Table 12
Mobile Wireless Coverage by Technology[364]

Technology	*POPs in Covered Blocks*[365]	*% of Total POPs*	*Square Miles Contained in Those Blocks*	*% of Total Square Miles*
CDMA	283,012,304	99.2%	2,656,291	69.9%
GSM/TDMA	282,245,886	99.0%	2,418,867	63.7%
iDEN	258,571,891	90.7%	1,135,311	29.9%
Total Digital	284,658,590	99.8%	2,894,888	76.2%

119. Table 13 below provides estimates, based on American Roamer data, of the extent of mobile data and mobile broadband network coverage in the United States. Table 13 shows the population and land area covered by the 2.5G CDMA and GSM mobile data network technologies, as well as population and land area covered by the mobile broadband network technologies, HSPA, EV-DO, and WiMAX. Table 13 shows that 2.5G mobile data networks, which were widely deployed several years ago, covered 99.8 percent of the total U.S. population as of August 2010. Coverage by the individual CDMA and GSM path technologies, as well as the overall 2.5G coverage figure, each increased a fraction of a percent from November 2009.[366]

120. When looking at mobile broadband coverage, Table 13 shows that 98.5 percent of the U.S. population was covered by at least one mobile provider using a 3G or 4G network technology as of August 2010, up from 98.1 percent in November 2009.[367] EV-DO coverage increased 0.4 percent from 279 million people, or 97.9 percent of the U.S. population, to 280 million people, or 98.3 percent of the U.S. population.[368] Also, HSPA coverage grew five percent from 217 million POPs to 228 million POPs (76 percent to 80 percent of the U.S. population).[369] In addition, mobile WiMAX networks, which covered approximately 28 million people in November 2009, had expanded to census blocks covering over 50 million POPs, or 18 percent of the population, as of August 2010.[370]

(Continued from previous page)
27?utm_medium=nl&utm_source=internal (citing Sprint Nextel CEO Dan Hesse). The company gave no firm date for the shutdown and said it would be a gradual process. *Id.*

[364] Commission estimates based on American Roamer database, July 2010. POPs are from the 2000 Census, and the square miles include the United States and Puerto Rico.

[365] A covered block has at least one provider.

[366] *See Fourteenth Report*, 25 FCC Rcd at 11487-88, ¶ 121, Table 13.

[367] See Fourteenth Report, 25 FCC Rcd at 11487-88, ¶ 122, Table 13.

[368] *See Fourteenth Report*, 25 FCC Rcd at 11487-88, ¶ 122, Table 13.

[369] *See Fourteenth Report*, 25 FCC Rcd at 11487-88, ¶ 122, Table 13.

[370] Mobile broadband coverage across different states and areas of the country is shown in Map D-29 in Appendix D.

Table 13
Mobile Wireless Data/Broadband Network Coverage by Census Block[371]

Technology		*POPs in Covered Blocks*	*% of Total POPs*	*Square Miles Contained in Those Blocks*	*% of Total Square Miles*
2.5G	CDMA 1xRTT	282,944,167	99.2%	2,629,513	69.2%
	GPRS/EDGE	282,137,101	98.9%	2,348,442	61.8%
	Total 2.5G Mobile Data Network Coverage	**284,592,972**	**99.8%**	**2,834,959**	**74.6%**
3G/ 4G	WCDMA/HSPA	227,718,219	79.8%	524,653	13.8%
	EV-DO/EV-DO Rev. A	280,437,386	98.3%	2,234,901	58.8%
	Mobile WiMAX	50,360,040	17.7%	32,189	0.8%
	Total Mobile Broadband Coverage (3G/4G)	**280,965,094**	**98.5%**	**2,256,448**	**59.4%**

121. Additional information on mobile broadband network deployment can be found in the National Broadband Map.[372] The National Broadband Map displays the geographic areas where broadband service is available, the technology used to provide the service, and the speeds of the service.[373] The Map is searchable by address and indicates the broadband providers offering service in the corresponding census block or street segment.[374]

122. Chart 4 below depicts the pace of 3G and 4G deployment over the past five years. EV-DO network coverage has grown from 62.6 percent of the U.S. population in 2006 to 98.3 percent in August 2010.[375] This is reflected in the network deployment activities of the two major EV-DO providers, Verizon Wireless and Sprint Nextel, which have begun to focus on 4G rather than EV-DO deployment – Verizon Wireless with LTE and Sprint Nextel with its investment in Clearwire. HSPA network coverage was not nearly as extensive as EV-DO coverage in 2006, covering only 20 percent of the U.S. population.[376] However, HSPA deployment has been increasing in recent years, and HSPA networks covered nearly 80 percent of the population in August 2010. As discussed, the largest HSPA network operators, AT&T and T-Mobile, are in the process of expanding and upgrading their networks.

[371] Commission estimates based on data supplied by American Roamer, Aug. 2010. POPs are from the 2000 Census, and the square miles include the United States and Puerto Rico.

[372] The National Broadband Map was created by the National Telecommunications and Information Administration (NTIA) in partnership with Commission, 50 states, five territories, and the District of Columbia. It can be accessed at http://www.broadbandmap.gov/.

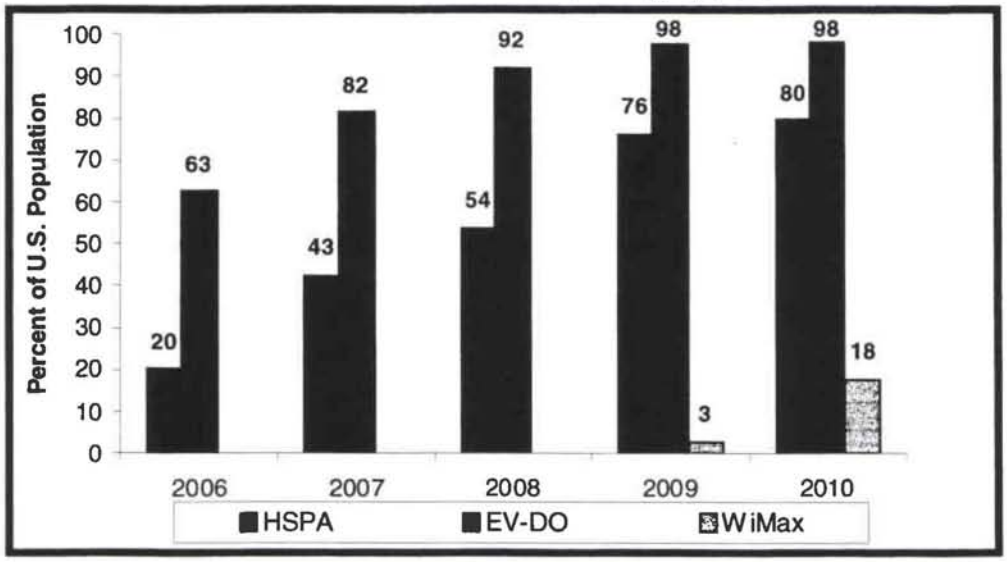
[373] Broadband Technology Opportunities Program (BTOP) Quarterly Program Status Report, Nov. 2010, NTIA, at 8.

