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 kilohertz[432] 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

---

[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>.

games, must first 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

---

[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.

MB-based pricing plans between accessing the mobile Internet from a mobile phone and accessing it from 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 of 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

---

[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.

paging 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 field 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

---

[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.

receive.[483] 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

---

[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=idenupdt&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*.

Wireless 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 ALLTEL, 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 of available content is based on the number and type of content providers with whom the carrier has an

---

[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>.

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 POP3[522] 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 well as the ability to access corporate e-mail accounts. Mobile telephone carriers frequently include

---

[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.

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/?blnOverride=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 announced in December 2002 that they had created a new company, Cometa Networks, which plans to

---

[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>.

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) <http://onstar.internetpressroom.com/pressroom.cfm>; OnStar, *About Us: Fast Facts* (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") in the United States.[597] For example, both Globalstar Telecommunications LTD. ("Globalstar") and

---

<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.

[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

Iridium Satellite LLC. ("Iridium Satellite") are using Big LEO[598] 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 terrestrial service on MSS frequencies.[601] On February 10, 2003, the Commission released a Report and

---

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).

[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).

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 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.

---

[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.

[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

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.

195. Revenue per minute[618] in Western Europe averaged nearly $0.24 in the fourth quarter of

---

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.*

[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

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 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

---

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.

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

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]

203. One analysis highlights the difference between U.S. and European mobile pricing by

---

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.

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 charges for outgoing calls, while receiving unlimited incoming calls free of charge. From the

---

[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.

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 have kept mobile termination charges low, and because U.S. mobile subscribers pay to make and receive

---

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

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

---

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*.

were 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 services[683] 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

Marlene H. Dortch WTC
Secretary