18 FCC Rcd 1962, 1964 (2003) (“*Flexibility Order*”).

⁶⁰⁵ *Flexibility Order* at 1965.

⁶⁰⁶ *Id.*

⁶⁰⁷ Mobile Satellite Ventures Subsidiary, LLC, *NOI Comments*, at 5-6 (filed Jan. 27, 2003).

⁶⁰⁸ *Flexibility Order* at 1984.

States, Western Europe and parts of the Asia-Pacific region with regard to mobile penetration, usage, and pricing.⁶⁰⁹ 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 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.

193. Based on more recent data, it is clear that these three differences continued into the year 2002.⁶¹⁰ 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 80 percent in Western Europe at the end of 2002, and ranged from highs of more than 90 percent in Italy and Portugal to a low of approximately 63 percent in France.⁶¹¹ Thus, as in previous years, U.S. mobile penetration at the end of 2002, at approximately 49 percent, was lower than the lowest mobile penetration rate in Western Europe. Japan finished the year with a mobile penetration level of 62 percent,⁶¹² only slightly below the low end of the range in Western Europe and significantly higher than the U.S. level. South Korea's year-end penetration level was within the range of European levels at 68 percent.⁶¹³

194. Average minutes of use per subscriber continue to be significantly higher in the United States than in Western Europe and parts of the Asia-Pacific region.⁶¹⁴ In particular, average MOUs were estimated to be approximately 458 per month in the United States in the fourth quarter of 2002.⁶¹⁵ This compares with an average across Western Europe of just 116, and with figures in individual European countries that ranged from a high of 200 in Ireland to a low of 72 in Germany.⁶¹⁶ MOUs in Japan and South Korea were considerably higher than the Western European average, but still well below the U.S. figure, at 170 and 296, respectively.⁶¹⁷ MOUs in South Korea are high by global standards.

⁶⁰⁹ *Seventh Report*, at 13032-13036. 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 Oftel's review of effective competition in the mobile market: *Effective Competition Review: Mobile*, Office of Telecommunications, Feb. 2001, at 7.

⁶¹⁰ See Appendix D, Table 12, at D-14.

⁶¹¹ Linda Mutschler, *Global Wireless Matrix 4Q02*, Merrill Lynch, Global Securities Research, Apr. 2, 2003, at 2 ("*Global Wireless Matrix 4Q02*"); Ric Prentiss, *NextWave of U.S. Wireless Competitive Landscape Posters from Tampa Bay*, Raymond James, Equity Research, Jan. 28, 2003, at 6 ("*Raymond James Report*").

⁶¹² *Global Wireless Matrix 4Q02*, at 2.

⁶¹³ *Id.*

⁶¹⁴ 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 103.

⁶¹⁵ *Id.*, at 2.

⁶¹⁶ *Id.*

⁶¹⁷ *Id.*

195. Revenue per minute⁶¹⁸ in Western Europe averaged nearly \$0.24 in the fourth quarter of 2002, and ranged from a high of \$0.29 in Germany to lows of \$0.19-\$0.20 in France, Italy, Portugal, and Ireland.⁶¹⁹ Average revenue per minute in the United States during the same period, at \$0.12, was about half the European average and well below the low end of the European range.⁶²⁰

196. The *Seventh Report*⁶²¹ noted that revenue per minute in Japan was nearly double the U.S. level in 2001 and was also the highest in the group of European and Asian-Pacific countries being compared. This pattern persisted in 2002. At \$0.30, revenue per minute in Japan was more than double the U.S. figure in 2002, and it continued to be higher than revenue per minute in Western European mobile markets.⁶²² In contrast, revenue per minute in South Korea, at \$0.10, was even lower than the U.S. figure.⁶²³

b. Market Environment

197. As discussed in the *Seventh Report*,⁶²⁴ the explanations offered by analysts for the foregoing international differences in mobile market performance generally focus on two fundamental differences between the mobile market environment in the United States and the mobile market environment abroad. The first difference relates to the competitive environment in which carriers operate, and the second to the use of mobile party pays (“MPP”) rather than calling party pays (“CPP”) for billing mobile calls.

198. A competitive market environment stimulates mobile subscriber growth and thereby drives up mobile penetration by exerting downward pressure on the pricing of services paid for by subscribers. Paradoxically, however, the relatively high levels of mobile penetration in Western Europe have not been achieved as the result of a more competitive market environment. On the contrary, analysts agree that mobile markets in Western Europe are both structurally and behaviorally less competitive than the U.S. mobile market, and that this is one of the principal reasons that revenue per minute is significantly lower, and average mobile usage significantly higher, in the United States than in Western Europe.⁶²⁵

199. One dimension of market structure is the number of competitors per market. European

⁶¹⁸ 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. For the relatively few countries in which ARPU is calculated somewhat differently, Merrill Lynch adjusts the reported figures to make them more comparable to the mobile metrics of other countries. *Id.*, at 103.

⁶¹⁹ *Id.*, at 2.

⁶²⁰ *Id.*

⁶²¹ *See Seventh Report*, at 13036.

⁶²² *Global Wireless Matrix 4Q02*, at 2.

⁶²³ *Id.*

⁶²⁴ *See Seventh Report*, at 13036-13037.

⁶²⁵ *Raymond James Report*, at 4-5; *NextGen VII*, at 2.

countries have achieved significantly higher mobile penetration rates than the U.S. with typically just three to four operators per market.⁶²⁶ This compares with six national operators in the United States and from five to seven or more operators in a large percentage of U.S. regional markets.⁶²⁷ Only 21 percent of the population in Western Europe can choose from five mobile operators, whereas 80 percent of the U.S. population can choose from five mobile operators and approximately 21 percent of the U.S. population can choose from seven or more operators.⁶²⁸

200. A second dimension of market structure is the size distribution of market shares among competitors. In addition to having a smaller number of competitors, European mobile markets are characterized by significantly greater inequality of market shares among competitors than the U.S. market. In particular, mobile markets in Western Europe are typically dominated by the top two mobile operators. The two mobile operators with the largest market shares control more than 70 percent of all mobile subscribers in virtually all Western European mobile markets except the UK, and in the majority of these markets they control more than 80 percent of all mobile subscribers.⁶²⁹ In the United States, by contrast, less than 40 percent of mobile users subscribe to the services of the number one and number two mobile competitors.⁶³⁰

201. The difference in the size distribution of market shares and the level of dominance in European mobile markets are important because they may affect the competitive interactions among the market participants, particularly with regard to pricing behavior.⁶³¹ One analysis posits that pricing behavior in some European mobile markets is consistent with an “umbrella pricing” model.⁶³² Since the number one and number two operators in European mobile markets that are dominated by the top two competitors have an incentive to keep prices high, the pressure to reduce prices depends on how the weakest competitors behave. Pricing pressure will come, if at all, from the third or fourth largest competitor. However, the weaker players are typically unwilling to disturb the pricing framework established by the dominant duopoly, preferring instead to operate peacefully under the duopoly’s “pricing umbrella.”

202. As they have in the past, some analysts continue to use the word “benign” to characterize the pricing of wireless services in European mobile markets.⁶³³ In contrast, the past pricing promotions of some U.S. carriers are characterized as aggressive, and the U.S. mobile market is described as having experienced a “price war” among the six national competitors.⁶³⁴

⁶²⁶ *Raymond James Report*, at 4; *NextGen VII*, at 7.

⁶²⁷ *Raymond James Report*, at 4. *See also*, *Seventh and Eighth Reports*.

⁶²⁸ *Id.*

⁶²⁹ *NextGen VII*, at 12-13.

⁶³⁰ *Id.*, at 13.

⁶³¹ *Id.*, at 13-17.

⁶³² Terence Sinclair, *European Mobile (2)*, Schroder Salomon Smith Barney, Equity Research, Sept. 10, 2002, at 10 and 15.

⁶³³ *NextGen VII*, at 2.

⁶³⁴ *Id.*, at 2.

203. One analysis highlights the difference between U.S. and European mobile pricing by focusing on the comparison with the UK.⁶³⁵ The UK is widely regarded as the most competitive large mobile market in Western Europe. With all four British GSM operators having a relatively equal share of total subscribers, the UK is the only large European market that is not dominated by the number one and number two competitors. Nevertheless, a comparison of selected contemporary rate plans offered by Verizon Wireless in the United States and Vodafone in the UK finds that the pricing differential between the United States and the UK is significant, even allowing for the fact that the service bundle offered by Verizon Wireless applies to incoming as well as outgoing minutes.⁶³⁶

204. The more aggressive pricing behavior of U.S. mobile operators also partly explains why U.S. mobile subscribers use their phones so much more than European mobile subscribers. In the United States, competitive pressure has induced mobile operators to offer progressively larger and larger buckets of minutes, and to include virtually unlimited night and weekend minutes and also long-distance in their service offerings.⁶³⁷ In contrast, the bucket plans offered by European mobile operators are not priced as attractively as U.S. offerings of comparable size, they generally do not include unlimited off-peak minutes, and they are not offered by all mobile operators in all Western European markets.⁶³⁸ Using the Verizon-Vodafone comparison again, one analysis concludes that a U.S. mobile subscriber who opts for a large bundle of minutes with virtually unlimited night and weekend minutes perceives that the incremental price of using a wireless minute is virtually free, whereas a mobile subscriber in the U.K. does not have the same perception.⁶³⁹ Moreover, the incremental price of making a wireless call generally compares more favorably to the incremental price of making an equivalent landline call in the United States than in the U.K.⁶⁴⁰ This analysis indicates that the attractive pricing of bucket plans by U.S. mobile operators stimulates wireless usage per subscriber, and does so in part by encouraging greater substitution of wireless calls for landline calls in the United States than is the case in European markets.⁶⁴¹

205. As noted earlier, the ability of Western European countries to achieve significantly higher mobile penetration rates than the United States with far higher levels of market concentration and far less competitive pressure on pricing may at first glance appear paradoxical from the perspective of economic theory. One possible explanation for this paradox is that, other things equal, CPP may stimulate greater subscriber demand for mobile phone service than MPP.⁶⁴² With CPP, the subscriber only incurs airtime

⁶³⁵ *Id.*, at 35-36.

⁶³⁶ *Id.*

⁶³⁷ *Id.*, at 28-29.

⁶³⁸ *Id.*, at 35-37.

⁶³⁹ *Id.*, at 40-41.

⁶⁴⁰ *Id.*

⁶⁴¹ *Id.*, at 38-42.

⁶⁴² Apart from CPP, many analysts argue that higher mobile penetration in Western Europe and parts of the Asia-Pacific is partly explained by the higher monthly price of local landline telephone service abroad, which in many countries is in turn partly the result of metered local landline service. *See, for example*, Jerry Hausman, *From 2G to 3G: Wireless Competition for Internet-Related Services*, Jan. 22, 2002, presented at American Enterprise Institute Seminar Series in Telecommunications Deregulation on Apr. 23, 2002, at 2.

charges for outgoing calls, while receiving unlimited incoming calls free of charge. From the subscriber's point of view, use of CPP makes mobile phone service cheaper and more affordable, particularly in the case of low-income and low-usage customers.⁶⁴³ For this reason, CPP is widely regarded as being more conducive to the successful promotion of prepaid offerings than MPP.⁶⁴⁴ As noted in the *Sixth Report* and *Seventh Report*⁶⁴⁵ the rapid growth of prepaid subscribership has been a major driver of mobile subscriber growth in most European and some Asian-Pacific markets, with prepaid subscribers accounting for a considerably larger share of the total mobile subscriber base in many CPP markets than in the United States.⁶⁴⁶

206. In addition to stimulating subscriber growth on the demand side, use of CPP may stimulate the supply of mobile phone service by strengthening the mobile operator's financial interest in acquiring subscribers, particularly prepaid and other low-usage customers who don't want to spend much on mobile phone service. The supply-side stimulation effect of CPP is the result of the impact of CPP on mobile termination rates.

207. Termination rates are the prices that fixed and mobile operators charge the operator of the network on which a call originates to terminate traffic on their own networks. Despite recent declines induced by pressure from European regulators to bring these rates more closely into line with costs, mobile termination rates in Western Europe remain high, as do the profit margins on mobile termination. Recently, fixed-to-mobile termination rates in Western Europe have averaged about €0.16 (slightly more than \$0.16) per minute, while mobile-to-fixed termination rates are comparatively low.⁶⁴⁷ By contrast, mobile termination rates in the United States are comparatively negligible at \$0.005 per minute,⁶⁴⁸ about the same as the average rates for terminating traffic on fixed networks. Mobile termination rates in South Korea are much lower than European levels, though still somewhat higher than the U.S. average, at about €0.039 per minute.⁶⁴⁹

208. As explained in the *Seventh Report*,⁶⁵⁰ a widely accepted explanation of why mobile termination rates are high in Europe and other CPP markets is that CPP confers a form of market power on mobile operators with regard to the setting of mobile termination charges. Since European mobile subscribers only pay for the calls they make, competition among mobile operators to attract and retain customers exerts downward pressure on the price of outgoing mobile calls but not on mobile termination charges, which are absorbed by callers who have little choice but to terminate their calls on the mobile network chosen by the mobile subscriber. In contrast, U.S. regulatory rules on inter-carrier compensation

⁶⁴³ Sam Paltridge, *Cellular Mobile Pricing Structures and Trends*, OECD, May 16, 2000, at 37.

⁶⁴⁴ *Id.*; *NextGen VII*, at 19.

⁶⁴⁵ *See Sixth Report*, at 13390-13391, and *Seventh Report*, at 13033-13034.

⁶⁴⁶ *See Appendix D, Table 12, at D-14.* As noted below, however, Japan and Korea are exceptions in that prepaid users account for relatively low share of the mobile subscriber base in these two CPP markets.

⁶⁴⁷ *NextGen VII*, at 62.

⁶⁴⁸ *Id.*, at 15.

⁶⁴⁹ Linda Mutschler, *Initiation Report*, Merrill Lynch, Global Securities Research, Sept. 19, 2002, at 42.

⁶⁵⁰ *See Seventh Report*, at 13037

have kept mobile termination charges low, and because U.S. mobile subscribers pay to make and receive calls, competition among mobile operators acts to constrain the prices of both incoming and outgoing calls.

209. Depending on the operator and the market, termination charges can amount to as much as 15 to 35 percent of a European mobile operator's revenues.⁶⁵¹ As discussed in the *Seventh Report*,⁶⁵² high mobile termination revenues are another reason, apart from differences in the competitive environment, that revenue per minute is significantly higher in Western Europe and most other CPP markets than in the United States.⁶⁵³ Mobile termination revenues may stimulate mobile subscriber growth from the supply side by helping mobile carriers recover the costs of customer acquisition and billing over the lower volumes of sales generated by small users. Even if subscribers rarely use their mobile phones to make calls, the termination revenues carriers receive on incoming calls under CPP may offset acquisition and billing expenses by enough to make it worthwhile for mobile carriers to compete for the business of such low-volume users.

210. In effect, high termination rates on fixed-to-mobile calls have served to promote the development of the mobile telephone industry in Europe by directing subsidies from established fixed-line services to mobile services.⁶⁵⁴

211. By stimulating mobile subscriber growth and driving up mobile penetration, use of CPP can also affect average mobile usage. For example, low MOUs in Europe and other CPP markets are partly attributable to the impact of CPP in enabling operators to tap into the prepaid market. As noted in the *Sixth Report*,⁶⁵⁵ the relatively large share of prepaid subscribers in the European mobile subscriber base pulls down measures of MOUs because on average European prepaid subscribers use their phones much less than postpaid customers. Moreover, because use of CPP also makes postpaid offerings more affordable to low-usage customers, even the postpaid market in CPP countries appears to be characterized by lower average usage than the U.S. market. In Japan and South Korea, for example, prepaid subscribers are a tiny fraction of the total mobile subscriber base.⁶⁵⁶ Nevertheless, while MOUs in Japan and South Korea are higher than the European average, they are still lower than the U.S. figure.⁶⁵⁷

⁶⁵¹ *NextGen VII*, at 3.

⁶⁵² *Seventh Report*, at 13037.

⁶⁵³ Linda Mutschler, *Initiation Report*, Merrill Lynch, Global Securities Research, Sept. 19, 2002, at 42-43. At the same time, one reason revenue per minute is comparatively low in South Korea is that, as noted earlier, fixed-to-mobile termination rates in South Korea are much lower than those in Europe.

⁶⁵⁴ *NextGen VII*, at 62. We note that the Commission has acknowledged the increasing concern that U.S. carriers and consumers originating international calls from fixed networks in the U.S. may bear the burden of such subsidies. In October 2002, the Commission initiated a proceeding in which it sought comment on the issue of high foreign mobile termination rates and their effect on U.S. consumers and competition. See International Settlements Policy Reform; International Settlement Rates, IB Docket Nos. 02-324, 96-261, *Notice of Proposed Rulemaking*, 17 FCC Rcd 19954 (2002).

⁶⁵⁵ See *Sixth Report*, at 13393.

⁶⁵⁶ *NextGen VII*, at 27.

⁶⁵⁷ See Appendix D, Table 12, at D-14.

212. There is another, more direct way that use of CPP or MPP can influence MOUs, and that is through their impact on incentives to use mobile phones.⁶⁵⁸ In theory, MPP creates an incentive for wireless subscribers to switch off their mobile phones when not placing calls to avoid being charged for incoming calls, and for the same reason it also discourages them from giving out their mobile phone number. In contrast, CPP theoretically has the potential to stimulate mobile usage by increasing the accessibility of mobile subscribers to incoming calls, and also by allowing mobile subscribers to devote their entire wireless budget to outgoing calls.

213. In practice, U.S. mobile operators have managed to counter the potentially adverse incentive effects of MPP by introducing bucket plans to stimulate usage.⁶⁵⁹ As noted above, progressive increases in the size of mobile buckets have been a major driver of average mobile usage in the United States. Bucket plans may increase the accessibility of mobile subscribers to their friends and family in an environment in which they pay for both incoming and outgoing calls.⁶⁶⁰ At the same time, high mobile termination rates in Europe and other CPP environments may discourage people from calling mobile subscribers by increasing the cost of placing calls to mobile phones.

c. Mobile Data Developments

214. Mobile telephone carriers in other countries continued to offer mobile data services over next generation networks during the past year. As mentioned in the *Seventh Report*, NTT DoCoMo launched service, which the company calls FOMA (Freedom of Multimedia Access), over its WCDMA network in Japan in October 2001 and had approximately 105,000 FOMA subscribers as of April 2002.⁶⁶¹ As of March 2003, the number of FOMA subscribers had jumped to 330,000.⁶⁶² On the other hand, the CDMA carrier in Japan, KDDI, had 5.3 million subscribers to its 1xRTT-based services as of February 2003.⁶⁶³ Data services offered over next generation CDMA networks continue to be popular with consumers in South Korea. An estimated 47 percent of South Korea's mobile telephone subscriber base used services offered over 1xRTT or 1xEV-DO networks as of the end of 2002, up from 12 percent at the end of 2001.⁶⁶⁴

⁶⁵⁸ Sam Paltridge, *Cellular Mobile Pricing Structures and Trends*, OECD, May 16, 2000, at 37.