[374] Broadband Technology Opportunities Program (BTOP) Quarterly Program Status Report, Nov. 2010, NTIA, at 8. NTIA anticipates offering analytical tools to help consumers, businesses, policymakers, and researchers make further use of this data. *Id.*

[375] *See Eleventh Report*, 21 FCC Rcd at 10985, ¶ 95, Table 8.

[376] *See id.*

Chart 4
The Pace of 3G and 4G Network Deployment[377]



123. While mobile broadband network coverage has grown in recent years, certain geographical areas remain unserved by advanced mobile technologies. In October 2010, the Commission sought comment on the creation of a Mobility Fund that would use Universal Service Fund reserves to significantly improve coverage in these areas for current- or future-generation mobile wireless network technologies that provide mobile voice and Internet services.[378] The Mobility Fund NPRM proposes that market mechanisms – specifically, a reverse auction – be used to make one-time support available to service providers in order to cost-effectively extend mobile coverage in specified unserved areas.[379]

c. Coverage by Income Level

124. For the first time, this *Report* analyzes how the number of facilities-based mobile wireless providers that have coverage in a census tract varies based on median income levels. The analysis is based on mobile wireless and mobile broadband coverage data reported by American Roamer and estimates of median household income levels in each of the country's 65,000 census tracts prepared by Geolytics.[380] According to this analysis, the average number of mobile wireless providers increased from 6.07 in census tracts with median household income less than $25,000 to 6.35 in census tracts with median household income of more than $150,000, an increase of 0.28 service providers. The average number of mobile broadband providers increased from 3.32 in census tracts with median household income less than $25,000 to 3.72 in census tracts with median household income of more than $150,000,

[377] Commission estimates based on American Roamer database, Aug. 2010 (for 2010 data). *See Fourteenth Report*, 25 FCC Rcd at 11487-88, ¶ 122, Table 13; *Thirteenth Report*, 24 FCC Rcd at 6257, ¶ 145; *Twelfth Report*, 23 FCC Rcd at 2304, ¶ 143; *Eleventh Report*, 21 FCC Rcd at 10995, ¶ 117.

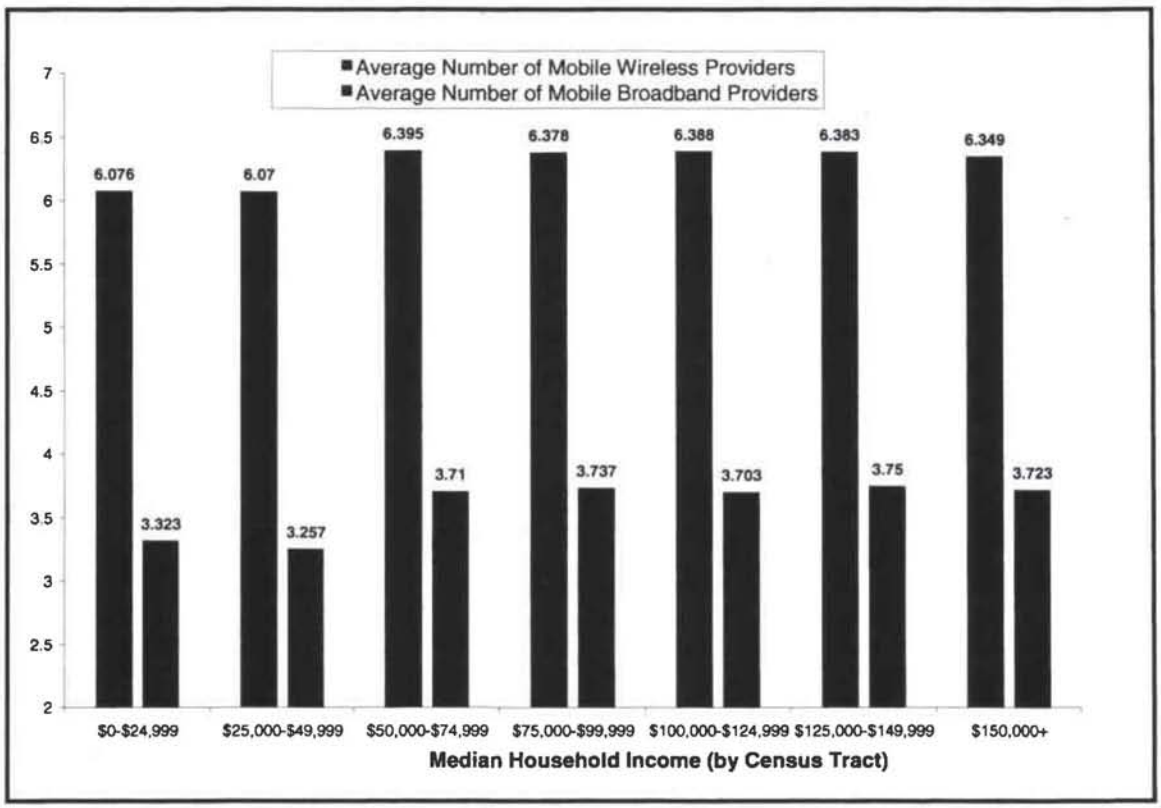
[378] Universal Service Reform, Mobility Fund, WT Docket No. 10-208, *Notice of Proposed Rulemaking*, FCC 10-182, at ¶ 1 (rel. Oct. 14, 2010).

[379] *Id.*

[380] Data on numbers of mobile wireless providers and mobile broadband providers are based on American Roamer database, July/August 2010. Data on median household income are based on Geolytics 2010 estimates. The analysis is done on a census tract, rather than census block, basis because the smallest geographic area for which medium household income data is available is census tracts. These data do not allow for an analysis of adoption rates for mobile wireless or mobile broadband services.

an increase of 0.40 service providers (see Chart 5). According to these data, the greatest difference in deployment appears to be between census tracts with median household income levels below and those with income levels above $50,000 per year.

Chart 5
Average Numbers of Mobile Wireless Providers and Mobile Broadband Providers in Census Tracts by Median Household Income



d. Roaming

125. Due to the challenges inherent in building out a wireless network, which can include both economic and environmental obstacles, it may be more cost-effective in some areas for a mobile wireless provider to enter into roaming agreements with other providers rather than build out its own facilities.[381] Roaming arrangements between commercial mobile wireless service providers allow customers of one mobile wireless provider to automatically receive service from another provider's network when they are in areas that their provider's network does not cover.[382] As shown in Table 22, total annual intercarrier

[381] *Fourteenth Report*, 25 FCC Rcd at 11489 ¶ 124; *see also* Reexamination of Roaming Obligations of Commercial Mobile Radio Service Providers, *Order on Reconsideration and Second Further Notice of Proposed Rulemaking*, 25 FCC Rcd 4181, 4192 ¶ 23 (2010) (*"Roaming Order on Reconsideration" and "Second Further Notice of Proposed Rulemaking"* respectively) (finding that in some areas of the country, low population densities, along with insufficient demand, make it uneconomic for several carriers to build out). Nonetheless, even where roaming services are available, providers deploying next generation networks still have incentives to build out to ensure that their subscribers receive all of the benefits of the providers' own advanced networks. *Id.* at 4197-98 ¶ 32. In particular, the relatively high price of roaming compared to providing facilities-based service is often sufficient to counterbalance the incentive to "piggy back" on another provider's network. *Id.*

[382] All mobile calling plans specify a calling area – such as a particular metropolitan area, a state, a region, the provider's entire network, or the entire United States – within which the subscriber can make a call without (continued....)

roaming revenues and voice minutes have declined as a percentage of total service revenues and total minutes, respectively, over the past ten years.[383] From a customer perspective, many service plans now include nationwide roaming at no additional cost to subscribers. In addition, changes in the mobile wireless industry over the last decade have resulted in service plans with larger geographic calling areas, which may have affected roaming arrangements in some instances.

126. Despite the declining contribution of roaming relative to wireless industry revenues and minutes of use on the whole, roaming remains important for mobile wireless providers in areas where they do not have network coverage. No mobile wireless provider – including none of the four nationwide providers – has built out its entire licensed service area, and consequently all providers employ roaming to some extent to fill gaps in their coverage.[384] In addition, as discussed above, there are various non-nationwide providers whose business plans are not focused on building out nationwide networks.[385] Nonetheless, through roaming agreements with other mobile wireless providers, many of the non-nationwide providers are able to offer voice coverage and service plans that are national in scope.[386] Accordingly, roaming can be particularly important for small and regional providers with limited network population coverage to remain competitive by meeting their customers' expectations of nationwide service.[387] Similarly, roaming may be important to new entrants who wish to begin offering service before they have fully built out their networks.[388]

(Continued from previous page)
incurring additional charges. Outside of this calling area, roaming services are obtained by a carrier for its customers through a roaming agreement with another carrier.

[383] *See* Section V.D.3, Intercarrier Roaming Rates and Revenue, *infra*.

[384] *Fourteenth Report*, 25 FCC Rcd at 11489-90 ¶ 125; *Roaming Order on Reconsideration,* 25 FCC Rcd at 4192 ¶ 23; *see also* Cricket Reply at 6; Sprint Nextel Comments at 30-31. One potential measure of the significance of roaming in the wireless industry is roaming revenues, which are discussed in detail below. *See* Section V.D.3, Intercarrier Roaming Rates and Revenue, *infra*.

[385] *See* Section III.E.1, Entry, *supra*. For example, Leap and MetroPCS focus mainly on offering service to customers in metropolitan areas, while US Cellular offers regional coverage to more than 6.1 million customers in five geographic market areas across 26 states. *See* United States Cellular Corporation, SEC Form 10-K, filed Feb. 25, 2010, at 1.

[386] *See, e.g.*, Cricket, *Best Cell Phone Coverage Areas, Cellular Maps*, http://www.mycricket.com/coverage/cell-phone-coverage (visited Oct. 14, 2010) (stating that "Cricket Wireless offers nationwide cell phone coverage all over the U.S."); Cricket, *Wireless Coverage Maps*, http://www.mycricket.com/coverage/maps/wireless (visited Oct. 14, 2010) (providing an interactive U.S. map showing Cricket's roaming coverage); MetroPCS, *Unlimited Cell Phone Plans*, http://www.metropcs.com/plans/ (visited Oct. 14, 2010) (showing MetroPCS plans that include nationwide coverage); MetroPCS, *Coverage Map*, http://www.metropcs.com/coverage/ (visited Oct. 14, 2010) (providing an interactive U.S. map showing the various types of coverage provided by MetroPCS in different geographic areas); US Cellular, *Cell Phone Plans*, http://www.uscellular.com/uscellular/plans/showPlans.jsp?type=plans&plan-selector-type=individual (visited Oct. 14, 2010) (after entering a valid zip code, shows US Cellular national plans); US Cellular, *Voice and Data Maps*, http://www.uscellular.com/coverage-map/index.html (visited Oct. 14, 2010) (providing interactive U.S. maps depicting US Cellular national voice and data coverage).

[387] *Fourteenth Report*, 25 FCC Rcd at 11489-90 ¶ 125; *see also* Cricket Reply at 6; RTG Comments at 6. Commenters in response to the *Fifteenth Report Public Notice* contend that the same consumer expectations regarding roaming and the nationwide availability of mobile wireless voice services now apply equally to mobile wireless data services. *See* Cricket Reply at 7; RTG Comments at 6.

[388] *Fourteenth Report*, 25 FCC Rcd at 11489-90 ¶ 125; *see also Roaming Order on Reconsideration,* 25 FCC Rcd at 4191-92 ¶ 21 (recognizing that without the ability to offer roaming in markets where they hold spectrum, new entrants would in effect be required "to build out their networks extensively throughout the newly obtained license area before they can provide a competitive service to consumers, all without the benefit of financing the construction of new networks over time with revenues from existing services and reliance on roaming to fill in gaps during build out").

127. Given the importance of roaming, particularly to small and regional providers, some commenters have identified the inability to negotiate favorable roaming agreements as a potential competitive concern.[389] According to a recent survey by NTCA of its membership, which consists exclusively of small, rural providers, 51 percent of the survey respondents indicated that "negotiating roaming agreements" was an area of concern.[390] In addition, several commenters state that, given the increasing significance of mobile wireless data services, the ability for small providers to negotiate data roaming agreements with large providers for these services on non-discriminatory terms and at reasonable rates is particularly important.[391] In comments filed in this proceeding, AT&T reports that it is negotiating data roaming with several providers but does not provide any more detail.[392] Verizon Wireless states that more than a third of its 60 active roaming partners also have data roaming agreements, about half of which provide for roaming on Verizon Wireless's EV-DO network.[393]