⁶⁵⁹ *NextGen VII*, at 28. We note that at least one U.S. carrier has begun offering plans with free incoming minutes. See Nextel, *Nextel National Free Incoming Plans* (visited Jun. 3, 2003) <http://www.nextel.com/phones_plans/promos/promo_free_incoming.shtml>.

⁶⁶⁰ *Id.*

⁶⁶¹ See *Seventh Report*, at 13041.

⁶⁶² NTT DoCoMo, *Subscriber Growth* (visited Apr. 15, 2003) <<http://www.nttdocomo.com/home.html>>. NTT DoCoMo also continued to add subscribers to its popular 2G mobile data service, i-mode; however, the growth in i-mode has been leveling off over the past several months. The number of i-mode subscribers grew 17 percent between March 2002 and March 2003 from 32.2 to 37.8 million. However, between March 2001 and March 2002, the number of i-mode subscribers grew approximately 35 percent. *Id.*

⁶⁶³ *Competition Heats Up a Bit in Japan's 3G Market*, CTIA Daily News, Mar. 17, 2003 (citing Daily Yomiuri).

⁶⁶⁴ Mark Shuper, *The Year of the COO, Continued: Status Report*, Morgan Stanley, Equity Research Global, April 2003, at 13 (CDMA 1x & EV-DO & Lead W-CDMA Subs to '06).

215. In Europe, Hutchison 3G began offering WCDMA service in Italy and the UK during the past year, and the company reported it had 50,000 subscribers in Italy and 10,000 in the UK as of March 2003.⁶⁶⁵ During 2002, many European operators delayed or suspended their planned WCDMA deployments; as of February 2003, many were not planning to launch WCDMA service until the second half of 2003 or 2004.⁶⁶⁶ Compared to the United States, mobile data ARPU is significantly higher in Europe. An estimated 10 to 20 percent of European mobile carriers' total ARPU is derived from data services, versus just under one percent in the United States.⁶⁶⁷ This development may be the result of a variety of factors, such as differences in consumer demand for mobile data products, in wireline Internet penetration rates, in the number of competing carriers, and in network technology standards. SMS continues to be the most frequently used mobile data service in Europe and constitutes the bulk of data ARPU; however, other data services are gaining in popularity.⁶⁶⁸ According to one estimate, mobile users in the UK downloaded 524 million web pages to their handsets in January 2003, up 25 percent from December 2002.⁶⁶⁹ Recent figures also show that, for several European carriers, sales of camera phones, which enable customers to use MMS, were strong during the fourth quarter of 2002.⁶⁷⁰

⁶⁶⁵ Linda Mutchler *et al.*, *Mobile Update – Update on Hutchison and UK Pricing*, Merrill Lynch, Equity Research, Mar. 28, 2003, at 2.

⁶⁶⁶ *NextGen VII*, at 56.

⁶⁶⁷ Mark Shuper, *The Year of the COO, Continued: Status Report*, Morgan Stanley, Equity Research Global, April 2003, at 13, 16.

⁶⁶⁸ *Id.*, at 16.

⁶⁶⁹ *U.K. Mobile Phone Users Download 17 Million Web Pages Per Day*, CTIA Daily News, Feb. 28, 2003 (citing REUTERS).

⁶⁷⁰ *European Mobile Companies Push MMS*, CTIA Daily News, Jan. 27, 2003 (citing DOW JONES NEWSWIRES).

III. CONCLUSION

216. During 2002, the CMRS industry experienced another year of growth, demonstrating the continuing demand for and reliance upon mobile services. As of December 2002, we estimate there were approximately 141.8 million mobile telephone subscribers, which translates into a nationwide penetration rate of roughly 49 percent.⁶⁷¹ During 2002, MOUs increased an estimated 12 percent, while the average cost of monthly service in 25 major markets fell 2.9 percent and the Cellular CPI declined 1.0 percent.⁶⁷²

217. Several metrics included in the report support our conclusion that the CMRS marketplace is effectively competitive. Mobile telephony providers continued to build out their networks and expand service availability during 2002.⁶⁷³ To date, 270 million people, or 95 percent of the total U.S. population, have three or more different operators offering mobile telephone service in the counties in which they live. Over 236 million people, or 83 percent of the U.S. population, live in counties with five or more mobile telephone operators competing to offer service. The average price of mobile telephone service continued to decline during 2002, and more than 30 percent of wireless customers switched providers.⁶⁷⁴ Moreover, evidence from industry analysts and marketing campaigns indicates that carriers have responded to consumer demands for improved service quality and that the majority of consumers are satisfied with their mobile telephone service.⁶⁷⁵

218. In addition, while relatively few wireless customers have “cut the cord” in the sense of canceling their subscription to wireline telephone service, there is growing evidence that consumers are substituting wireless service for traditional wireline communications.⁶⁷⁶ One analyst estimates that wireless has now displaced about 30 percent of total wireline minutes.⁶⁷⁷

219. The multitude of mobile data services, service providers, pricing plans, and devices available to consumers provides evidence that competition for the provision of mobile data products is developing successfully. One analyst estimates there were 11.9 million mobile telephone subscribers who used some type of mobile data service at the end of 2002, up from 7.6 million at the end of 2001. The estimated number of data-only mobile users grew from 1.1 million at the end 2001 to 2.3 million at the end of 2002.⁶⁷⁸ Furthermore, several mobile telephone operators have deployed GPRS, 1xRTT, or 1xEV-DO networks that allow them to offer mobile Internet access services for mobile telephone handsets, PDAs, and/or laptops at speeds generally ranging from 30 to 70 kbps.⁶⁷⁹ As of March 2003, these networks were

⁶⁷¹ See Section II.C.1.b(i), Subscriber Growth, *supra*.

⁶⁷² See Sections II.C.1.b(iii), Minutes-of-Use and II.C.1.c, Pricing Data and Trends, *supra*.

⁶⁷³ See Section II.C.1.b(ix), Market Entry, *supra*.

⁶⁷⁴ See Sections II.C.1.c, Pricing Data and Trends and II.C.1.b(v), Churn, *supra*.

⁶⁷⁵ See Section II.C.1.b(x), Quality of Service, *supra*.

⁶⁷⁶ See Section II.C.1.d, Wireless/Wireline Competition, *supra*.

⁶⁷⁷ *Id.*

⁶⁷⁸ See Section II.C.3.a, Mobile Data Introduction, *supra*.

⁶⁷⁹ See Section II.C.1.b(vii), Technology Deployment, *supra*.

available in at least some portion of U.S. counties covering approximately 265 million people.⁶⁸⁰ Furthermore, mobile data providers offer their customers a variety of services, both those focused on consumer entertainment and others aimed at maintaining a constant yet remote connection to work and office life.⁶⁸¹ One of the most popular mobile data services has been text messaging, which approximately 20 percent of all mobile telephone subscribers used during the fourth quarter of 2002.⁶⁸²

220. 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 services⁶⁸³ and conclude that effective competition exists in the CMRS marketplace. As mentioned above, the Commission will be issuing another Notice of Inquiry seeking additional and updated data from the public on the state of CMRS competition, particularly in rural areas and on a sub-national level, in preparation for its ninth annual report. With this next Notice, we hope to build on the information employed in this year's report and to obtain a wider range of facts and opinions from the public comments in order to assist in our analysis. We also plan to explore other avenues for data collection, such as contract research, for the next report.⁶⁸⁴ In addition, for the next report, we will continue efforts to improve our approaches to collecting and evaluating the various types of data and information that are available in order to assess the status of competition in the CMRS industry. In particular, we plan to seek comment on the interrelationship among dimensions of industry structure, indicators of operator conduct, and other relevant measures of market conditions.

⁶⁸⁰ See Section II.C.1.b(viii), Coverage by Technology Type, *supra*.

⁶⁸¹ See Section II.C.3.d, Services, Content, and Applications, *supra*.

⁶⁸² See Section II.C.3.d(ii), Text Messaging, *supra*.

⁶⁸³ See Section I.A, Background, *supra*.

⁶⁸⁴ The scale and scope of such collection efforts will be dependent upon the availability of funding and the discretion of the Commission.

IV. ADMINISTRATIVE MATTERS

221. This Eighth 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).

222. 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.

223. It is FURTHER ORDERED that the proceeding in the WT Docket No. 02-379 IS TERMINATED.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

APPENDIX A: FIXED WIRELESS VOICE AND DATA SERVICES

I. INTRODUCTION AND OVERVIEW

In this section, the Commission reviews the current state of the fixed wireless industry.⁶⁸⁵ The first part of Appendix A provides an overview of fixed wireless systems. The second part discusses recent developments in the industry, including the current level of service deployment and significant policy changes related to spectrum bands used for fixed wireless service.

Fixed wireless operators have used several spectrum bands, including Multipoint Distribution Service (“MDS”),⁶⁸⁶ Wireless Communications Service (“WCS”),⁶⁸⁷ unlicensed spectrum bands, 24 GHz, Local Multipoint Distribution Service (“LMDS”), and 39 GHz, to offer point-to-point, high-speed data services. In addition, some licensees of spectrum bands traditionally used for CMRS have also used that spectrum to provide fixed wireless services.⁶⁸⁸

This report groups fixed wireless operators into two major categories: lowerband providers (800 MHz to 5.8 GHz) and upperband providers (24 GHz to 39 GHz) due to the similar technical characteristics of the bands within each category.⁶⁸⁹

⁶⁸⁵ “Fixed wireless” services are also sometimes referred to as “wireless broadband” or “wireless DSL.” For a description of fixed wireless systems, see *Sixth Report*, at 13433-13437. For a more comprehensive discussion of competition in the fixed wireless industry and broadband telecommunications services generally, see *Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps To Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, Third Report*, 17 FCC Rcd 2844 (2002).

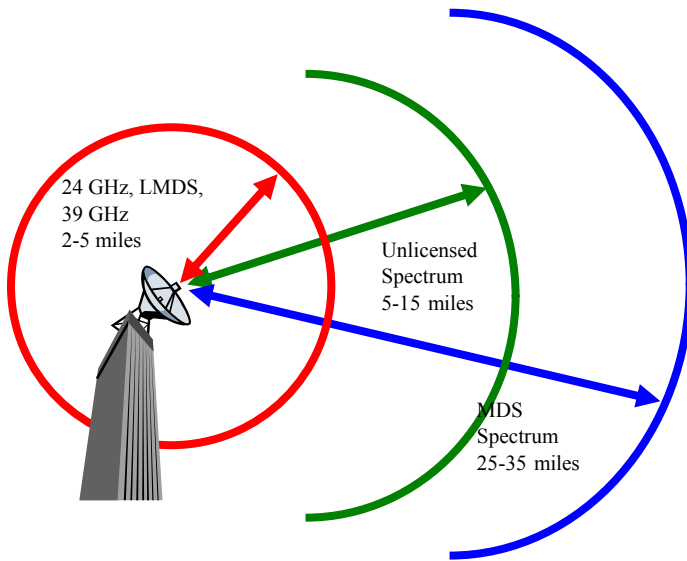
⁶⁸⁶ What is commonly referred to as MDS or MMDS spectrum includes 33 different 6 megahertz channels in the 2.1-2.2 GHz and 2.5-2.7 GHz spectrum bands. These channels include the Multipoint Distribution Service (“MDS”), Multichannel Multipoint Distribution Service (“MMDS”), and Instructional Television Fixed Service (“ITFS”) channels. MDS operators generally use the MMDS and MDS channels and lease excess capacity from ITFS operators.

⁶⁸⁷ The WCS band is located at 2305-2320 MHz and 2345-2360 MHz and surrounds the Digital Audio Radio Service (“DARS”) spectrum at 2320-2345 MHz.

⁶⁸⁸ “Licensees of cellular systems may use alternative cellular technologies and/or provide fixed services on a co-primary basis with their mobile offerings, including personal communications services . . . on the spectrum within their assigned channel block.” 47 CFR § 22.902(d).

⁶⁸⁹ The lowerbands consist of the cellular (800 MHz) and broadband PCS (1900 MHz) bands, the MDS (2.5-2.7 GHz) band, the WCS (2.3 GHz) band, and the unlicensed bands. The upperbands consist of the 24 GHz (DEMS) band, the LMDS (28 GHz) band, and the 39 GHz band.

Figure 1. Fixed Wireless Coverage Radii



Operators using lowerband spectrum are able to serve a wider geographic area with a single transmitter than operators using upperband spectrum (see Figure 1). Lowerband systems generally have a service radius of five to 35 miles from a central hub, depending on the particular spectrum band, the power of the transmitter, and the terrain. Upperband systems, on the other hand, face significant losses of signal strength due to atmospheric conditions, most notably precipitation (*i.e.*, rain, snow, and fog).⁶⁹⁰ Therefore, the range of individual transmitters in the upperbands is approximately two to five miles.

II. RECENT DEVELOPMENTS

A. Upperband Operations

As discussed in the *Sixth and Seventh Reports*, all of the major upperband fixed wireless providers – Winstar Communications, Inc. (“Winstar”), Teligent, Inc. (“Teligent”), Advanced Radio Telecom (“ART”), and XO Communications, Inc. (“XO”) – filed for bankruptcy during 2001 and 2002.⁶⁹¹ In recent months, many have emerged from bankruptcy with plans to continue providing fixed wireless services but on a more limited basis. Teligent, which filed for bankruptcy in May 2001, completed its reorganization and exited bankruptcy in September 2002 with a business plan focused on selling transport capacity to other telecommunications companies wholesale and to multi-location businesses as well as offering dedicated Internet access to large business customers.⁶⁹² Teligent has retained its 24 GHz

⁶⁹⁰ However, by adjusting factors such as cell size and transmission power, the networks can be engineered to the standard level of reliability in a telecommunications network, 99.999 percent. This level of reliability is also known as “five 9’s.” See *Sixth Report*, at 13435, note 602.

⁶⁹¹ See *Seventh Report*, at A-2 – A-4.

⁶⁹² *Teligent Completes Its Reorganization – Company Exits Bankruptcy Fully Funded and Debt Free*, News Release, Teligent, Sept. 12, 2002; John Rubino, *Teligent Rising*, VIRGINIA BUSINESS, Nov. 1, 2002, at 56-58, 61 (citing Teligent CEO James Continenza).

licenses in 74 markets.⁶⁹³

Winstar filed for bankruptcy protection in April 2001 and was acquired by IDT Corporation (“IDT”) in December 2001. IDT holds the former Winstar’s 28 GHz and 39 GHz licenses and has continued to offer many of the fixed wireless services that Winstar offered before it entered bankruptcy, including local and long distance telephone service, high-speed Internet and data services, and Frame Relay Services.⁶⁹⁴ IDT’s Winstar subsidiary currently operates in 22 markets and generated \$79.6 million in revenue between December 2001 and July 2002.⁶⁹⁵ IDT changed the name of its Winstar subsidiary to IDT Solutions in March 2003.⁶⁹⁶

XO entered bankruptcy in June 2002 and completed its reorganization in January 2003.⁶⁹⁷ The company is primarily a wireline CLEC but also holds LMDS and 39 GHz licenses covering 95 percent of the population of the 30 largest U.S. cities, and was able to continue funding its operations during its bankruptcy proceedings.⁶⁹⁸ XO uses its spectrum to deploy fixed wireless connections for business customers to whom it is not cost-efficient to construct a fiber optic connection.⁶⁹⁹

First Avenue Networks, which purchased Advanced Radio Telecom’s (“ART”) 39 GHz licenses during ART’s 2001 bankruptcy proceedings, now offers fixed wireless access on a wholesale basis to other carriers.⁷⁰⁰

B. Lowerband Operations

As discussed in the *Seventh Report*, AT&T Wireless and Sprint both announced in the fall of 2001 that they were terminating their fixed wireless operations.⁷⁰¹ And in July 2002, just prior to its bankruptcy filing, WorldCom Inc. (“WorldCom”), announced that it planned to discontinue or divest its fixed wireless operations.⁷⁰² The company announced in May 2003 that BellSouth plans to purchase

⁶⁹³ *Teligent Completes Its Reorganization – Company Exits Bankruptcy Fully Funded and Debt Free*, News Release, Teligent, Sept. 12, 2002.

⁶⁹⁴ IDT Corporation, SEC Form 10-K, Oct. 29, 2002, at 17, 21-24.

⁶⁹⁵ IDT Corporation, SEC Form 10-K, Oct. 29, 2002, at 17.

⁶⁹⁶ *IDT Corporation Announces that Winstar Will Become IDT Solutions*, News Release, IDT, Dec. 12, 2002.

⁶⁹⁷ *See Seventh Report*, at A-4; *XO Emerges from Bankruptcy*, RCR WIRELESS NEWS, Jan. 20, 2003, at 6. As part of the reorganization, telecom financier Carl Icahn now has an 80 percent ownership interest in the company. *Id.*

⁶⁹⁸ *See Seventh Report*, at A-4.

⁶⁹⁹ XO Communications, SEC Form 10-K, Mar. 21, 2003, at 12.

⁷⁰⁰ *See Seventh Report*, at A-4; First Avenue Networks, *Strategy* (visited Jun. 25, 2003) <<http://www.firstavenet.com/>>.

⁷⁰¹ *See Seventh Report*, at A-4 – A-5

⁷⁰² Dan Meyer, *WorldCom Plans Wireless Exit*, RCR WIRELESS NEWS, July 8, 2002, at 1; Chris Nolter, *M&A Work at WorldCom Cooled in February*, DAILY DEAL, Apr. 17, 2003.