128. In recent years, the Commission has taken actions to underscore the importance of roaming. In 2007, for instance, it clarified that automatic voice roaming is a common carrier obligation for CMRS providers.[394] In the *2007 Roaming Order and FNPRM*, the Commission held that CMRS providers must provide automatic voice roaming services to other technologically compatible providers outside their home areas upon reasonable request and on a just, reasonable, and nondiscriminatory basis pursuant to Sections 201 and 202 of the Communications Act.[395] In April 2010, the Commission adopted the *Roaming Order on Reconsideration*, which eliminates the home roaming exclusion and establishes the same general obligation to provide automatic voice roaming, regardless of whether the carrier requesting roaming holds spectrum in an area.[396] In the *Roaming Order on Reconsideration*, the Commission found that making automatic voice roaming arrangements available on just and reasonable terms and conditions will promote competition among multiple mobile wireless service providers, ensure that consumers have access to seamless coverage nationwide, and provide incentives for all providers to invest and innovate by using available spectrum and constructing wireless network facilities on a widespread basis.[397] In April 2011, the Commission, resolving questions raised in the 2007 *Roaming FNPRM* and the 2010 *Roaming*

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[389] *See* NTCA Comments at 3-4; RCA Comments at 4-5.

[390] NTCA 2009 Wireless Survey Report, April 2010, at 13.

[391] *See* MetroPCS Comments at 10-11; Sprint Nextel Comments at 30-31; US Cellular Reply at 15; Cricket Reply at 6-9. The *National Broadband Plan* recognizes the importance of data roaming to entry and competition for mobile broadband services. *National Broadband Plan,* at 49. Accordingly, it encourages the industry to adopt voluntary data-roaming arrangements and recommends that the Commission move forward promptly on its data roaming proceeding. *Id.*

[392] AT&T Reply at 25.

[393] Verizon Wireless Comments at 41.

[394] *See* Roaming Obligations of Commercial Mobile Radio Service Providers, *Report and Order and Further Notice of Proposed Rulemaking*, 22 FCC Rcd 15817, 15828 ¶ 27 (2007) (*2007 Roaming Order and FNPRM*) ("[W]e recognize that automatic roaming benefits mobile telephony subscribers by promoting seamless CMRS service around the country, and reducing inconsistent coverage and service qualities.")

[395] *Id.* at 15818-19 ¶ 2. The common carrier obligation to provide roaming extends to real-time, two-way switched voice or data services that are interconnected with the public switched telephone network and utilize an in-network switching facility that enables the provider to reuse frequencies and accomplish seamless hand-offs of subscriber calls. The Commission also extended the automatic roaming requirement to push-to-talk (PTT) and text messaging services, and in its Further Notice of Proposed Rulemaking sought comment on whether the roaming obligation should be extended to services that are classified as information services and services that are not CMRS.

[396] *Roaming Order on Reconsideration*, 25 FCC Rcd at 4182 ¶ 2.

[397] *Id.*

Second FNPRM, issued the *Data Roaming Order.*[398] The *Data Roaming Order* requires facilities-based providers of commercial mobile data services, whether or not such providers also offer CMRS, to offer data roaming arrangements to other mobile data service providers on commercially reasonable terms and conditions, subject to certain limitations.[399] The Commission found that its actions to promote commercial data roaming would facilitate investment in and deployment of mobile broadband networks.[400]

2. Advertising, Marketing, Sales Expenditures, and Retailing

129. Product information and perception is a second area of non-price competition among mobile wireless service providers. Firms may engage in advertising and marketing either to inform consumers of available products or services or to increase sales by changing consumer preferences.[401] Mobile wireless service is an "experience good,"[402] and in general, advertising for an experience good tends to be persuasive rather than informational in nature.

a. Advertising Expenditures

130. Advertising spending by wireless service providers, while still significant, continued to decline during 2009. According to Nielsen, advertising expenditures for mobile wireless service dropped eight percent from $3.7 billion in 2008 to $3.4 billion in 2009, albeit not as much as the decline in total U.S. ad spending. And such spending was still quite substantial.[403] At the same time, total U.S. ad spending fell nine percent to $117 billion. Despite the drop in overall advertising spending, wireless service providers continued to spend more on advertising than firms in many other industries. In Nielsen's rankings of advertising spending by product category, "wireless telephone service" rose from 6th place in 2008 to 5th place in 2009.[404]

131. When looking at the advertising expenditures of individual firms, we see that certain wireless service providers are among the largest advertisers in the country, but their ad spending declined in 2009. According to data from Kantar Media (formerly TNS), Verizon Communications (Verizon) and AT&T were the second and fourth largest U.S. advertisers, respectively, during 2009, as they were in 2008.[405] Verizon's advertising expenditures declined 6.9 percent during 2009 from $2.4 billion to $2.2 billion, while AT&T's ad spending dropped 4.1 percent from $1.986 billion to $1.904 billion. On the other hand, ad spending by Sprint Nextel – the 8th largest U.S. advertiser – rose 30 percent during 2009

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[398] *Reexamination of Roaming Obligations of Commercial Mobile Radio Service Providers and Other Providers of Mobile Data Services,* Second Report and Order, 26 FCC Rcd 5411 (2011).

[399] *Id.* at 5418-5428 ¶¶ 13-31.

[400] *Id.*

[401] *See* CTIA Comments at 52-55; AT&T Comments at 47; Verizon Wireless Comments at 80-81.

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

[403] *U.S. Ad Spending Down Nine Percent in 2009, Nielsen Says*, News Release, Nielsen, Feb. 24, 2010, *available at* http://en-us.nielsen.com/content/nielsen/en_us/news/news_releases/2010/february/2009_ad_spend_press.html (*U.S. Ad Spending Down Nine Percent in 2009, Nielsen Says*). Nielsen revised its 2008 total wireless telephone service ad spending figure from $3.4 billion to $3.7 billion. *See Fourteenth Report*, 25 FCC Rcd at 11491-92, ¶ 128.

[404] *U.S. Ad Spending Down Nine Percent in 2009, Nielsen Says*; *Nielsen Reports 2008 U.S. Ad Spend Down 2.6%*, Nielsen Wire, Mar. 13, 2009, *available at* http://blog.nielsen.com/nielsenwire/consumer/nielsen-reports-2008-us-ad-spend-down-26/; Verizon Wireless Comments at 80-81.

[405] *Kantar Media Reports U.S. Advertising Expenditures Declined 12.3 Percent in 2009*, News Release, Kantar Media, Mar. 17, 2010, *available at* http://www.kantarmediana.com/intelligence/press/kantar-media-reports-us-advertising-expenditures-declined-123-percent-2009?destination=node%2F24%2Fpress.

from $945 million to $1.23 billion.