WorldCom's fixed wireless assets, including its licenses, for \$65 million.⁷⁰³ WorldCom had been offering high-speed, fixed wireless Internet access service to business customers in 13 U.S. markets using both MDS and WCS spectrum.⁷⁰⁴

Despite the reorganizations and service terminations by all of the major fixed wireless providers, several smaller fixed wireless operators, including hundreds of operators using unlicensed spectrum,⁷⁰⁵ continue to provide high-speed Internet access service, generally in less densely populated markets across the country and often in only a few markets apiece. Most of the companies that use unlicensed spectrum to offer Internet access are local and regional Internet service providers, also referred to as wireless ISPs, that offer the service in an average of three markets apiece.⁷⁰⁶ Many of these carriers are targeting business customers, while others serve both businesses and residences. Many fixed wireless operators use lowerband spectrum to offer high-speed Internet access in rural and underserved areas. For example, Canyon Country Communications offers Internet access in Page, AZ; Planet Connect offers fixed wireless service in Bristol, Seymour, Newport, and Greeneville, TN; and DATAcentric sells the service in Lufkin, Conroe, and Bryan-College Station, TX.⁷⁰⁷

As mentioned in the *Sixth Report*, the Commission tracks the rollout of fixed wireless services by providers using lowerband spectrum on a county-by-county basis. Based on its analysis, the Commission estimates that there are at least 212 different lowerband operators providing fixed wireless services in 457 different counties.⁷⁰⁸ These counties contain 106 million people, or 37.3 percent of the U.S. population.⁷⁰⁹ This analysis is based on publicly-available information, such as news articles and operators' press releases, SEC filings, and web sites. There are several

⁷⁰³ Kristin Beckman, *WorldCom Assets Go to BellSouth*, RCR WIRELESS NEWS, May 19, 2003, at 17; Chris Nolter, *BellSouth Bids for WorldCom Unit*, DAILY DEAL, May 13, 2003.

⁷⁰⁴ See *Seventh Report*, at A-6.

⁷⁰⁵ Unlicensed spectrum consists of 26 megahertz in the 900 MHz band, 83.5 megahertz in the 2.4 GHz band, and 300 megahertz in the 5 GHz band. See, generally, 47 C.F.R. Part 15. Unlicensed spectrum is used for many purposes, including short-range data transmission technologies such as Bluetooth and 802.11, cordless phones, microwave ovens, and amateur radio. The spectrum is also used for WiFi access. See Section II.C.3.f, WiFi, *supra*. Companies using unlicensed spectrum to offer fixed wireless point-to-point broadband services primarily use the 2.4 GHz band, while some reportedly employ both the 2.4 GHz and 5 GHz bands for such services. Unlicensed fixed applications generally employ spread spectrum technology for long range transmissions in order to minimize the risk of interference with other operators. See *Sixth Report*, at 13439.

⁷⁰⁶ Many of these companies offer traditional wireline dial-up Internet access as well. See *Sixth Report*, at 13444. See also, Nancy Gohring, *Wireless ISPs: Emerging from the Shadows*, BROADBAND WIRELESS BUSINESS, March/April 2002, at 1, 8. Many of the small wireless ISPs believe that by offering service and becoming profitable in only one or a few markets before expanding to other markets, they will remain financially viable. *Id.*

⁷⁰⁷ See *Sixth Report*, at 13444.

⁷⁰⁸ See Appendix E, Map 10, at E-11.

⁷⁰⁹ Based on the 2000 Census. Many of these lowerband providers serve only business customers. Residential fixed wireless Internet access is available in at least 338 different counties. These counties contain approximately 62 million people or 22 percent of the U.S. population.

caveats to note when considering this data. First, in order to be considered as “covering” a county, an operator need only be offering service in a portion of that county. Second, the POPs and square mile figures in this analysis include all of the POPs and all of the square miles in a county considered to have coverage. Third, all population figures are based on the 2000 Census. Fourth, because some lowerband carriers serve small and remote locations and because unlicensed operators provide service without a license from the Commission, it is difficult to assess precisely who is operating where. Therefore, the analysis may not include certain companies that do not make the information on their fixed wireless offerings easily obtainable or publicly available.

C. Spectrum Allocation Proceedings

As mentioned in the *Seventh Report*, the Commission decided to permit mobile use of the 2500-2690 MHz band by MDS licensees in September 2001.⁷¹⁰ In March 2003, the Commission initiated a proceeding to facilitate the provision of fixed and mobile broadband access, as well as educational services, in the 2500-2690 MHz bands. With this action, the Commission began a comprehensive examination of the rules and policies governing these bands in order to provide greater opportunities for increased access to the spectrum and encourage efficient use of the spectrum.⁷¹¹

In addition, in November 2002, the Commission announced the reallocation of 2150-2155 MHz portion of the 2150-2160/62 MDS band for fixed and mobile services, including new, advanced wireless services that will be offered over next generation networks.⁷¹² MDS licensees currently use this band primarily for the upstream links in two-way, fixed wireless broadband services.⁷¹³

⁷¹⁰ See *Seventh Report*, at A-8.

⁷¹¹ Amendment of Parts 1, 21, 73, 74 and 101 of the Commission’s Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands, WT Docket No. 03-66, *Notice of Proposed Rulemaking and Memorandum Opinion and Order*, 18 FCC Rcd 6722 (2003).

⁷¹² Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands, WT Docket No. 02-353, *Notice of Proposed Rulemaking*, 17 FCC Rcd 24135 (2002).

⁷¹³ Under an informal agreement among MDS licensees, the principal use of this spectrum is for upstream communications to hub receiving facilities. *Id.*

**APPENDIX B:
U.S. INVESTMENT IN FOREIGN MOBILE OPERATORS**

The divestiture of stakes in foreign mobile telephone companies by U.S. mobile operators, a trend identified in the *Sixth Report*¹ and the *Seventh Report*,² continued in the second half of 2002 and in 2003.

SBC Communications shed two of its foreign mobile holdings in the past year. In November 2002, Canadian telecom conglomerate BCE, Inc. notified SBC Communications of its intention to exercise its right to buy SBC's remaining 20 percent stake in BCE mobile subsidiary Bell Canada for \$3.2 billion.³ SBC completed the sale of its interest in Bell Canada to BCE in December 2002.⁴ The following January, SBC finalized the sale of its 15 percent equity stake in France's Cegetel Groupe SA to London-based wireless carrier Vodafone Group plc for approximately \$2.3 billion in cash.⁵ Cegetel is a joint venture that owns 80 percent of Societe Francaise de Radiotelephone, the second-largest wireless provider in France. SBC Communications subsequently reported that it realized a gain of \$1.6 billion from the Cegetel sale.⁶

Western Wireless International Corporation ("WWI"), a subsidiary of Western Wireless, also divested two of its foreign mobile holdings in the past year. WWI announced the closing of the sale of its 57.3 percent interest in Icelandic wireless operator Tal hf to Islandssimi hf in November 2002.⁷ WWI's net proceeds from the transaction were expected to total approximately \$28.9 million. In June 2003, WWI announced its agreement to sell its 19 percent interest in Croation wireless operator VIPnet d.o.o. to Mobilcom Austria Aktiengesellschaft & CO KG, the majority owner of VIPnet.⁸ WWI expected that proceeds from the sale of its interest and related shareholder debt would be \$70 million.

In June 2003, Atlantic West, a 50/50 joint venture between Verizon Communications and AT&T Wireless, succeeded in its longstanding effort to sell the U.S. operators' combined 49 percent stake in Czech mobile operator Eurotel Praha to Czech telephone operator Cesky Telecom, the owner of the remaining 51 percent stake in Eurotel. As detailed in the *Seventh Report*,⁹ Atlantic West had reached a preliminary agreement on the sale with Cesky Telecom for a price of \$1.5 billion in July 2001, but Cesky Telecom subsequently cut the offered price to \$1.1 billion and negotiations were ultimately abandoned in November 2001 after the parties failed to agree on the purchase price and Atlantic West rejected Cesky

¹ See *Sixth Report*, at 13388-13389.

² See *Seventh Report*, at 13028-13030.

³ *BCE to Buy Out SBC's Bell Canada Stake*, TR DAILY, Nov. 11, 2002.

⁴ *Investor Briefing*, SBC Communications, Inc., Jan. 28, 2003, at 8.

⁵ *Id.*

⁶ *Investor Briefing*, SBC Communications, Inc., Apr. 24, 2003, at 11.

⁷ *Western Wireless International Announces Closing of Sale of Interest in Icelandic Wireless Operator*, News Release, Western Wireless Corporation, Nov. 26, 2002.

⁸ *Western Wireless International Agrees to Sell Interest in Croation Wireless Operator*, News Release, Western Wireless Corporation, June 4, 2003.

⁹ See *Seventh Report*, at 13030.

Telecom's latest offer. Negotiations later resumed and the parties finally reached an agreement this past year. On June 5, 2003, the Board of Directors of Cesky Telecom approved the terms of a preliminary agreement with Atlantic West to purchase the remaining 49 percent stake that it does not already own in its mobile telephony unit Eurotel Praha.¹⁰ The parties agreed on a price of \$1.05 billion to be paid in cash. In a related move, Eurotel owners declared that a dividend of \$415 million will be paid prior to the closing of the transaction. The dividend payment raises the value of the sale to an estimated \$1.25 billion.¹¹

Verizon announced on June 13, 2003 that it plans to sell its 39.4 percent equity stake in Mexican wireless carrier Grupo Iusacell to Movil Access, a Mexican company and wireless telecom investor, following approval of the latter's offer by the Mexican securities commission.¹² Movil Access offered to acquire 100 percent of Grupo Iusacell's stock for \$10 million, plus the assumption of \$814 million in Iusacell debt.¹³ Vodafone Americas, which owns another 35 percent equity stake in Grupo Iusacell, is also reported to be planning to accept the offer. Bell Atlantic Corporation, which later merged with GTE Corporation to form Verizon, paid \$1 billion for its Iusacell stake in 1993, while Vodafone bought its share in Iusacell for \$973.4 million in 2001¹⁴

¹⁰ *Board Approves Principal Terms of Acquisition of Eurotel*, Press Release, Cesky Telecom, June 5, 2003.

¹¹ Linda Mutschler, *AT&T Wireless – Czech Deal Approved*, Global Equity Research, Merrill Lynch, June 5, 2003, at 1.

¹² *Verizon Communications Announces Plans To Sell its Equity Stake in Iusacell*, Press Release, Verizon Communications, June 13, 2003.

¹³ *Verizon To Sell Iusacell Stake*, TRDAILY, June 13, 2003; Joel Millman and Santiago Perez, *Verizon, Vodafone Sell Iusacell, Ending Costly Mexico Venture*, THE WALL STREET JOURNAL, June 16, 2003, at B3.

¹⁴ Joel Millman and Santiago Perez, *Verizon, Vodafone Sell Iusacell, Ending Costly Mexico Venture*, THE WALL STREET JOURNAL, June 16, 2003, at B3.

**APPENDIX C:
LOWER 700 MHz AUCTION #44 RESULTS**

Bidder Name	Total High Bids	Net High Bids (1)	POPs
Aloha Partners, L.P.	77	\$28,793,380	117,383,349
Vulcan Spectrum LLC	24	\$15,075,000	7,236,558
Cavalier Group, LLC	7	\$6,472,050	24,617,122
Union Telephone Company	16	\$4,452,000	2,670,974
LIN Television Corporation	18	\$4,293,000	7,475,819
DataCom Wireless, L.L.C.	3	\$3,303,950	11,053,041
Harbor Wireless, LLC	14	\$2,836,600	8,487,727
MilkyWay Broadband, LLC	48	\$2,757,105	10,405,189
Redwood County Telephone Company	17	\$1,984,500	6,552,179
David M. Gates	7	\$1,742,000	3,871,000
Whidbey Telephone Company	3	\$1,212,100	675,464
Lynch 3G Communications Corporation	8	\$1,118,000	1,722,987
Capitol Broadcasting Company, Inc.	12	\$888,000	2,963,816
Corr Wireless Communications, LLC	9	\$762,000	2,643,203
PGTV, Inc.	1	\$740,350	2,097,447
East Kentucky Network, LLC	9	\$643,000	1,856,852
Bluegrass Cellular, Inc.	9	\$639,000	1,886,924
Ronan Telephone Company	3	\$618,000	374,399
KanOkla Telephone Association, Inc.	4	\$475,150	479,533
Lexcom Telephone Company	1	\$453,000	914,232
First Cellular of Southern Illinois	7	\$423,000	1,405,713
Chariton Valley Communication Corporation, Inc.	6	\$397,800	605,695
Cameron Communications Corporation	6	\$340,000	1,076,431
Banks Broadcasting, Inc.	2	\$326,400	468,783
Agri-Valley Communications, Inc.	7	\$320,450	1,253,761
Blue Valley Tele-Communications, Inc.	2	\$293,250	190,348
Kennebec Telephone Company, Inc.	11	\$283,400	696,004
Public Service Wireless Services, Inc.	4	\$250,000	832,638
SJI, Inc.	4	\$249,000	828,045
Lackawaxen Long Distance Company, Inc.	4	\$247,000	826,262
Citizens Telephone Cooperative	4	\$246,000	723,276
Nemont Communications, Inc.	2	\$243,950	136,385
CT Communications, Inc.	3	\$238,000	789,808
PVT Networks, Inc.	1	\$231,000	226,366
Peoples Telephone Cooperative, Inc.	3	\$230,350	904,559
The Ponderosa Telephone Co.	1	\$219,300	303,190
Mobius Communications Company	4	\$197,250	282,744
Grand River Communications, Inc.	8	\$184,000	501,900
Kaplan Telephone Company, Inc.	2	\$181,500	581,272
Craw-Kan Telephone Cooperative, Inc.	5	\$172,550	650,983
Central Wisconsin Communications, Inc.	2	\$167,450	384,203
Plateau Telecommunications, Inc.	2	\$166,000	370,422
XIT Telecommunications & Technology, Ltd.	4	\$159,800	555,697
Dickey Rural Services, Inc.	3	\$143,650	351,093
Eastern Colorado Wireless Partnership	4	\$143,100	259,898
Star Wireless LLC	4	\$137,150	600,171
Waller, Inc.	3	\$121,500	518,389

McElroy Electronics Corporation	2	\$118,300	604,893
The Tri-county Telephone Association, Inc.	2	\$117,750	184,012
3G COMM, LLC	1	\$116,350	315,121
Glenwood Telephone Membership, Corporation	3	\$115,500	253,961
Missouri RSA No. 7 L.P. dba Mid-Missouri Cellular	1	\$107,000	157,047
McBride Spectrum Partners I, LLC	4	\$102,505	526,323
Triangle Communication System, Inc.	3	\$102,000	126,308
ComSouth Tellular, Inc.	2	\$96,750	432,349
San Carlos Apache Telecommunications Utility, Inc.	2	\$96,000	318,457
Allcom Communications, Inc.	1	\$90,000	210,908
FTC Management Group, Inc.	2	\$90,000	300,683
Rainbow Telephone Cooperative Association, Inc.	3	\$87,750	386,017
Scott Reiter	1	\$84,500	433,785
MTC North, Inc.	1	\$84,000	374,182
Northeast Nebraska Telephone Company	2	\$84,000	256,395
GTC Wireless, Inc.	2	\$82,500	367,183
Holland Wireless, L.L.C.	1	\$80,750	316,633
Poka Lambro Telecommunications, Ltd.	3	\$76,500	256,348
Swayzee Telephone Company	2	\$73,500	324,177
Cable & Communications Corporation	4	\$73,015	189,871
Chequamegon Telephone Cooperative, Inc.	2	\$72,000	321,299
WSS, L.L.C.	2	\$69,000	305,276
North Dakota Network Co.	1	\$67,000	61,933
Kingdom Telephone Company	1	\$66,000	92,590
CTC Telcom, Inc.	2	\$61,500	239,922
Guadalupe Valley Communications Systems, L.P.	2	\$61,000	204,342
Star Telephone Company, Inc.	1	\$61,000	180,185
Webster-Calhoun Cooperative Telephone Association	2	\$54,750	244,541
BPS Telephone Company	1	\$50,150	197,439
BEK Communications Cooperative	2	\$41,250	136,048
Beulahland Communications, Inc.	1	\$38,350	123,051
Tri-County Communications, Inc.	1	\$36,000	110,131
Guam Cellular and Paging	1	\$34,000	133,152
Advantage Cellular Systems, Inc.	1	\$33,750	150,599
McDonald County Telephone Company	1	\$33,000	93,482
Farmers Cellular Telephone, Inc.	1	\$31,450	121,990
DYCOM Holding, Inc.	1	\$29,750	115,644
Alpine Communications, L.C.	1	\$28,900	114,478
Northern New Mexico Telecom, Inc.	1	\$27,300	22,300
Arctic Slope Telecommunications and Cellular, Inc.	1	\$26,250	118,282
Mark Twain Communications Company	1	\$24,000	55,897
United Telephone Association, Inc.	3	\$23,850	104,466
Yell County Telephone Company, Inc.	1	\$23,250	104,770
C&W Enterprises, Inc.	1	\$22,500	98,458
City of Ketchikan dba Ketchikan Public Utilities	1	\$21,000	68,989
Pioneer Telephone Association, Inc.	1	\$20,400	80,134
West Wisconsin Telcom Cooperative, Inc.	1	\$20,250	89,365
Montana Spectrum Alliance	1	\$19,550	77,691
H&B Communications, Inc.	1	\$18,750	82,345
Farmers Telephone Company, Inc.	1	\$18,000	59,620
Nortex Communications Company	1	\$18,000	80,087
S&T Communications Inc	2	\$17,775	49,224

Great Plains Communications, Inc	1	\$17,000	35,875
Panhandle Telecommunication Systems, Inc.	1	\$7,700	25,743
Blanca Telephone Company	1	\$7,500	27,520

Source: Federal Communications Commission

Notes: (1) As of the close of the auction.

LOWER 700 MHz AUCTION #49 RESULTS

Bidder Name	Total High Bids	Net High Bids (1)	POPs
QUALCOMM Incorporated	5	\$38,036,000	237,029,635
Aloha Partners II, L.P.	89	\$5,816,590	22,873,669
Cavalier Group, LLC	44	\$2,143,050	11,379,618
LIN Television Corporation	13	\$1,980,000	3,374,467
Vermont Telephone Company, Inc.	5	\$1,628,600	1,577,173
D&E Investments, Inc.	5	\$828,000	1,229,242
Whidbey Telephone Company	7	\$652,800	1,244,671
Lynch 3G Communications Corporation	4	\$620,000	1,053,479
Lima Directional Paging Co., Inc.	3	\$513,750	587,652
Banks Broadcasting, Inc.	4	\$513,000	709,789
Valley Telephone Cooperative, Inc.	3	\$451,350	656,014
Viacel Corporation	2	\$403,910	760,069
AGRI-VALLEY COMMUNICATIONS, INC.	2	\$341,700	678,656
United Telephone	10	\$341,250	NA
BPS Telephone Company	5	\$300,050	675,436
Peoples Telephone Cooperative, Inc.	3	\$294,100	491,572
KM Communications, Inc.	3	\$237,150	286,664
Adams Telcom, Inc.	2	\$201,750	415,537
Westelcom Network, Inc.	2	\$192,000	480,944
Corr Wireless Communications, LLC	3	\$189,550	640,315
Delta Media Corporation	4	\$161,200	448,811
DataCom Wireless, L.L.C.	4	\$139,100	876,163
WCTA Wireless Inc.	1	\$133,450	106,046
David M. Gates	7	\$123,760	1,240,017
Pioneer Telephone Cooperative, Inc.	3	\$122,000	281,107
CAPITOL BROADCASTING COMPANY, INC.	4	\$101,000	663,594
Grand River Communications, Inc.	4	\$86,700	532,659
Wireless Network Management	2	\$85,500	187,384
Kennebec Telephone Company	2	\$57,200	185,826
Red River Rural Telephone Association, Inc.	1	\$43,350	214,745
McBride Spectrum Partners II, LLC	1	\$25,350	103,833
Bluegrass Cellular, Inc.	1	\$25,000	91,545
Acumen Technologies, Inc.	1	\$11,050	142,982
RED LAKE BAND OF CHIPPEWA INDIANS	1	\$9,800	65,227
American Samoa Telecommunications Authority	1	\$6,900	57,291

Source: Federal Communications Commission

Notes: (1) As of the close of the auction.

**APPENDIX D:
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

Source: Cellular Telecommunications and Internet Association, *Semi-Annual Wireless Industry Survey*
<http://www.wow-com.com/industry/stats/surveys/>.

Table 3: Economic Area Penetration Rates

EA	EA Name	Subscribers	2000 Census	EA penetration rate	EA density
34	Tampa-St. Petersburg-Clearwater, FL	1,335,363	2,395,997	55.73%	891.0
10	New York-No. New Jer.-Long Island, NY-NJ-CT-PA-MA-VT	13,607,067	25,712,577	52.92%	890.6
12	Philadelphia-Wilmington-Atl. City, PA-NJ-DE-MD	3,857,780	7,309,792	52.78%	778.8
161	San Diego, CA	1,628,114	2,813,833	57.86%	660.5
64	Chicago-Gary-Kenosha, IL-IN-WI	5,455,054	10,328,854	52.81%	556.5
55	Cleveland-Akron, OH-PA	1,983,225	4,692,460	42.26%	427.8
3	Boston-Worcester-Lawrence-Lowell-Brockton, MA-NH-RI-VT	4,263,353	7,954,554	53.60%	421.8
31	Miami-Fort Lauderdale, FL	3,311,130	5,602,222	59.10%	413.8
13	Washington-Baltimore, DC-MD-VA-WV-PA	5,003,728	8,403,130	59.55%	402.8
63	Milwaukee-Racine, WI	1,056,619	2,255,183	46.85%	366.9
57	Detroit-Ann Arbor-Flint, MI	3,794,344	6,963,637	54.49%	364.1
50	Dayton-Springfield, OH	451,137	1,133,004	39.82%	318.5
49	Cincinnati-Hamilton, OH-KY-IN	1,075,343	2,184,860	49.22%	294.1
11	Harrisburg-Lebanon-Carlisle, PA	498,960	1,125,265	44.34%	292.4
20	Norfolk-Virginia Beach-Newport News, VA-NC	924,504	1,722,764	53.66%	289.9
160	Los Angeles-Riverside-Orange County, CA-AZ	9,485,741	18,003,420	52.69%	286.1
53	Pittsburgh, PA-WV	1,364,699	2,971,829	45.92%	284.8
33	Sarasota-Bradenton, FL	389,839	763,795	51.04%	273.6
163	San Francisco-Oakland-San Jose, CA	5,126,825	9,111,806	56.27%	271.1
30	Orlando, FL	1,943,099	3,642,540	53.34%	265.8
40	Atlanta, GA-AL-NC	3,397,545	5,471,412	62.10%	246.0
23	Charlotte-Gastonia-Rock Hill, NC-SC	1,071,319	2,031,519	52.73%	240.5
32	Fort Myers-Cape Coral, FL	429,957	692,265	62.11%	234.3
133	McAllen-Edinburg-Mission, TX	478,031	978,369	48.86%	222.0
8	Buffalo-Niagara Falls, NY-PA	583,482	1,507,759	38.70%	212.9
62	Grand Rapids-Muskegon-Holland, MI	657,141	1,881,991	34.92%	206.8
170	Seattle-Tacoma-Bremerton, WA	2,286,128	4,135,291	55.28%	190.4
51	Columbus, OH	974,843	2,349,060	41.50%	190.4
18	Greensboro-Winston-Salem-High Point, NC-VA	877,273	1,854,853	47.30%	189.1
19	Raleigh-Durham-Chapel Hill, NC	1,008,819	1,831,510	55.08%	188.4
164	Sacramento-Yolo, CA	1,258,188	2,311,567	54.43%	188.1
172	Honolulu, HI	706,712	1,211,537	58.33%	187.2
65	Elkhart-Goshen, IN-MI	315,244	936,245	33.67%	185.7
41	Greenville-Spartanburg-Anderson, SC-NC	631,558	1,248,824	50.57%	183.6
70	Louisville, KY-IN	671,230	1,416,914	47.37%	180.9
83	New Orleans, LA-MS	881,511	1,725,338	51.09%	171.9
67	Indianapolis, IN-IL	1,364,398	3,066,469	44.49%	171.4
131	Houston-Galveston-Brazoria, TX	3,184,408	5,632,853	56.53%	169.2
7	Rochester, NY-PA	466,524	1,493,518	31.24%	167.2
44	Knoxville, TN	467,294	983,329	47.52%	165.6
22	Fayetteville, NC	258,032	528,224	48.85%	164.6
56	Toledo, OH	575,990	1,294,395	44.50%	163.9
66	Fort Wayne, IN	270,422	725,847	37.26%	158.5
130	Austin-San Marcos, TX	806,102	1,349,267	59.74%	156.1
81	Pensacola, FL	321,837	623,252	51.64%	154.1

26	Charleston-North Charleston, SC	337,688	587,297	57.50%	149.8
43	Chattanooga, TN-GA	320,302	720,375	44.46%	145.3
45	Johnson City-Kingsport-Bristol, TN-VA	258,641	576,081	44.90%	144.5
60	Appleton-Oshkosh-Neenah, WI	163,720	433,250	37.79%	143.6
82	Biloxi-Gulfport-Pascagoula, MS	181,074	396,754	45.64%	143.5
84	Baton Rouge, LA-MS	360,788	739,673	48.78%	140.3
78	Birmingham, AL	840,055	1,578,903	53.20%	137.1
5	Albany-Schenectady-Troy, NY	477,695	1,171,669	40.77%	134.7
46	Hickory-Morganton, NC-TN	199,887	519,208	38.50%	131.9
42	Asheville, NC	217,924	444,594	49.02%	128.6
96	St. Louis, MO-IL	1,713,867	3,558,651	48.16%	127.0
24	Columbia, SC	470,366	932,115	50.46%	126.0
52	Wheeling, WV-OH	98,045	327,645	29.92%	124.5
15	Richmond-Petersburg, VA	773,113	1,446,123	53.46%	124.0
74	Huntsville, AL-TN	489,343	997,824	49.04%	119.1
127	Dallas-Fort Worth, TX-AR-OK	3,939,831	7,645,530	51.53%	119.0
54	Erie, PA	168,550	519,348	32.45%	116.4
29	Jacksonville, FL-GA	1,008,013	1,885,190	53.47%	112.5
14	Salisbury, MD-DE-VA	133,529	363,970	36.69%	111.2
102	Davenport-Moline-Rock Island, IA-IL	249,327	558,913	44.61%	108.3
25	Wilmington, NC-SC	437,363	878,267	49.80%	107.4
71	Nashville, TN-KY	1,173,096	2,444,643	47.99%	105.1
6	Syracuse, NY-PA	685,817	1,902,640	36.05%	104.7
73	Memphis, TN-AR-MS-KY	869,480	1,882,332	46.19%	103.0
103	Cedar Rapids, IA	220,243	384,577	57.27%	101.3
85	Lafayette, LA	281,290	601,654	46.75%	100.0
162	Fresno, CA	592,579	1,419,998	41.73%	98.6
2	Portland, ME	318,218	748,817	42.50%	98.6
17	Roanoke, VA-NC-WV	372,178	826,284	45.04%	97.8
158	Phoenix-Mesa, AZ-NM	1,834,796	3,407,197	53.85%	93.9
9	State College, PA	280,918	809,979	34.68%	92.4
28	Savannah, GA-SC	321,449	668,214	48.11%	91.9
101	Peoria-Pekin, IL	232,899	528,671	44.05%	91.0
27	Augusta-Aiken, GA-SC	256,061	604,799	42.34%	89.8
87	Beaumont-Port Arthur, TX	213,655	456,637	46.79%	89.2
99	Kansas City, MO-KS	1,261,851	2,469,340	51.10%	88.7
92	Fayetteville-Springdale-Rogers, AR-MO-OK	177,573	405,160	43.83%	88.4
21	Greenville, NC	382,332	823,517	46.43%	87.7
48	Charleston, WV-KY-OH	404,431	1,199,373	33.72%	85.4
39	Columbus, GA-AL	254,726	496,538	51.30%	84.1
134	San Antonio, TX	1,013,681	2,141,060	47.34%	83.0
107	Minneapolis-St. Paul, MN-WI-IA	2,262,258	4,498,286	50.29%	83.0
47	Lexington, KY-TN-VA-WV	654,494	1,851,367	35.35%	80.4
167	Portland-Salem, OR-WA	1,438,644	2,883,737	49.89%	76.0
69	Evansville-Henderson, IN-KY-IL	367,147	854,714	42.96%	75.3
80	Mobile, AL	289,482	676,258	42.81%	74.8
93	Joplin, MO-KS-OK	102,316	263,904	38.77%	74.7
68	Champaign-Urbana, IL	253,397	630,898	40.16%	73.5
124	Tulsa, OK-KS	650,809	1,384,426	47.01%	72.4

104	Madison, WI-IL-IA	402,418	933,823	43.09%	71.3
72	Paducah, KY-IL	56,042	226,586	24.73%	70.0
79	Montgomery, AL	239,775	481,137	49.84%	66.9
125	Oklahoma City, OK	774,495	1,698,197	45.61%	65.0
35	Tallahassee, FL-GA	334,360	720,434	46.41%	63.5
38	Macon, GA	313,486	768,701	40.78%	62.9
37	Albany, GA	151,812	468,178	32.43%	62.7
118	Omaha, NE-IA-MO	492,197	1,044,156	47.14%	62.4
159	Tucson, AZ	495,573	999,882	49.56%	60.0
97	Springfield, IL-MO	245,684	517,462	47.48%	58.2
98	Columbia, MO	157,350	369,014	42.64%	58.0
88	Shreveport-Bossier City, LA-AR	233,657	573,616	40.73%	58.0
4	Burlington, VT-NY	186,248	605,393	30.76%	57.6
89	Monroe, LA	149,561	333,519	44.84%	56.1
106	Rochester, MN-IA-WI	157,011	318,374	49.32%	55.6
36	Dothan, AL-FL-GA	120,426	332,409	36.23%	53.7
105	La Crosse, WI-MN	54,764	241,903	22.64%	53.7
86	Lake Charles, LA	215,364	536,758	40.12%	52.4
141	Denver-Boulder-Greeley, CO-KS-NE	2,335,988	3,984,105	58.63%	52.0
95	Jonesboro, AR-MO	107,880	303,852	35.50%	51.3
16	Staunton, VA-WV	171,964	334,087	51.47%	51.0
61	Traverse City, MI	70,091	286,745	24.44%	50.7
119	Lincoln, NE	178,073	379,321	46.95%	50.2
75	Tupelo, MS-AL-TN	230,214	625,002	36.83%	49.8
77	Jackson, MS-AL-LA	593,570	1,432,518	41.44%	49.7
94	Springfield, MO	321,087	859,559	37.35%	48.1
100	Des Moines, IA-IL-MO	748,786	1,683,257	44.48%	47.3
91	Fort Smith, AR-OK	114,606	329,136	34.82%	46.5
132	Corpus Christi, TX	235,222	549,012	42.84%	46.5
90	Little Rock-North Little Rock, AR	700,992	1,614,850	43.41%	46.1
166	Eugene-Springfield, OR-CA	329,133	791,776	41.57%	43.1
76	Greenville, MS	97,365	252,280	38.59%	41.0
117	Sioux City, IA-NE-SD	91,763	252,656	36.32%	39.5
152	Salt Lake City-Ogden, UT-ID	1,009,595	2,088,974	48.33%	35.7
123	Topeka, KS	179,799	454,539	39.56%	35.6
59	Green Bay, WI-MI	289,283	671,225	43.10%	34.2
108	Wausau, WI	192,046	487,723	39.38%	34.1
157	El Paso, TX-NM	309,851	955,602	32.42%	33.0
58	Northern Michigan, MI	30,911	269,986	11.45%	28.5
169	Richland-Kennewick-Pasco, WA	275,354	677,674	40.63%	27.7
137	Lubbock, TX	177,227	374,626	47.31%	27.2
153	Las Vegas, NV-AZ-UT	898,876	1,709,797	52.57%	23.7
147	Spokane, WA-ID	352,752	829,735	42.51%	23.6
1	Bangor, ME	*	526,106	*	20.9
156	Albuquerque, NM-AZ	454,076	921,086	49.30%	20.9
122	Wichita, KS-OK	416,387	1,175,577	35.42%	20.5
128	Abilene, TX	80,260	222,147	36.13%	20.3
109	Duluth-Superior, MN-WI	145,751	350,059	41.64%	18.5
113	Fargo-Moorhead, ND-MN	161,626	371,691	43.48%	16.4

155	Farmington, NM-CO	86,362	193,872	44.55%	16.0
116	Sioux Falls, SD-IA-MN-NE	241,324	519,143	46.49%	15.1
165	Redding, CA-OR	138,134	336,820	41.01%	14.4
149	Twin Falls, ID	71,395	162,397	43.96%	14.1
150	Boise City, ID-OR	273,879	574,876	47.64%	13.7
139	Santa Fe, NM	114,412	258,790	44.21%	13.1
126	Western Oklahoma, OK	58,060	139,761	41.54%	12.0
138	Amarillo, TX-NM	216,278	481,633	44.91%	11.8
120	Grand Island, NE	101,188	288,047	35.13%	11.6
136	Hobbs, NM-TX	65,699	190,340	34.52%	11.2
148	Idaho Falls, ID-WY	139,264	306,120	45.49%	10.9
146	Missoula, MT	154,364	399,183	38.67%	10.8
110	Grand Forks, ND-MN	88,977	230,253	38.64%	10.2
135	Odessa-Midland, TX	164,993	388,007	42.52%	10.1
129	San Angelo, TX	79,794	202,679	39.37%	10.1
140	Pueblo, CO-NM	100,157	279,600	35.82%	8.7
168	Pendleton, OR-WA	61,713	200,681	30.75%	8.7
154	Flagstaff, AZ-UT	164,921	401,766	41.05%	8.2
142	Scottsbluff, NE-WY	24,854	92,360	26.91%	7.8
151	Reno, NV-CA	313,218	670,013	46.75%	7.6
111	Minot, ND	*	111,195	*	7.0
112	Bismarck, ND-MT-SD	73,115	175,427	41.68%	6.3
114	Aberdeen, SD	*	82,608	*	5.4
143	Casper, WY-ID-UT	166,979	408,708	40.86%	5.2
115	Rapid City, SD-MT-NE-ND	81,387	213,696	38.09%	5.0
121	North Platte, NE-CO	*	61,758	*	5.0
144	Billings, MT-WY	161,907	404,902	39.99%	4.9
145	Great Falls, MT	55,629	166,564	33.40%	4.2
171	Anchorage, AK	285,300	626,932	45.51%	1.0

* Data withheld to maintain firm confidentiality.

Source: Federal Communications Commission internal analysis based on preliminary year-end 2002 filings for Numbering Resource Utilization in the United States. Density is persons per square mile.

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

Year-End 2001		Year-End 2002	
Operator	Total	Operator	Total
1 Verizon Wireless	29,398	Verizon Wireless	32,491
2 Cingular Wireless	21,596	Cingular Wireless	21,900
3 AT&T Wireless	18,047	AT&T Wireless	20,900
4 Sprint PCS	13,555	Sprint PCS	14,760
5 Nextel	8,667	Nextel	10,612
6 VoiceStream	6,993	T-Mobile	9,913
7 ALLTEL	6,683	ALLTEL	7,600
8 US Cellular	3,461	US Cellular	4,103
9 Western Wireless	1,177	Leap Wireless	1,512
10 Leap Wireless	1,119	Western Wireless	1,197
11 Qwest	1,114	Qwest	1,034
12 Telecorp	1,018	Centennial (1)	897
13 Centennial	827	Nextel Partners	877
14 CenturyTel	797	Triton PCS	830
15 Dobson Comm.	700	Dobson Comm.	768
16 Triton PCS	686	Rural Cellular	722
17 American Cellular	657	American Cellular	690
18 Rural Cellular	647	Alamosa PCS	622
19 Price Wireless	570	AirGate	589
20 Nextel Partners	516	US Unwired	561
21 Alamosa PCS	503	Broadwing	470
22 Broadwing	462	Midwest Wireless	300
23 AirGate	453	Horizon PCS	271
24 PrimeCo	385	Ntelos	267
25 PR. Tel. Co.	327	Southern LINC	260

Sources: For 2001, see *Seventh Report*, at 13094. For 2002, 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 29, 2003) <<http://www.southernlinc.com/faqs.asp>>. Midwest Wireless, *Midwest Wireless and DTN Market Access Team Up to Deliver Commodity Quotes to Wireless Phones*, News Release, May 27, 2003.

Notes

(1) As of Nov. 30, 2002.