132. According to Bernstein, AT&T's share of quarterly wireless ad spending fell to 26.2 percent in the third quarter of 2009, from 31.4 percent in the third quarter of 2008, while Sprint's rose from 15.9 percent to 25.7 percent during the same period.[406] The shares of wireless ad spending for Verizon Wireless and T-Mobile declined slightly during that period. Bernstein claims that Sprint's significant increase in ad spending represents the company's "continuing bid to restore its brand," while "AT&T reduced spending markedly ... as it increasingly struggled with eroding network performance, declining customer satisfaction, and a raft of bad press, all stemming from the heavy data usage of an army of iPhone users."[407]

b. Marketing Campaigns

133. In 2009 and early 2010, mobile wireless service providers' marketing campaigns focused largely on their mobile broadband networks and the data capabilities of the devices available on those networks. Many providers sought to highlight their data network quality, coverage, and/or capabilities, differentiating those from rival offerings. As discussed in the *Fourteenth Report*, in a marketing campaign that began in 2008 and continued throughout 2009, AT&T claimed to have the nation's fastest 3G network.[408] Verizon Wireless countered this campaign by launching a series of advertisements in October 2009 highlighting its mobile broadband network coverage and comparing it to that of AT&T.[409]

134. As service providers have launched new network technologies with faster data speeds during the past year, they have touted the benefits of these network services in their marketing campaigns and many have labeled the services on such networks as "4G." For example, after it began reselling Clearwire's WiMAX service, Sprint Nextel launched a new marketing campaign in which it refers to its network as the Now Network and emphasizes the capabilities and applications of faster mobile Internet services.[410] In addition, when it launched the HTC EVO in June 2010, the company advertised that it was offering the nation's first 4G phone.[411] In November 2010, T-Mobile launched an ad campaign in which it refers to its HSPA+ network as "4G."[412] This campaign includes a television ad that mimics Apple's "I'm a Mac and I'm a PC" ads and highlights the faster speeds and capabilities of T-Mobile's myTouch

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[406] Craig Moffett, *et al.*, *U.S. Wireless: Ad Wars..the Battle for Mind Share*, Bernstein Research, Jan. 22, 2010, at 7.

[407] Craig Moffett, *et al.*, *U.S. Wireless: Ad Wars.. the Battle for Mind Share*, Bernstein Research, Jan. 22, 2010, at 5.

[408] *AT&T Offers Nation's Fastest 3G Network*, Press Release, AT&T, July 10, 2008 (the claims are based on "data compiled by leading independent wireless research firms"). A 12-city test of 3G network speeds conducted by Gizmodo in December 2009 also found that AT&T had the fastest download speeds. See *Our 2009 12-City 3G Data Mega Test: AT&T Won*, Gizmodo, Dec. 22, 2009, *available at* http://gizmodo.com/5428343/our-2009-12+city-3g-data-mega-test-att-won.

[409] *See* Joshua Topolsky, *Verizon Removes Gloves, Begins 'There's a Map for That' Anti-AT&T Ad Campaign*, ENGADGET MOBILE, Oct. 5, 2009, *available at* http://mobile.engadget.com/2009/10/05/verizon-removes-gloves-begins-theres-a-map-for-that-anti-atand/. In the ads, Verizon Wireless claims it has five times the 3G coverage as AT&T.

[410] *Sprint Launches Two New Marketing Campaigns*, Press Release, Sprint Nextel, Apr. 6, 2009; Sprint Nextel, *Welcome to the Now Network*, http://now.sprint.com/nownetwork/?ECID=vanity:nownetwork (visited Dec. 23, 2010); Sprint Commercial – Now Network, YouTube, http://www.youtube.com/watch?v=TwkPPo6-i9M (visited Dec. 23, 2010).

[411] *See New Sprint Campaign Links Iconic "Firsts" with America's First 4G Phone, HTC EVO 4G*, Press Release, Sprint Nextel, June 3, 2010, *available at* http://newsroom.sprint.com/article_display.cfm?article_id=1533; Sprint – HTC EVO 4G Firsts, YouTube, http://www.youtube.com/watch?v=HdLtWVy1DQI (visited Dec. 23, 2010).

[412] *See T-Mobile 4G Service Now Available in More Markets and on More Devices*, Press Release, T-Mobile, Nov. 2, 2010, *available at* http://press.t-mobile.com/articles/americas-largest-4g-network; T-Mobile Launches "Largest and Fastest 4G" Ad Campaign, YouTube, http://www.youtube.com/watch?v=FBYgAulZs6s (visited Dec. 23, 201).

4G device over the iPhone 4.[413] In early 2011, AT&T followed T-Mobile in referring to its HSPA+ network, as well as its future LTE network, as "4G."[414] Verizon Wireless also adopted the 4G marketing label for its LTE network, launched in December 2010, calling it the largest LTE and "most advanced" 4G network in the world."[415]

135. Service providers' advertisements have also focused on the devices available on their networks. For instance, AT&T has highlighted the availability of the iPhone and iPad, Sprint has run ads focused on the capabilities of the EVO device, and many of Verizon Wireless's ads have featured the various DROID devices. As a counterpart to this, some providers have run ads highlighting the weaknesses of the devices available on their competitors' networks. For example, in a 2010 print ad for the DROID X, Verizon Wireless and Motorola publicized the advantages of the DROID over the iPhone 4, stating the DROID's "double antenna design" allowed consumers "to hold the phone any way you like." This was an effort to highlight the antenna problems of the iPhone 4, which caused the device to lose a signal when held a certain way.[416]

136. In mid-2010, both AT&T and Verizon Wireless shifted the tone and focus of their marketing campaigns. The two operators stopped running ads attacking each other's network and shifted to broader, more abstract campaigns that subtly emphasized the benefits of network coverage. AT&T's ads featured the phrase "Rethink Possible," while Verizon Wireless's centered on "Rule the Air." Verizon Wireless ended its "Can You Hear Me Now?" slogan as its Rule the Air ads show objects being transformed into antennas and cell sites. Some of AT&T's ads have featured orange fabric, representing the company's network coverage, being spread across various areas of the country, while another shows a man using a smartphone to quickly change a train ticket in order to board the train and meet his future wife.

c. Retailing

137. Mobile wireless service providers distribute and sell their products and services through a variety of direct and indirect retail channels in order to increase customer growth and reduce customer acquisition costs.[417] The various distribution channels include: 1) direct retail outlets, such as provider-owned stores and kiosks; 2) indirect retail outlets, including mass-market electronics retailers such as Best Buy, Wal-Mart, Target, Costco, Radio Shack, and Amazon; 3) provider websites; and 4) telemarketers.[418] Service providers continued to report in early 2010 that customers obtained through direct channels tend to be more loyal and generate higher revenue that those obtained through indirect channels. For instance, Verizon Wireless had approximately 2,300 company-owned and operated stores and kiosks as of December 31, 2009, and reported that the customers obtained through these channels are less likely to

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[413] T-Mobile myTouch 4G "Piggyback," YouTube, http://www.youtube.com/watch?v=3KmfXupi9cg (visited Dec. 23, 2010).