**Table 5: Estimated Mobile Telephone Rollouts
by Number of Launches by County**

Total Number of Providers in a County	Number of Counties	POPs Contained in Those Counties (1)	% of Total US POPs	Square Miles Contained in Those Counties	% of Total US Square Miles
3 or More	2232	270,233,931	94.7%	1,861,820	51.6%
4 or More	1674	254,738,264	89.3%	1,301,067	36.1%
5 or More	1211	235,569,285	82.6%	940,523	26.1%
6 or More	789	202,753,811	71.1%	642,426	17.8%
7 or More	259	72,474,947	25.4%	230,073	6.4%

Table 6: County Quartiles with Estimated Rollout by at least 3 Mobile Telephone Providers

County Quartile Based on Population	Total Number of Counties (2)	Number of Counties with at least 3 Providers	Percent of Counties in Quartile with at least 3 Providers	Total POPs in Quartile Counties (1)	POPs in Counties with at least 3 Providers	Percent of Quartile POPs with at least 3 Providers
1st Quartile	805	781	97.0%	234,640,253	232,508,956	99.1%
2nd Quartile	805	659	81.9%	31,425,466	26,141,620	83.2%
3rd Quartile	804	527	65.6%	14,135,298	9,490,930	67.1%
4th Quartile	805	263	32.7%	5,029,499	1,988,010	39.5%

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

Notes:

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

Table 7: Mobile Telephone Digital Coverage

Technology	POPs in Those Areas (1)	% of Total POPs (2)	Square Miles Contained in Those Counties	% of Total Square Miles
CDMA	259,854,520	91.1%	1,849,933.6	51.3%
TDMA / GSM	265,342,450	93.0%	1,928,473.1	53.5%
iDEN	248,006,454	86.9%	1,295,614.2	35.9%
Total Digital	277,586,564	97.3%	2,573,948.1	71.4%

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%
1997 to 2002		12.1%		-32.6%		-0.3%		18.5%		-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%

Source: See Appendix D, Table 1, at D-2 (ARPU); Dec 2002 CTIA Survey, at 208 (minutes of use).

Table 10: Market Entry Over Time

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

Source: FCC estimates

**Table 11: U.S. Mobile Telephone Operators'
Holdings in Foreign Mobile Operators**

Operator	Country	Subscribers (Brand name)	Venture	Ownership (%)
SBC	Denmark	1.975 million	Tele Danmark	41.6
	Belgium	4.07 million (Proximus)	Belgacom	17.5 (controls 24.36% through investment in Tele Danmark, which owns 16.5% of Belgacom)
	South Africa	6.395 million (Vodacom)	Telkom SA(owns 50% of Vodacom)	18
	Mexico	20.067 million	America Movil	8
BellSouth	Uruguay	143,000 (Movicom)	Abiatar	46
	Guatemala	193,000	BellSouth Guatemala	60
	Nicaragua	201,000	Nicacell	89
	Ecuador	632,000	Otecel	89.4
	Panama	335,000	BellSouth Panama	43.7
	Brazil (Sao Paulo)	1.669 million	BCP	45.4
	Brazil (northeast)	1.005 million	BCP	47.1
	Venezuela	3.107 million	Telcel	78.2
	Argentina	1.32 million	Movicom/ BellSouth	65
	Chile	1.032 million	BellSouth Chile	100
	Columbia	1.349 million	Celumovil	66
	Peru	530,000	Tele 2000	97.4
	Denmark	1.103 million	Sonafon	46.5
	Israel	2.53 million	Cellcom	34.7
AT&T	Canada	3.356 million	Rogers Wireless	34.3
	Taiwan	4.341 million	FarEasTone	22.7
	Slovakia	1.298 million	EuroTel Bratislava	24.5
	India	1.204 million	IDEA Cellular	33
	India	1 million (BPL Mobile)	BPL Cellular	49
	Antigua & Barbuda	NA	Antigua Wireless	85
	Bermuda	NA	Telecommunicati ons Limited	60
	Dominica	NA	Wireless Ventures	100
	St. Lucia	NA	Wireless Ventures	69
	St. Vincent & Grenadines	NA	Wireless Ventures	100
Verizon	Italy	19 million	Omnitel Pronto Italia	23.1
	Slovakia	1.298 million	EuroTel Bratislava	24.5
	Greece	2.514 million	STET Hellas	17.5

	Indonesia	1.823 million	Excelcomindo	23.1
	Japan	3.849 million	Tu-Ka	2.7-5
	New Zealand	1.229 million	Telecom New Zealand	21.5
	Philippines	NA (Extelcom)	BayanTel (owns 46.6% stake in wireless provider Extelcom)	19.4
	Argentina	1.006 million (CTI Movil)	CTI Holdings	65.3
	Canada	2.996 million	TELUS Corporation	23.7
	Venezuela	2.561 million	CANTV	28.5
	Taiwan	6.24 million	Taiwan Cellular Corporation	13
	Dominican Republic	550,000	CODETEL	100
Western Wireless International	Ireland	145,000	Meteor	81
	Austria	318,000	tele.ring	99.5
	Slovenia	NA	Western Wireless	100
	Georgia	NA	MagtiCom	14.5
	Ghana	NA	Western Telesystems	56.7
	Cote d'Ivoire	NA	CORA de Comstar	40
	Bolivia	NA	NuevaTel	71.5
	Haiti	NA	COMCEL	51
Nextel International	Canada	NA	NII Holdings	36
	Japan	NA		
	Argentina	NA		
	Brazil	NA		
	Mexico	517,000		
	Peru	NA		
	Philippines	NA		

Sources: Publicly available information such as operators' news releases, web sites and filings with the Securities and Exchange Commission. Subscriber figures for a number of foreign affiliates are from Linda Mutschler, *Global Wireless Matrix 4Q02*, Merrill Lynch Global Securities Research, Apr. 2, 2003.

Table 12: Mobile Performance in Selected Countries

Country	CPP or MPP	Penetration (%)	Share of Prepaid (%)	MOUs	Revenue per Minute (\$)
USA	MPP	49	5	458	0.12
Canada	MPP	37		270	0.11
UK	CPP	85	69	132	0.22
Germany	CPP	72	54	72	0.29
Italy	CPP	93		121	0.20
France	CPP	63		156	0.20
Finland	CPP	85		146	0.24
Japan	CPP	62	3	170	0.30
South Korea	CPP	68	1	296	0.10
Australia	CPP	68		173	0.16

Sources: Linda Mutschler, *Global Wireless Matrix 4Q02*, Global Securities Research, Merrill Lynch, Apr. 2, 2003; Linda Mutschler, *The Next Generation VII*, Global Securities Research, Merrill Lynch, Feb. 21, 2003.

**APPENDIX E:
MOBILE DATA**

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Table 1: Text Messaging and IM Services E-2

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Table 1: Text Messaging and IM Services

Provider	Per-Message		Monthly Price for Messaging Packages	IM Service (included unless otherwise noted)
	Send	Receive		
Verizon Wireless	10¢	2¢	\$2.99 for 100	AOL IM MSN Messenger (offered through Mobile Web plan)
			\$3.99 for 200	
			\$7.99 for 600	
Cingular Wireless	10¢	10¢	\$2.99 for 100	
			\$5.99 for 250	
			\$9.99 for 500	
T-Mobile	5¢	5¢	\$2.99 for 500	AOL IM
AT&T Wireless	10¢	Free	\$1.99 for 25	AOL IM
			\$4.99 for 100	Yahoo! Messenger
			received messages free	
Nextel	10¢	10¢	\$5.00 for 300	AOL IM (\$5 per month for unlimited use)
			\$9.00 for 1000	
			\$10.00 for unlimited text, AIM, and web use	
Sprint PCS	NA	NA	\$15 per month for all PCS Vision applications	

Sources:

Text Messaging: Verizon Wireless, *Mobile Messenger Service: Overview* (visited Jan. 17, 2003) <<http://www.verizonwireless.com/jsp/mobilemessenger/index.jsp>>; Cingular Wireless, *Text Messaging Pricing* (visited Jan. 23, 2003) <http://www.cingular.com/beyond_voice/tm_pricing>; T-Mobile, *2-Way Text Messaging* (visited Jan. 24, 2003) <<http://www.t-mobile.com/2waytxt/>>; AT&T Wireless, *Phone Fun Messaging* (visited Jan. 27, 2003) <http://www.attws.com/personal/txt_msg/messaging/text/>; Sprint PCS Vision, *How Can I Use It?* (visited Jan. 28, 2003) <<http://www.pcsvision.com/howcan.html>>; Sprint PCS, *PCS Service Plans: Select Your Plan* (visited Jan. 28, 2003) <<http://www1.sprintpcs.com/explore/servicePlansOptionsV2/PlansOptions.jsp>>; Nextel, *Nextel Mobile Messaging* (visited Feb. 4, 2003) <<http://www.nextel.com/services/mobilemessaging/index.shtml>>.

IM: Verizon Wireless, *Mobile Messenger Service: Instant Messaging* (visited Jan. 17, 2003) <<http://www.verizonwireless.com/jsp/mobilemessenger/instantmessaging.jsp>>; T-Mobile, *2-Way Text Messaging* (visited Jan. 24, 2003) <<http://www.t-mobile.com/2waytxt/>>; AT&T Wireless, *Phone Fun Instant Messaging* (visited Jan. 27, 2003) <http://www.attws.com/personal/txt_msg/messaging/instant/>; Nextel, *Nextel Mobile Messaging* (visited Feb. 4, 2003) <<http://www.nextel.com/services/mobilemessaging/index.shtml>>.

Table 2: Mobile Internet Access Services

Carrier/ Provider	Plan	Network	Data, or Voice Add-On?	Measurement	Service Specific?	Device Specific?
Verizon Wireless	Express Network Buckets	1xRTT	Add-on	Minutes		1xRTT phone, Thera smartphone
	Express Network Per-MB	1xRTT	Data	MB	Internet Access	1xRTT phone, Aircard 555 card, or Thera smartphone
	Express Network Unlimited	1xRTT	Data	Unlimited	Internet Access	
	Mobile IP	2G	Data	Unlimited	Internet Access	CDPD wireless modem card
	Mobile Web	2G	Add-on	Minutes	Text, IM, Web, E-mail	Web enabled phone
	Mobile Web Plus	2G	Add-on	Minutes	Text, IM, Web, E-mail	Kyocera smartphone
	Get It Now	2G with BREW	Add-on	Minutes	Ring tones, Games, Web, MMS	Get It Now-enabled phone
Cingular Wireless	Wireless Internet	2G	Add-on	Minutes	Info alerts, Web	Web enabled phone
	Wireless Internet Express	GPRS	Add-on or data	MB	Internet access	GPRS phone or Treo smartphone
Nextel	Web	2G	Add-on	Unlimited or minutes	Info alerts	Web enabled phone
	Premium Web	2G	Add-on	Unlimited or minutes	IM, Web, E-mail	Web enabled phone
	Full Service Package	2G	Add-on	Unlimited or minutes	Text, IM, Web, E-mail (corp)	Web enabled phone
	Packetstream	2G	Data	MB	Internet access	Phone or iM1100 card
	Packetstream Gold	2G	Data	Unlimited	Internet access	Phone or iM1100 card
	Dial-Up Service	2G	Add-on	Minutes	Web, E-mail, web, Corp server	Phone connected to PC or PDA
T-Mobile	T-Zones	GPRS	Add-on	MB	Web, Ring tones, Games, MMS, E-mail (POP3)	GPRS phone
	T-Zones Pro	GPRS	Add-on	MB	Web, Ring tones, Games, MMS, E-mail (corp)	GPRS phone
	T-Mobile Internet	GPRS	Data	MB	Internet Access	GPRS phone or modem card attached to PC or PDA
	Sidekick plans	GPRS	Add-on	Voice minutes Unlimited data	Text, IM, MMS, Web, E-mail	Sidekick smartphone
AT&T	mMode	GPRS	Add-on or	MB	Games, MMS,	GPRS phone

Wireless			data		Ring tones, Web, E-mail	
Sprint PCS	PCS Vision	1xRTT	Add-on	Unlimited	Text, Ring tones, MMS, Web, E-mail (corp)	1xRTT phone
	Vision for laptops and PDAs	1xRTT	Data	MB Unlimited	Internet access	1xRTT phone, smartphone, or wireless modem card
Go America	Data – All RIM	Mobitex/GPRS	Data	Unlimited	Web, BlackBerry email	RIM 950, 857, 957 RIM 5810
	Data – RIM 5810	GPRS	Data (must purchase sep voice plan)	MB: Unlimited:	Web BlackBerry email	RIM 5810
	Data & Voice – RIM 5810	GPRS	Data with voice	Unlimited: MB: Minute:	BlackBerry email Web Voice	RIM 5810
	Data – GPRS	GPRS	Data	MB	Internet access	G100 GPRS card for laptops and Pocket PCs
	Data – 1xRTT (offered by Earthlink)	1xRTT	Data	MB	Internet access	Aircard 555 card for laptops
Earthlink	Internet access for PDAs	2G - CDPD	Data	Unlimited	Internet access	Certain PDAs - Monthly prices vary by PDA
	Internet access for RIM	Mobitex	Data	Unlimited	BlackBerry email, web access is extra	RIM 950, 857, 957
	Data – 1xRTT (same as above)	1xRTT	Data	MB	Internet access	Aircard 555 card for laptops

Sources: The information in the table is a sample of mobile Internet access services offered by selected mobile data providers in March 2003 and should not be considered an exhaustive list. The information was taken from company web sites, news releases, and newspaper and periodical articles.

Table 3: Mobile Service Availability by Device*

Application/ Feature	Type of Device				
	Pager	Mobile Phone	Smartphone	PDA	Laptop
Voice		✓	✓		
Paging	✓	✓	✓		
Text Messaging	✓	✓	✓	✓	
Information Alerts	✓	✓	✓		
Ring tones & Graphics		✓	✓		
Games		✓	✓		
Images & Video		✓	✓	✓	✓
Web Browsing – Limited		✓	✓		
Web Browsing - Complete			✓	✓	✓
E-mail – POP3		✓	✓	✓	✓
E-mail – corporate			✓	✓	✓
Corporate server access			✓	✓	✓
QWERTY Keypad			✓	✓	✓
Color		✓	✓	✓	✓

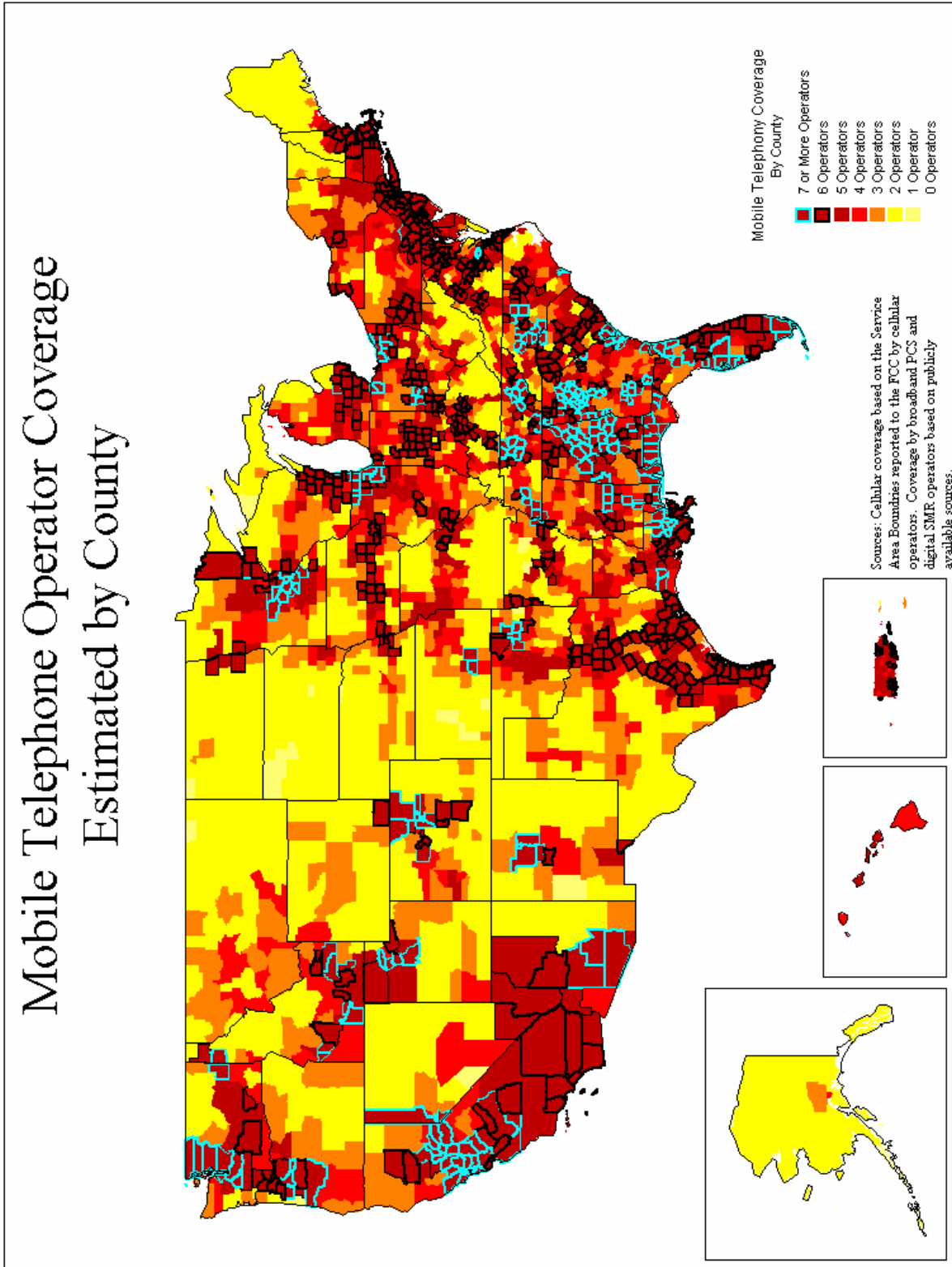
* The above table provides an overview of the applications and features that are available on at least one model of the device categories included in the table. It is not meant to imply that the marked applications and features are available on every model within the device category.

Sources: The information was taken from company web sites, news releases, and newspaper and periodical articles in February and March 2003.

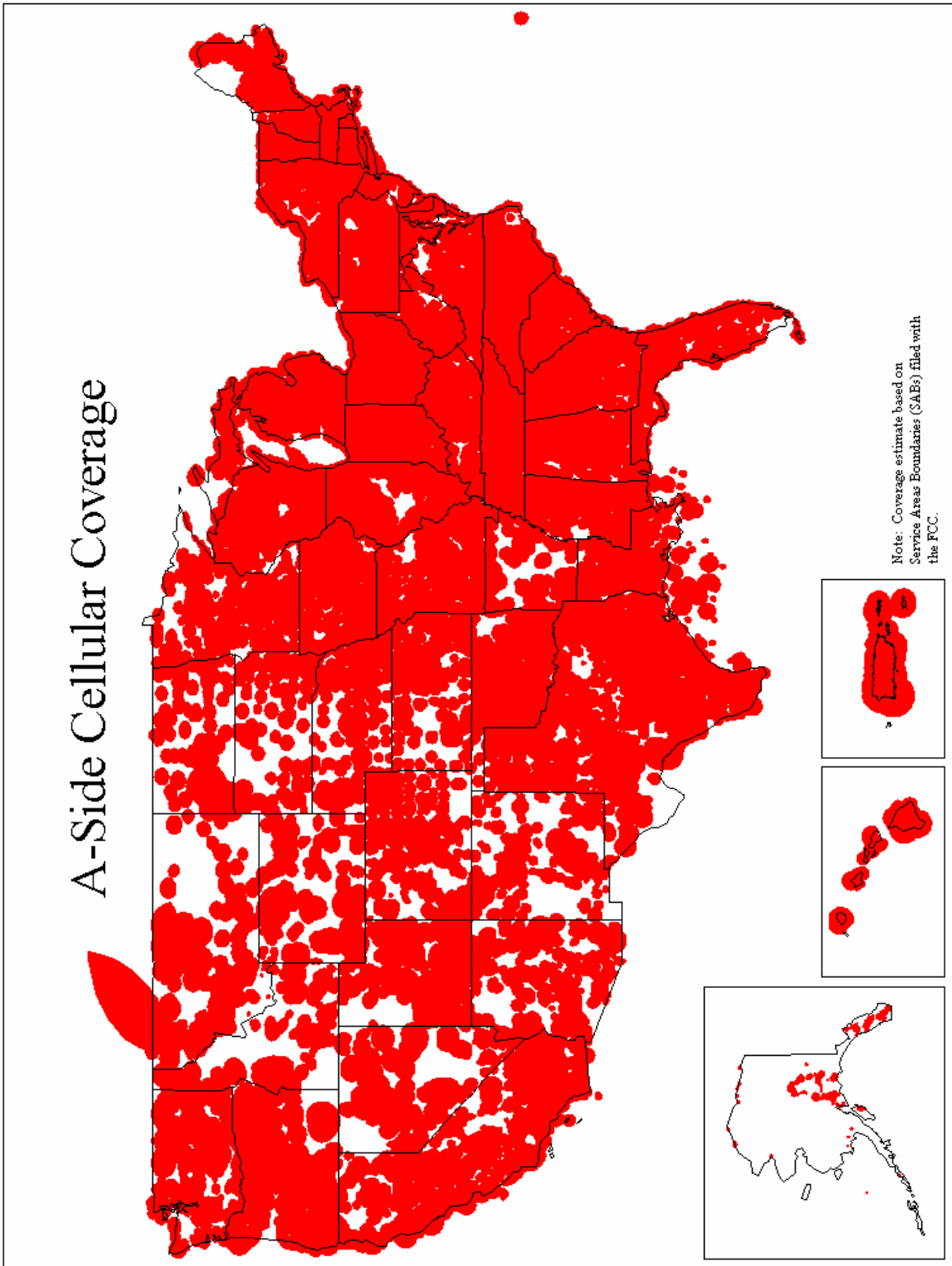
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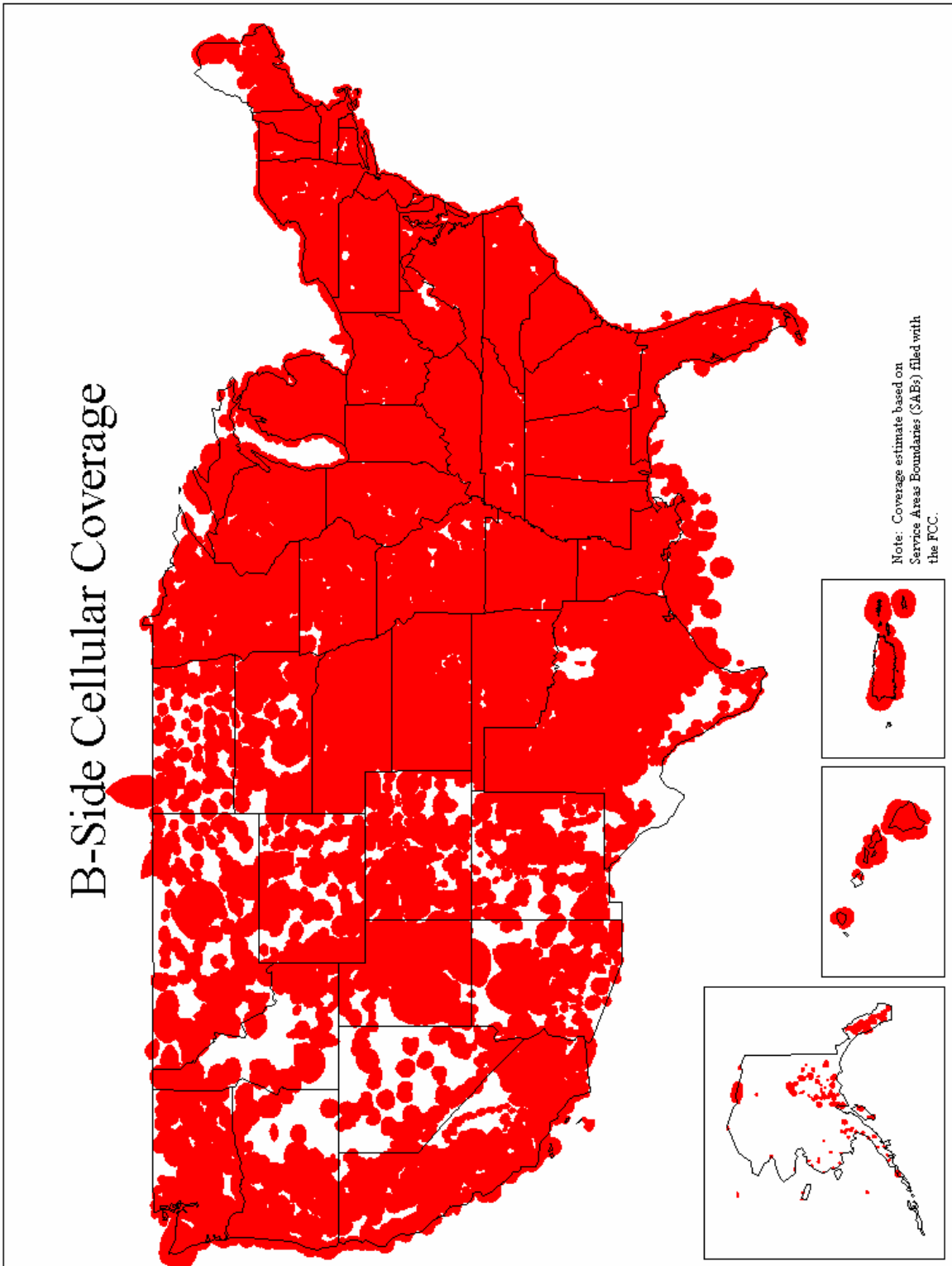
Map 1