[414] *AT&T Announces Plans to Deliver Nation's Most Advanced Mobile Broadband Experience*, Press Release, AT&T, Jan. 5, 2011, *available at* http://www.att.com/gen/press-room?pid=18885&cdvn=news&newsarticleid=31477&mapcode=wireless-networks-general|consumer.

[415] 4G LTE Technology and Verizon Wireless, YouTube, http://www.youtube.com/watch?v=ED5j7FOXsvU (visited Dec. 23, 2010); *Verizon Wireless Launches the World's Largest 4G LTE Wireless Network on Dec. 5*, Press Release, Verizon Wireless, Dec. 1, 2010, *available at* http://news.vzw.com/news/2010/12/pr2010-11-30a.html.

[416] Nilay Patel, *Consumer Reports Confirms iPhone 4 Antenna Problems – And So Do We*, Engadget, July 12, 2010, at http://www.engadget.com/2010/07/12/consumer-reports-confirms-iphone-4-antenna-problems-and-so-do/; Paul Reynolds, *Apple's Bumper Case Alleviates the iPhone 4 Signal Loss Problem*, Consumer Reports, Electronics Blog, July 14, 2010, at http://blogs.consumerreports.org/electronics/2010/07/apple-iphone4-iphone-4-bumper-case-fixes-antenna-issue-problem-signal-loss-tested-verified-consumer-reports-labs-quick-fix.html?loc=interstitialskip.

[417] *See Fourteenth Report*, 25 FCC Rcd at 11493, ¶ 132.

[418] *Id.*; Verizon Communications, Inc., SEC Form 10-K, filed Feb. 26, 2010, at 4, 9.

cancel their service than those obtained through indirect, mass-market channels.[419] In addition, Leap had 280 direct retail locations, consisting of company-owned stores and kiosks, at year-end 2009, up from 263 at the end of 2008, which generated 23 percent of the company's gross adds in 2009.[420] The company's indirect retail channels consisted of local authorized dealers and "premier" dealers, which are independent dealers that sell Cricket service exclusively in stores that look and function similar to company-owned stores.[421] Leap continued to report that, in 2009, the premier stores generated "significantly more" business than the other indirect dealers. The premier locations made up 46 percent of the company's total indirect retail locations at the end of 2009, up from 37 percent at the end of 2008.[422] In 2009, Leap also began selling its broadband access and daily and monthly pay-as-you-go products at 3,900 national mass-market retail locations.[423]

3. Differentiation in Mobile Wireless Handsets/Devices

138. In addition to network quality and advertising, a third component of non-price rivalry among mobile wireless service providers is the differentiation of the downstream products that they offer or that rely on their networks, including handsets/devices, operating systems, and mobile applications.[424] With respect to handsets and devices, providers compete by introducing new handsets/devices, distinguishing their handset/device offerings from those of their competitors, responding to competitors' handset/device innovations with rival offerings, offering certain handset/device models on an exclusive basis, and allowing handsets/devices that they do not sell directly to be used on their networks.[425] During 2009 and early 2010, data-centric devices – including smartphones,[426] laptop cards, and other data-only devices – continued to drive growth, and service providers launched several new devices in an effort to differentiate themselves from their competitors. In addition, as competition among mobile device operating system/platform developers has intensified, service providers' ability to offer certain device

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[419] Verizon Communications, Inc., SEC Form 10-K, filed Feb. 26, 2010, at 9. This represents a decrease of 200 company stores and kiosks from the 2,500 reported as of the end of 2008. *See Fourteenth Report*, 25 FCC Rcd at 11493, ¶ 132

[420] Leap Wireless International, Inc., SEC Form 10-K, filed Feb. 27, 2010, at 5-6.

[421] *Id.*

[422] Leap Wireless International, Inc., SEC Form 10-K, filed Feb. 27, 2010, at 5-6. At the end of 2009, Leap had 3,760 indirect channel locations, including 1,740 premier dealer locations. At the end of 2008, the company had 2,826 indirect channel locations, including 1,036 premier dealer locations. *Id.*; *Fourteenth Report*, 25 FCC Rcd at 11493, ¶ 132.

[423] Leap Wireless International, Inc., SEC Form 10-K, filed Feb. 27, 2010, at 5-6.

[424] *See, e.g., Torch Passes from Voice to Data*, at 24.

[425] *See Fourteenth Report*, 25 FCC Rcd at 11494-95, ¶ 135. *See also* Section VI.A.3, Handsets, Handset Locking, and Handset Applications, *infra*.

[426] While there is no industry standard definition of a smartphone, for purposes of this *Report*, we consider the distinguishing features of a smartphone to be an HTML browser that allows easy access to the full, open Internet; an operating system that provides a standardized interface and platform for application developers; and a larger screen size than a traditional, voice-centric handset. Many smartphones also have touch screens and/or a QWERTY keypad, and, as discussed below, run an operating system that offers a standard platform for application developers to create and sell device software through an application store. *See The Mobile Internet Report*, Morgan Stanley, Morgan Stanley Research, Dec. 15, 2009, at 110 (*Morgan Stanley Mobile Internet Report*); Verizon Communications, Inc., SEC Form 10-K, filed Feb. 24, 2009, at 6; Wikipedia, *Smartphone*, http://en.wikipedia.org/wiki/Smartphone (visited Mar. 8, 2010). In addition to smartphones and traditional handsets, the third category of devices, for purposes of this *Report*, is data-centric devices, which includes devices with no inherent voice capability, such as USB wireless modem laptop cards, mobile Wi-Fi devices, and laptops and netbooks with embedded mobile wireless modems. The traditional handset category includes voice-centric handsets that do not allow or are not designed for easy web browsing.

platforms, and the applications that run on those platforms, to their customers has influenced their ability to compete.