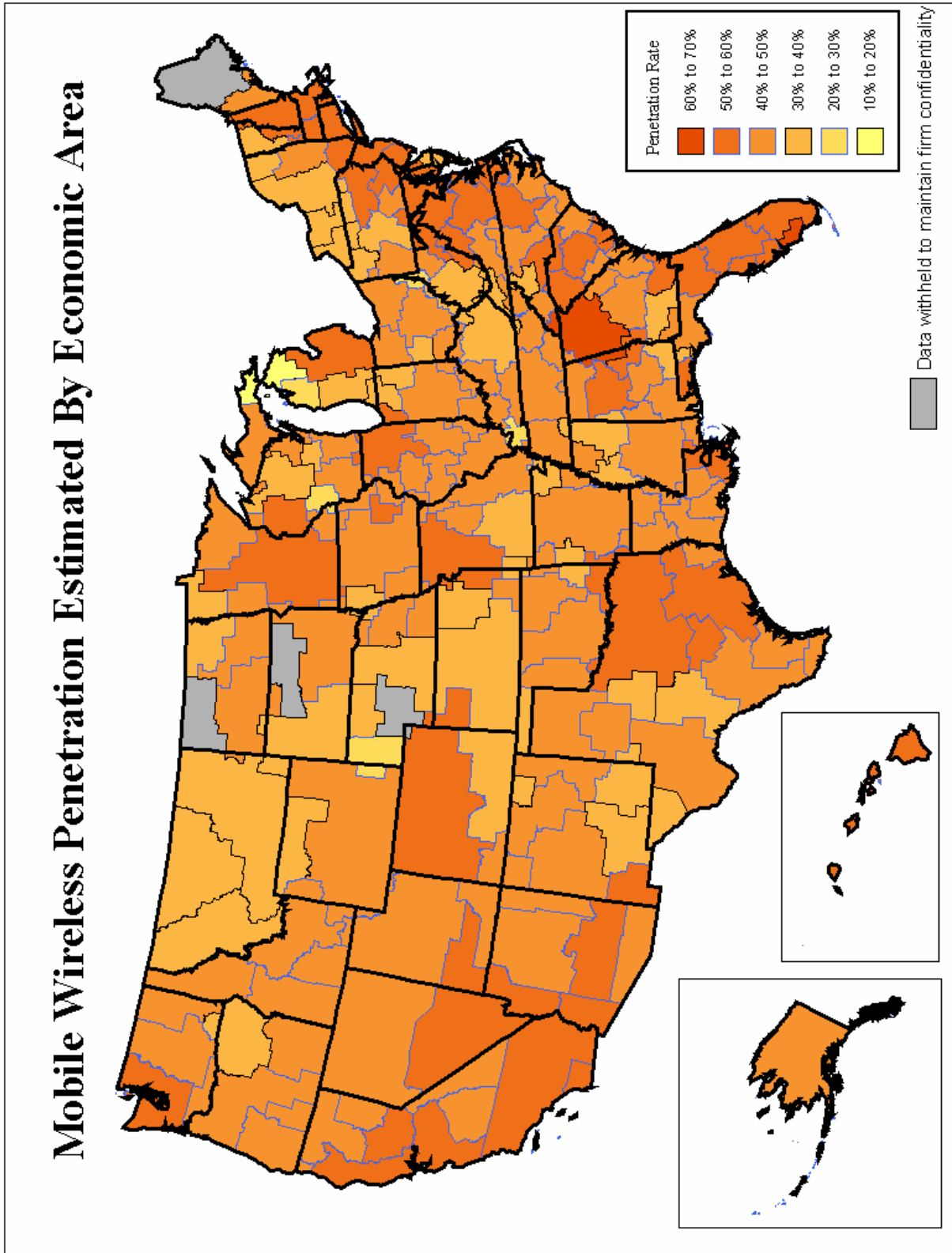
Map 2



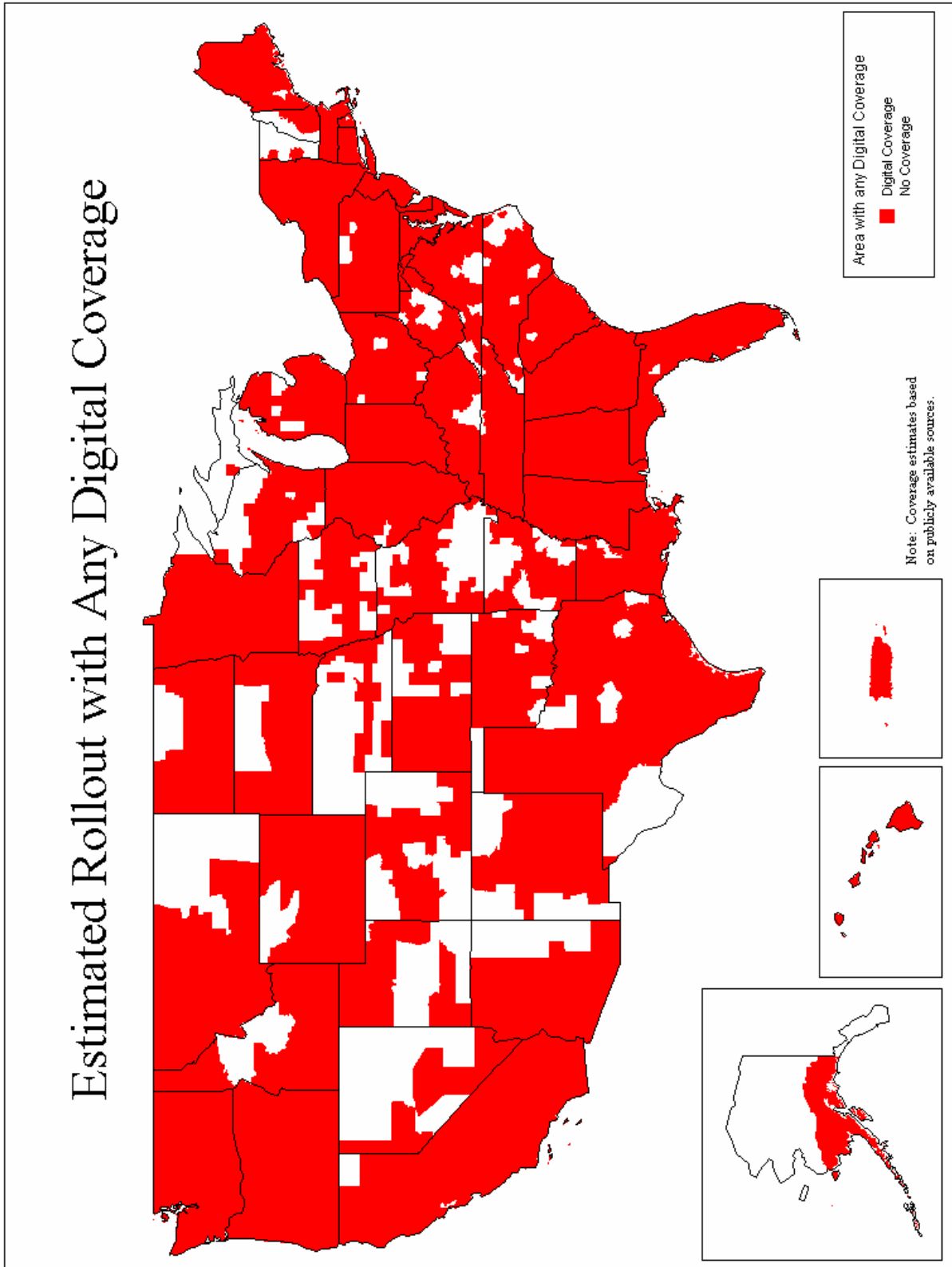
Map 3



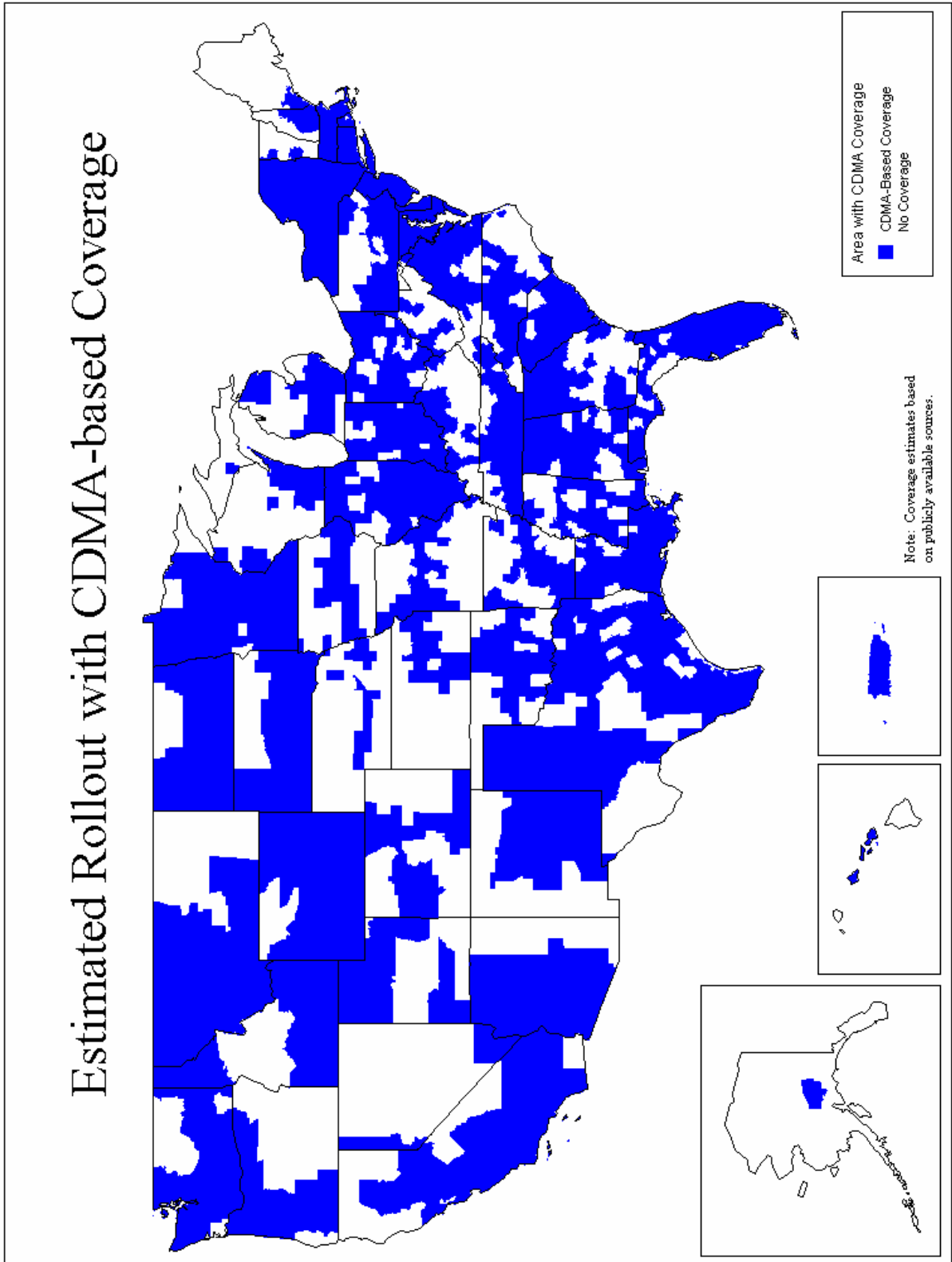
Map 4



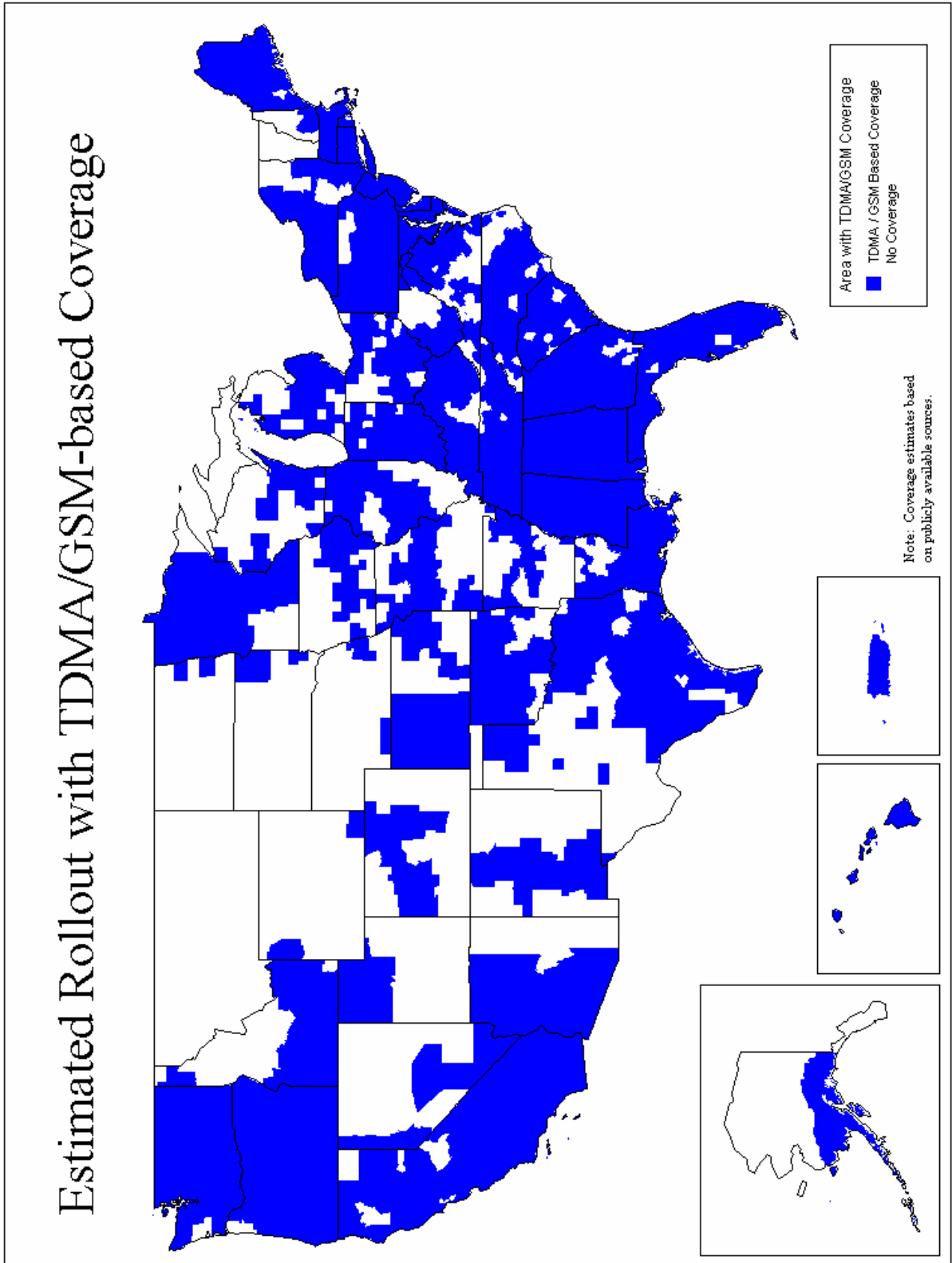
Map 5



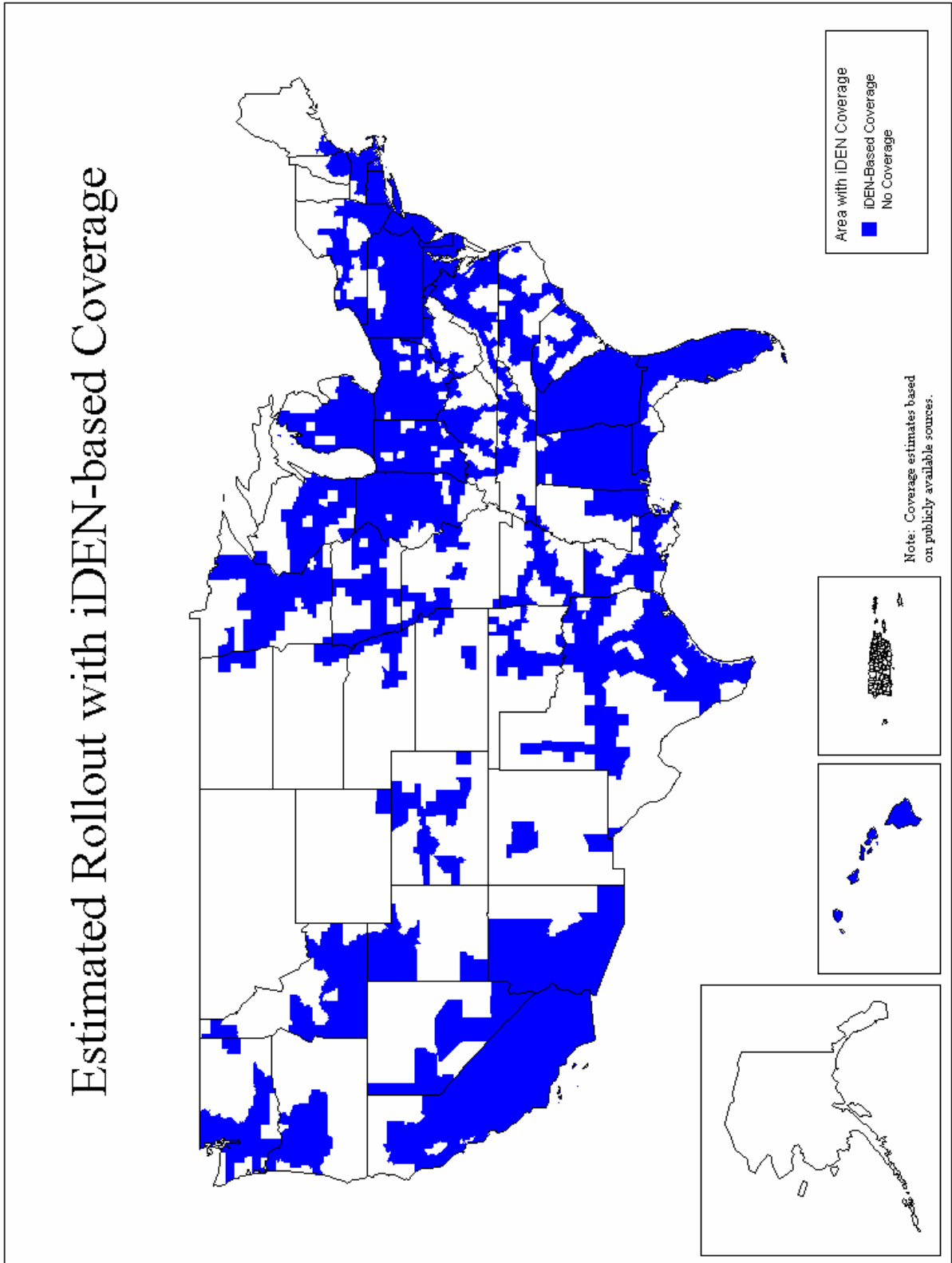
Map 6



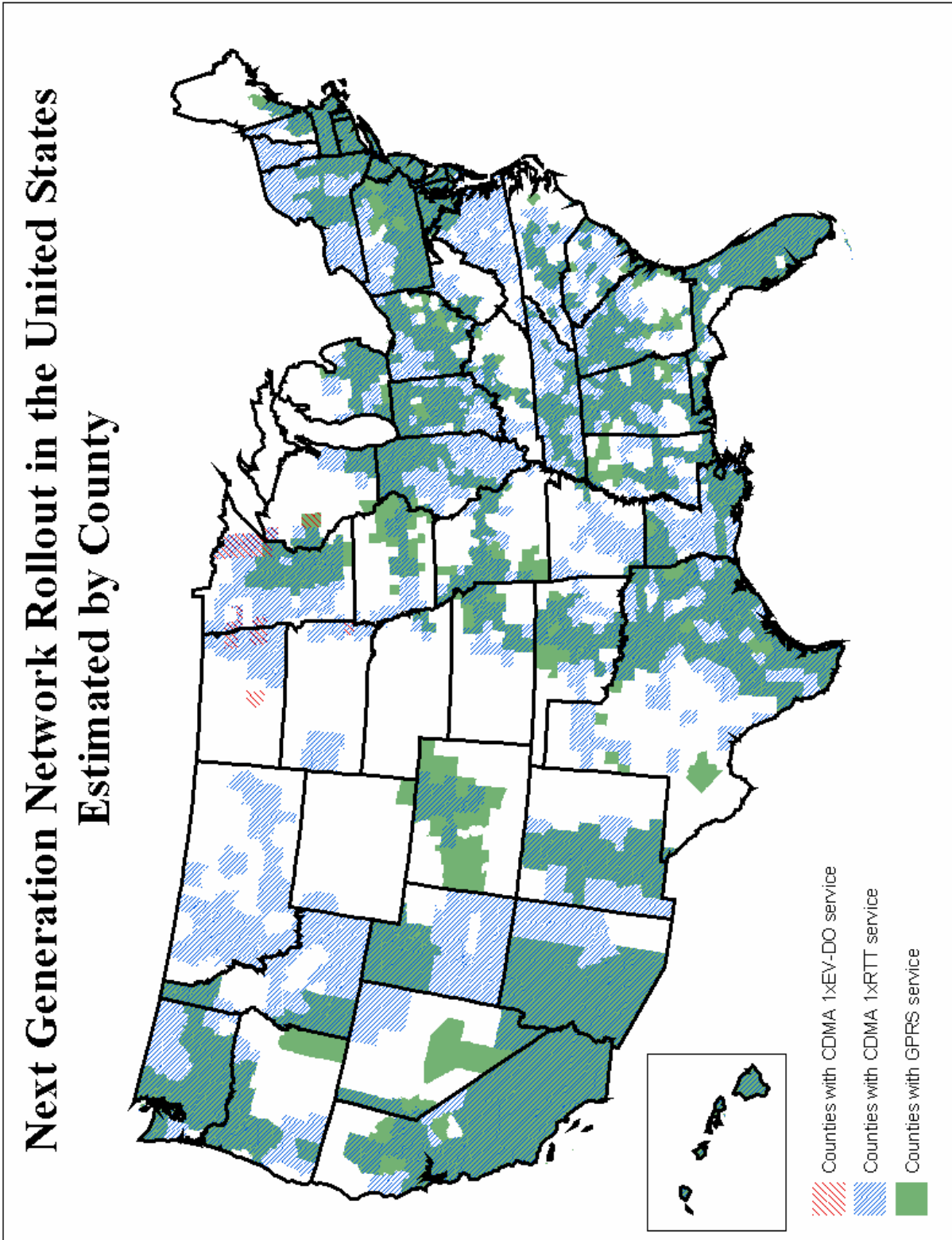
Map 7



Map 8



Map 9



Map 10

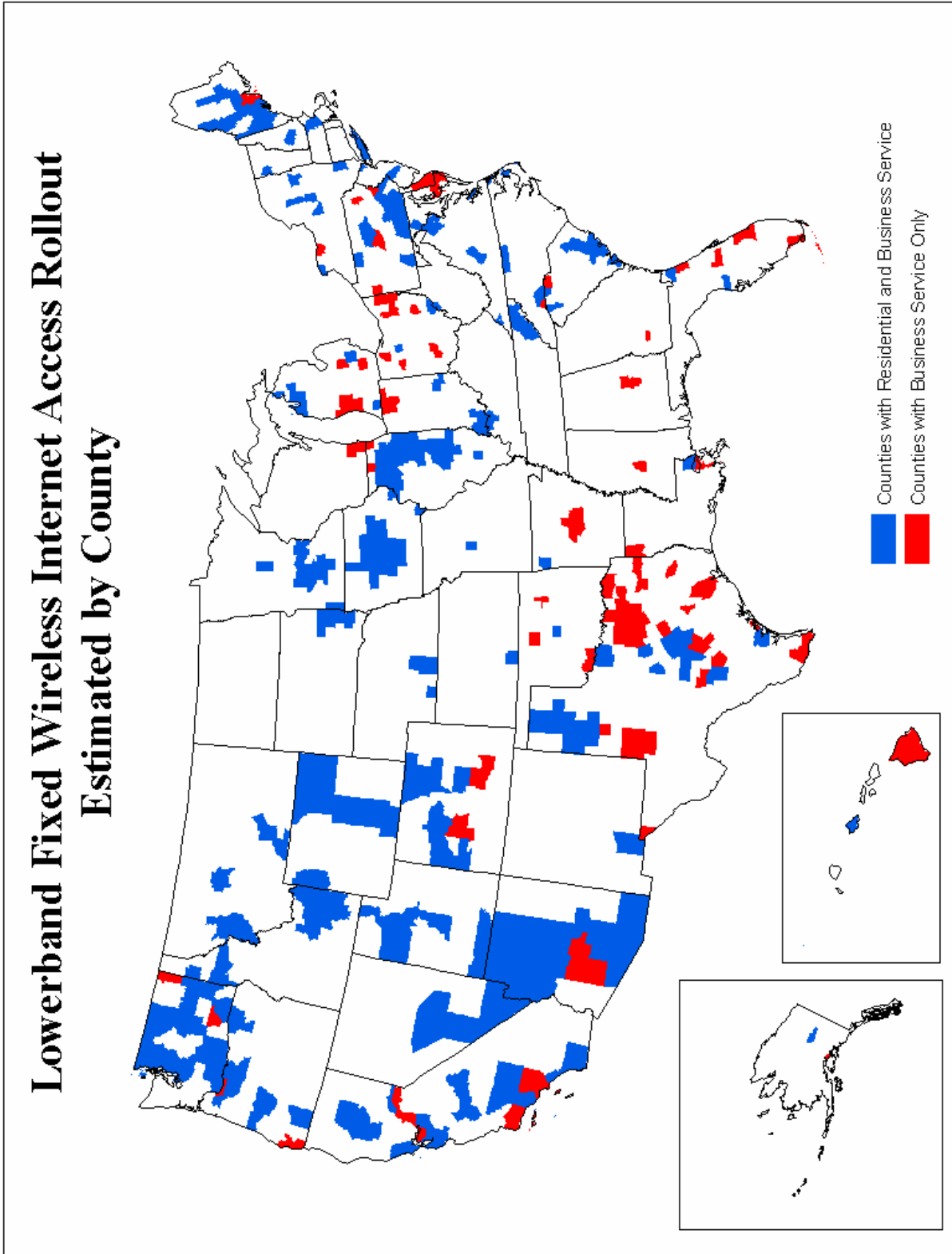
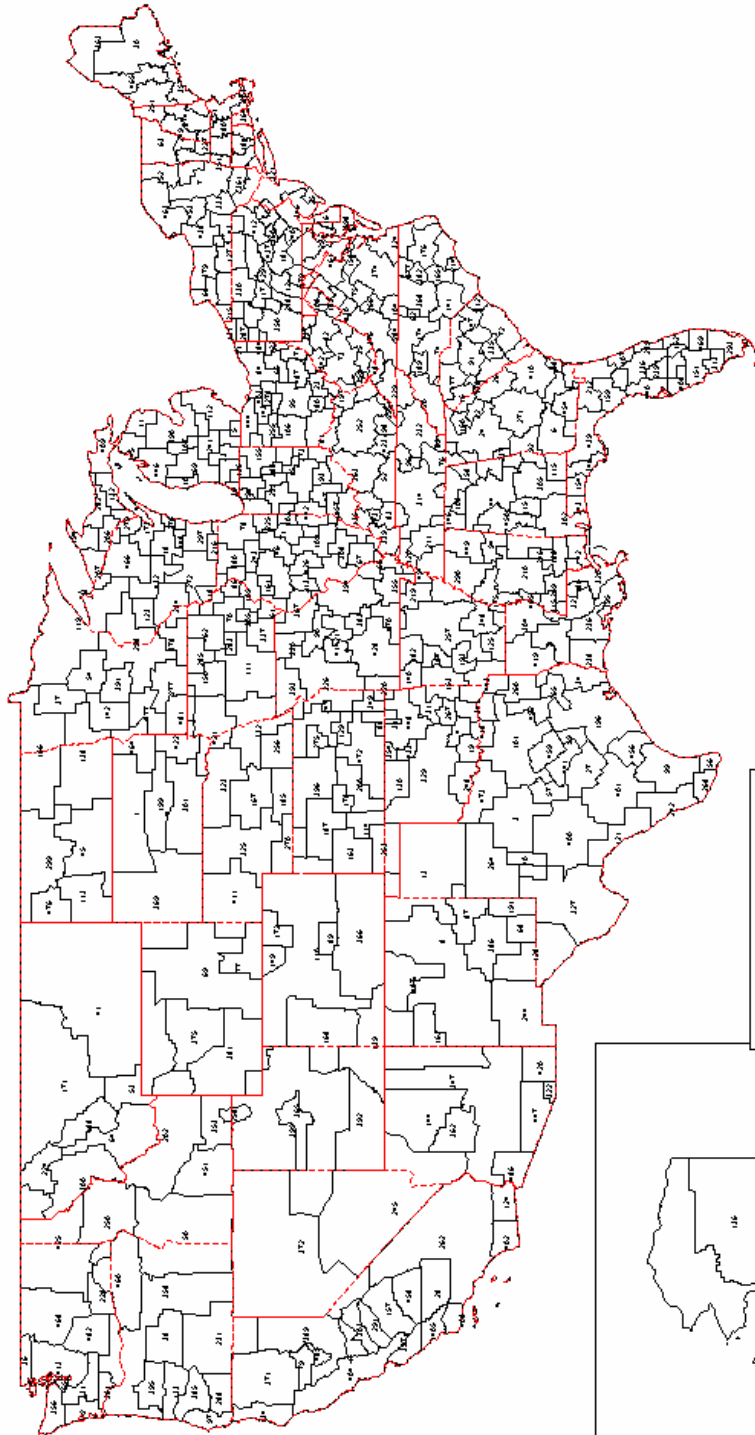


Table 1: Geographic Licensing Schemes

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	

Map11

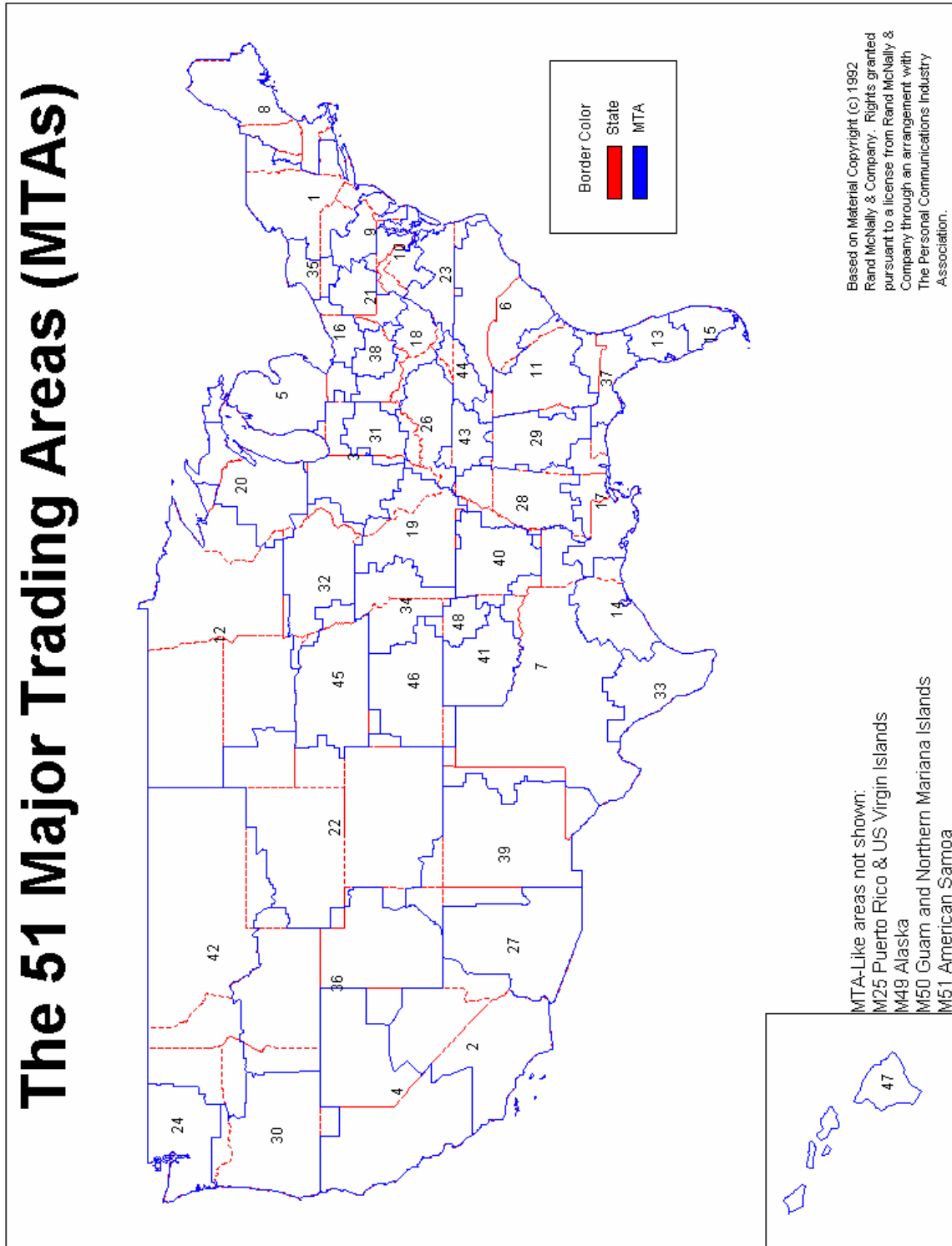
The 493 Basic Trading Areas (BTAs)



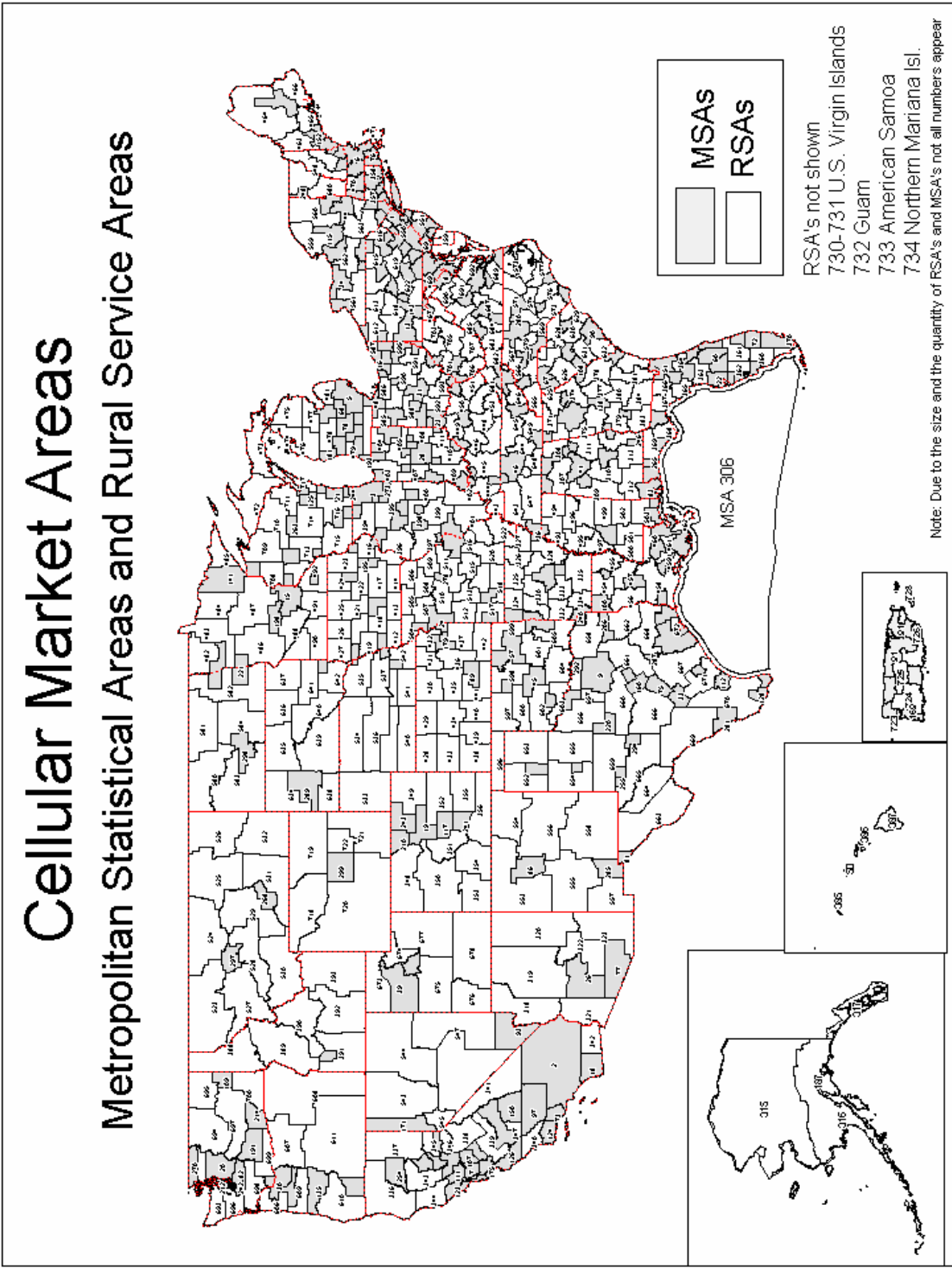
BTA-Like areas not shown:
B488 San Juan, PR
B489 Mayaguez, PR
B490 Guam
B481 US Virgin Islands
B492 American Samoa
B493 Northern Mariana Islands

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Map 12

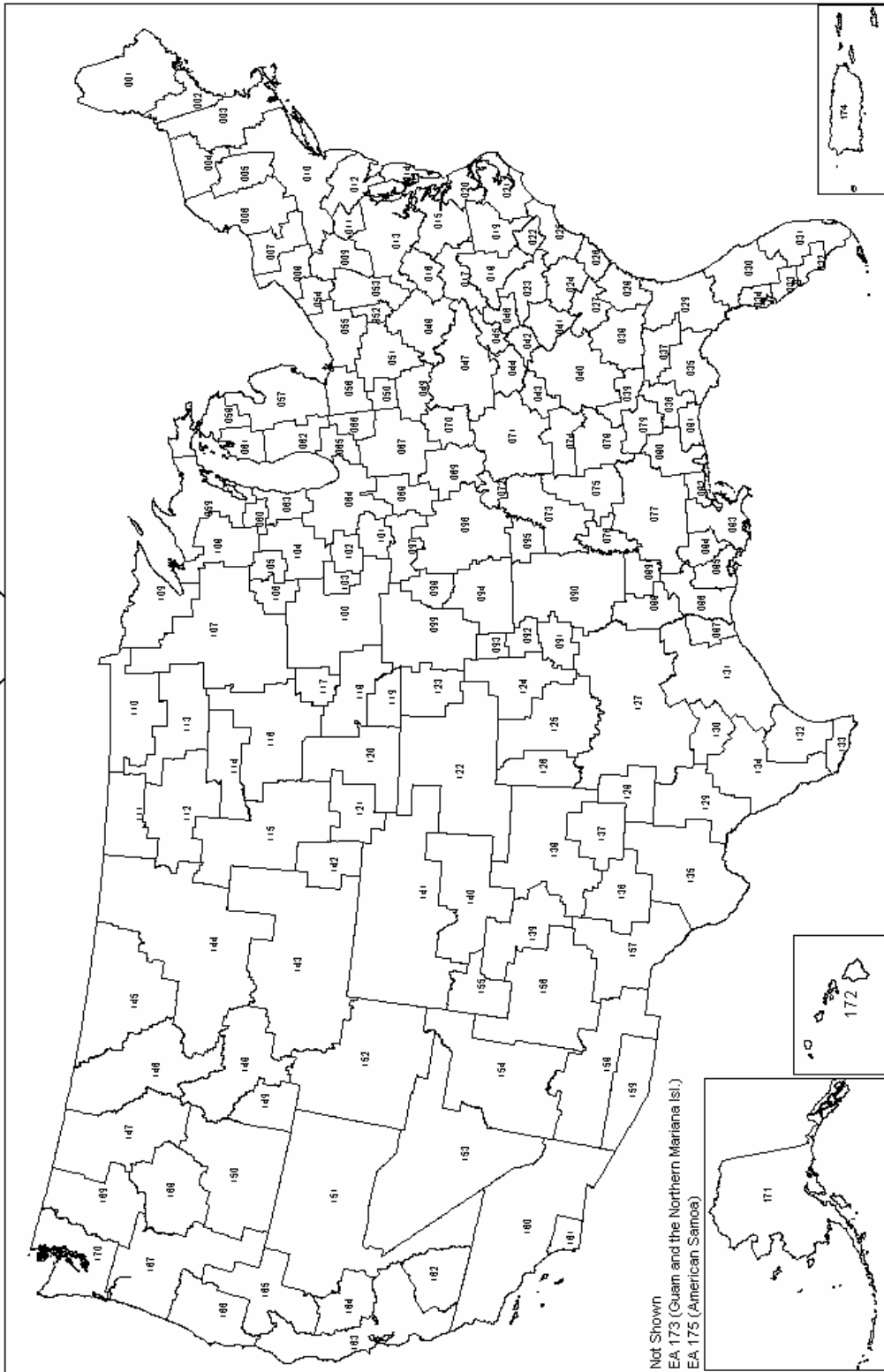


Map 13



Map 14

Economic Areas (EAs)



Not Shown
EA 173 (Guam and the Northern Mariana Is.)
EA 175 (American Samoa)

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

**APPENDIX G:
LIST OF COMMENTERS**Comments

3G Americas LLC
CDMA Development Group
Cellular Telecommunications & Internet Association
Dobson Communications Corporation
Fred Williamson & Associates, Inc.
John A. Ball
Mobile Satellite Ventures Subsidiary LLC
Montana Telecommunications Association
National Telecommunications Cooperative Association
Rural Telecommunications Group

Reply Comments

CDMA Development Group
Fred Williamson & Associates, Inc.
South Dakota Telecommunications Association
T-Mobile USA, Inc.
Virgin Mobile USA, LLC
Western Wireless Corporation

Ex Parte Filings

Rural Telecommunications Group
Consumers Union

**SEPARATE STATEMENT OF
CHAIRMAN MICHAEL K. POWELL**

Re: Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services (Eighth Report)

The annual analysis of the CMRS market demonstrates how a lighter regulatory hand has ushered in innovation and technological advancement, and the power of facilities-based competition into the marketplace. Today 95% of American consumers now have three or more choices in wireless providers, and a stunning 71% have six or more choices. And with this wealth of choices have come lower per minute prices and more innovative services. The conclusion is inescapable: the wireless industry is highly competitive. The Report, however, notes that rural areas have fewer competitors than urban areas. I look forward to working with my colleagues to develop policies that will enhance the effectiveness of competition in rural areas by removing unnecessary regulatory barriers to facilitating the deployment and delivery of spectrum-based services in these areas. This is the most comprehensive wireless competition report that the Commission has ever produced and I applaud the efforts of the Wireless Bureau to update, verify, and diversify our data to better capture the state of the marketplace.

**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.

Congress requires the Commission annually to “review competitive market conditions with respect to commercial mobile services” and “include in its annual report an analysis of those conditions,” in order to perform an “analysis of whether or not there is effective competition.” I believe that the Commission could do far better. The Report’s contains insufficient data. Much of the limited data included are unverifiable and are derived from sources with a stake in the outcome of our determination. And the Commission does not establish any standard for determining when “effective competition” exists or even to define what “effective competition” is. These problems leave the Report vulnerable to the charge of being results-oriented, and mean that the hard and good work of the Commission’s staff is underutilized.

The limited data that we do have show that in urban areas wireless prices are dropping and carriers are expanding their networks. That’s great news, and I believe that better data and a better standard for analyzing this data would yield results that would show that in many areas the competition that characterizes the wireless market is something to strive for as the FCC pursues wireline competition policy. But half of the country is still served by three or fewer competitors. And one quarter of all US counties have two or fewer competitors.

In this context, and because we need the ability to analyze competition changes if wireless mergers occur, the nature and sources of our data trouble me, especially in the Enron era, when the use of hard to verify corporate data and Wall Street analysts’ reports is under close scrutiny. The Report is largely based on unverified corporate press releases and advertisements, surveys conducted by industry lobbying organizations, unverified Wall Street analysts’ reports that may be influenced by the stock holdings of those analysts’ firms, SEC filings that are not designed for this purpose, and newspaper reports.

I believe that the Commission must gather more independent, verified data to do its job effectively. But the Commission does not gather any of its own data for this report. To their credit, our staff recognized the natural limitations of its data sources and generated some creative solutions to counteract a subset of the inadequacies of the publicly available sources. For instance, this year’s Report was improved by data from the Number Resource Utilization/Forecast (“NRUF”) database and the ULS Database. Using these new sources of information, aside from strengthening the integrity of the Report, underscores the reliability and utility of data directly collected by the FCC, as opposed to data generated by interested parties. But FCC-collected data is just not available for most of the critical questions the Report addresses.

This year the Commission staff also tried to gather more information through a NOI that asked for more data from our licensees. But as the Report states, the Commission did not receive from licensees any new data on subscribership, ARPU, usage, churn, or pricing, or maps of their

coverage areas. In other words, we asked industry to help us with our effort and they said “no.”

If industry will not assist us in this effort, I believe that the Commission has a responsibility to contract with outside, independent researchers to gather the following data. First, we need independent data on wireless prices. We currently have no pricing data at all on smaller markets, and rely instead on pricing in the most competitive, biggest markets as a proxy for the least competitive, smallest markets. This does not make sense. Second, we need reliable data on the number of competitors in various markets. Today we treat an entire county as served by a company if that company advertises that they serve any part of the county, even just a highway skirting the edge of a county. We say that consumers in a county have two competitors to choose from even if the service areas of those competitors don't overlap at all in the county. Again, this does not make sense. Third, we need independent, annual data on quality of service. Quality of service, price and investment are three critical indicia of competition, and we need to understand all three. Specifically, we need data on dropped calls, service unavailability, and poor connections. Without this basic information, the Commission cannot make conclusions on competition that withstand scrutiny.

I am not alone in thinking that we must improve. In April, the GAO released a report that found that the Commission does not gather any data on call quality despite its importance to consumers. The GAO Survey states that the Commission must begin to include quality of service analysis in its competition report and that “[d]ata sources other than consumer surveys would be useful in assessing the extent of mobile phone quality problems; however, these data were either not available or were of limited usefulness because they were not collected systematically.” I share the GAO's broad concern that our data collection is inadequate and that we should make data on call quality available to this public. If it is somehow too financially burdensome on the Commission to gather adequate data, we should explain our plight to Congress and ask for the needed budget resources. But this is too important to ignore.

In considering the benefits of a more comprehensive and intensive data gathering effort, I also want to note that the British regulatory agency gathers far more information for the benefit of its wireless consumers than does the FCC. While I am not at this time suggesting that we should follow OFTEL's practice of requiring licensees to submit reports, as part of its ongoing monitoring of competition in the British wireless industry, OFTEL conducts quarterly surveys of mobile phone users. OFTEL has used the information it collects on network performance and other factors to determine whether there is effective competition among carriers. We should find a way to gather similar data. If this is somehow too financially burdensome on the Commission, we should explain our plight to Congress and ask for the needed budget resources.

I also believe that we must establish a definition of “effective competition” and a standard for determining when such competition exists. How can we do the job Congress gave us without doing so? Admirably, the Report includes a long list of possible indicia of competition, including price, expansion of networks, investment levels, churn, quality of service, subscriber growth, usage rates, and ARPU. But merely listing possible relevant areas of inquiry is far different from having a rigorous method of determining whether current market characteristics mean that there is adequate competition. We don't say whether one factor is more important than another, how they relate to each other, or whether regional differences matter at

all in the overall competitive determination. Without more rigor, without an articulated “effective competition” standard, the Report is of limited use in providing an analytically solid foundation for Commission or Congressional action.

Without adequate data and without a clear explanation of how we determine adequate competition, I cannot support the reasoning contained in this item, and must only concur in the result. I do want to thank the Wireless Bureau staff, however, for another fine job this year. They work hard, and do good work with the resources they have. The report is very important, and your work is very important, which is why I focus so much on it every year. Thank you.