139. *Smartphones*. As discussed in the *Fourteenth Report*, service providers, handset manufacturers, and platform developers have introduced an array of smartphone devices in recent years to respond to consumer demand for devices with high-speed data capabilities, easy-to-use web browsers, and access to customized mobile applications.[427] These launches have represented both an attempt to prevent customers from switching to a competing provider in order to obtain the device offered by that provider, as well as an effort to migrate traditional, voice-centric handset customers to smartphones. Smartphone users typically generate higher data ARPU and have lower churn rates, which can offset the slowing growth in subscriber penetration and declining voice ARPU.[428] On the other hand, smartphone users also typically have higher bandwidth consumption levels, which can strain wireless network capacity.[429]

140. Service providers launched several new smartphone devices, including many devices running Google's Android operating system, in 2009 and 2010. For example, in 2009, Verizon Wireless began offering the Android-based Motorola and HTC DROID devices, T-Mobile launched the Android-based myTouch 3G, Samsung Behold II, and Motorola CLIQ smartphones, while Sprint Nextel launched the HTC Hero and Samsung Moment.[430] In 2010, Verizon Wireless launched, on an exclusive basis, newer versions of the DROID – the Motorola DROID X and DROID 2, and the HTC DROID Incredible – which included updated features such as faster processing speed, additional memory, Wi-Fi connectivity, higher-megapixel cameras, video cameras, mobile hotspot capabilities, and Adobe Flash player.[431] In June 2010, Sprint introduced the Android-based HTC EVO, the first hybrid EV-DO/WiMAX smartphone.[432] In addition to enabling faster download speeds in areas where the WiMAX network is available, the EVO includes features such as video chat, mobile hotspot capabilities, HDMI cable ports, Adobe Flash, and a kickstand.[433] In September 2010, Sprint launched a second EV-

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[427] *See Fourteenth Report*, 25 FCC Rcd at 11495, ¶ 136.

[428] *See Finding Value in Smartphones*, at 7, 26; *Smartphone Adoption Steadily Rising*, at 1, 2.

[429] *Smartphone Adoption Steadily Rising*, at 1, 2.

[430] *See Fourteenth Report*, 25 FCC Rcd at 11498-99, ¶ 141.

[431] *July 2010: DROID X by Motorola Lands on the Nation's Largest & Most Reliable 3G Network*, Press Release, Verizon Wireless, June 23, 2010, *available at* http://news.vzw.com/news/2010/06/pr2010-06-22.html; *See What DROID Does Next: DROID 2 by Motorola Pre-Sale Starts August 11 at VerizonWireless.com*, Press Release, Verizon Wireless, Aug. 10, 2011, *available at* http://news.vzw.com/news/2010/08/pr2010-08-09c.html; *DROID Incredible by HTC Delivers an Incredible 3G Experience*, News Release, Verizon Wireless, Apr. 29, 2010, *available at* http://news.vzw.com/news/2010/04/pr2010-04-28d.html. Not all features listed are available on all three devices.

[432] The device runs on both Sprint Nextel's EV-DO network and Clearwire's WiMAX network. *The Wait Is Over – America's First 3G/4G Phone, HTC EVO 4G, Available Nationwide Today, Exclusively from Sprint*, News Release, Sprint, June 4, 2010. MetroPCS introduced the first LTE smartphone to be made available in the United States, the Samsung Craft, in September 2010. *MetroPCS Launches First 4G LTE Services in the United States and Unveils World's First Commercially Available 4G LTE Phone*, Press Release, MetroPCS, Sept. 21, 2010, *available at* http://investor.metropcs.com/phoenix.zhtml?c=177745&p=irol-newsArticle&ID=1473355&highlight=; *MetroPCS Launches Commercial 4G LTE Services in the Dallas/Fort Worth Metroplex*, Press Release, MetroPCS, Sept. 29, 2010, *available at* http://investor.metropcs.com/phoenix.zhtml?c=177745&p=irol-newsArticle&ID=1475926&highlight=.

[433] *The Wait Is Over – America's First 3G/4G Phone, HTC EVO 4G, Available Nationwide Today, Exclusively from Sprint*, News Release, Sprint, June 4, 2010.

DO/WiMAX smartphone, the Samsung Epic 4G.[434] As discussed below, Android's share of the total smartphone operating system market increased significantly during the first eight months of 2010.[435]

141. While other service providers focused on introducing Android-based smartphones in 2009 and 2010, AT&T continued its trend of offering a new version of the Apple iPhone. As mentioned in the *Fourteenth Report*, AT&T began selling the iPhone 3GS in June 2009.[436] In June 2010, Apple released and AT&T began selling, as the exclusive network provider, the iPhone 4.[437] The distinguishing features of the iPhone 4 include a user-facing video camera that enables a two-way video chat application called FaceTime, a high-resolution screen, and a 5-megapixel flash camera.[438] In January 2011, Verizon Wireless announced that it would begin selling the iPhone 4 for use on its EV-DO network in February 2011.[439]

142. A key way in which service providers differentiate themselves from their rivals on the basis of devices is by offering certain smartphone devices on an exclusive basis. The AT&T-iPhone exclusivity arrangement – which ended in February 2011 when Verizon Wireless began offering the iPhone – has been the longest-lived example. However, service providers have offered several other popular smartphones exclusively, such as Verizon Wireless with the DROID device and AT&T with the RIM Blackberry Torch.[440]

143. Related to the efforts by service providers to compete by offering smartphone devices has been the intensifying competition among the smartphone device operating system developers themselves, including Apple, Google, RIM, and Microsoft. And with operating systems come application stores, as each mobile OS developer has created an application store that is bundled with and designed to run on that developer's specific platform. Apple devices provide access to the Apple App Store, Android devices provide access to the Android Market, Blackberry smartphone users can access the Blackberry App World, and so on.[441] As mobile operating systems, and the functionalities and application stores they enable, play a more prominent role in a consumer's mobile wireless experience, consumers are showing an increasing loyalty to particular device platforms. If consumers want to be able to download the applications available from a particular app store, they must use a device that runs the OS that provides access to that app store. Some mobile operating systems are bundled with the devices that are manufactured by the OS developer, such as with Apple and RIM. In such cases, the bundled OS-device

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[434] *Second 3G/4G Phone, Samsung Epic 4G, Launches with One of the Best First-Day Sales for Any Sprint Device*, News Release, Sprint, Sept. 3, 2010, *available at* http://newsroom.sprint.com/article_display.cfm?article_id=1620.

[435] *See* Section VII.B.1, Mobile Wireless Handsets/Devices and Operating Systems, *infra.*

[436] The iPhone 3GS includes a camera, video camera, speaker phone, digital compass, more memory, longer battery life and a new version of the iPhone operating system, OS 3.0. The 3GS is also able to connect to AT&T's HSPA 7.2 Mbps network. *See Fourteenth Report*, 25 FCC Rcd at 11496, ¶ 138.

[437] *AT&T to Offer iPhone 4 on June 24*, News Release, AT&T, June 7, 2010, *available at* http://www.att.com/gen/press-room?pid=18004&cdvn=news&newsarticleid=30863&mapcode=consumer|wireless. *See Fourteenth Report*, 25 FCC Rcd at 11499-500, ¶ 143.

[438] *Apple Presents iPhone 4*, News Release, Apple, June 7, 2010, *available at* http://www.apple.com/pr/library/2010/06/07iphone.html.

[439] *Verizon Wireless & Apple Team Up to Deliver iPhone 4 on Verizon*, Press Release, Verizon Wireless, Jan. 11, 2011, *available at* http://news.vzw.com/news/2011/01/pr2011-01-11a.html.

[440] *AT&T and Research in Motion Ignite Customers with the New BlackBerry Torch*, Press Release, AT&T, Aug. 3, 2010, *available at* http://www.att.com/gen/press-room?pid=18197&cdvn=news&newsarticleid=31006&mapcode=wireless;

[441] *See Fourteenth Report*, 25 FCC Rcd at 11499, ¶ 142. The number of applications available on each application store, and the market shares of the various mobile operating systems, are discussed in SectionVII.B.1, Mobile Wireless Handsets/Devices and Operating Systems, *infra*.

manufacturer may choose to sell its devices to multiple service providers or to a single service provider. Other operating systems, such as Android and Microsoft Windows, are available on multiple devices.

144. Service providers, seeking to differentiate their products and services from their rivals, have responded to this developing relationship between operating systems and devices in various ways. First, in cases where the device and OS are bundled, service providers have responded to consumer demand for the applications and features of that OS by offering exclusively, in some cases for a limited period of time, all of the manufacturer's smartphone devices or certain device models. Prior to February 2011, AT&T was the only service provider for all of Apple's iPhone models, while several service providers have sold different RIM Blackberry devices on an exclusive basis. Second, in cases where an OS is available on devices produced by multiple manufacturers, service providers can compete by offering a particular device exclusively and touting the distinguishing features of that device. Examples of this type of conduct by service providers include Verizon Wireless's exclusive offering of the DROID devices and Sprint's launch of the EVO. In cases where a particular smartphone OS is available on other devices offered by competing providers, the service provider has highlighted the attributes of the individual smartphone devices that it sells exclusively, even if for only a limited period of time, as well as the benefits of its network – the speed, coverage, or reliability.[442]

145. *Data-Only Devices.* In addition to launching new smartphone devices in 2009 and 2010, several service providers began offering a range of new data-only devices, including devices to facilitate mobile Internet access on computers – wireless data cards, mobile Wi-Fi hotspots,[443] and netbook computers with embedded modems[444] – as well as tablet devices and e-readers. The first mobile tablet device was the Apple iPad, introduced in January 2010. The iPad has a 10-inch screen, web browsing capabilities, can be used to view photos or watch videos, and has e-reader capabilities and an on-screen touch keyboard. It can be purchased with built-in connectivity to AT&T's HSPA network (or with a Wi-Fi-only connection) but does not allow voice communications.[445] According to one analyst, the iPad is an attractive device for consumers looking at netbooks or e-readers as a second computing device but is too limited to serve as a full replacement for a notebook, laptop, or desktop computer.[446] As a media device, however, the iPad could serve as a more personalized substitute for a television set, according to some industry analysts.[447]

146. In addition, certain mobile wireless networks provide data connections for electronic reading devices, such as the Amazon Kindle or the Barnes & Noble Nook. The data connection, used to download electronic books and other reading materials, is typically provided as resold by third-party retailers, rather than directly by mobile wireless service providers. With e-readers, users typically do not pay a separate fee for data access but instead pay the e-book retailer a fee for purchasing and downloading books or other reading materials. Estimates of the number of Kindles sold as of January 2010 range from

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[442] *See* Section IV.B.1, Network Coverage and Technology Upgrades, *supra.*

[443] Mobile Wi-Fi, or "Mi-Fi," devices are credit card-sized, mobile Wi-Fi routers with mobile broadband wide-area connections that allow a certain number of Wi-Fi-enabled devices in short range to connect to the Internet via a Wi-Fi connection.

[444] *See* Section V.A, Subscribership/Connection Levels, *infra*, for data on the number of mobile wireless subscribers by device type.

[445] Craig Moffett, *et al.*, *Apple: Alas, the iPad Unveiled – What Does It Mean?*, Bernstein Research, Jan. 28, 2010, at 1 (*Apple: Alas, the iPad Unveiled – What Does It Mean*); Craig Moffett, *et al.*, *Weekend Media Blast: Maybe We Just Don't Like Each Other*, Bernstein Research, Apr. 23, 2010, at 1-2.

[446] *Apple: Alas, the iPad Unveiled – What Does It Mean?*, at 1.

[447] The 10-inch screen, when held 17 inches away, has approximately the same field of vision ratio as a 50-inch television located eight feet away from a viewer. Craig Moffett, *et al.*, *Weekend Media Blast: Maybe We Just Don't Like Each Other*, Bernstein Research, Apr. 23, 2010, at 1-2.

2.5 million to 3 million.[448] In October 2009, Amazon switched from Sprint to AT&T as the data connection provider for the Kindle 2.[449]

147. As discussed in the *Fourteenth Report*, many service providers offer netbook computers, typically selling them at a lower upfront price than when purchased through an electronics retailer, but with the requirement that the customer purchase a monthly mobile broadband access plan with a two-year contract.[450] In October 2010, Sprint introduced the first netbook and notebook computers – the Dell Inspiron Mini 10 and Dell Inspiron 11z – with an embedded dual-mode EV-DO/WiMAX modem.[451]

148. Many service providers also offer mobile Wi-Fi hotspots, and in January 2010, Sprint began offering the first dual mode EV-DO/WiMAX mobile hotspot.[452] In addition, several of the smartphone devices launched by service providers in 2010 included mobile hotspot capabilities, which typically allow around five to eight nearby Wi-Fi-enabled devices to connect to the Internet via the EV-DO or WiMAX connection of the smartphone. Examples of smartphones with built-in mobile hotspot capabilities include the EVO, the DROID X, and DROID 2.

149. While many mobile wireless service providers have been providing EV-DO- and HSPA-enabled wireless modem laptop cards for several years, in 2009 and 2010, a few began offering, or announced plans to offer, WiMAX- and LTE-enabled laptop cards. In 2009 and 2010, Sprint and Clearwire began offering dual-mode laptop cards that can connect to both Sprint's EV-DO network and Clearwire's WiMAX network. As mentioned above, Verizon Wireless began offering two LTE-compatible USB wireless modem cards in December 2010 and unveiled ten additional LTE-compatible consumer-oriented devices, including smartphones and tablets, in January 2011, to be available by mid-2011.[453] In addition, AT&T announced the availability of three LTE/HSPA 7.2-compatible wireless modem cards in October 2010, and plans to begin offering LTE-enabled smartphones, tablets, and mobile

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[448] Douglas MacMillan, *Amazon CEO: "Millions" of Kindles Sold*, The Tech Beat, BusinessWeek, Jan. 28, 2010, *available at* http://www.businessweek.com/the_thread/techbeat/archives/2010/01/amazon_ceo_mill.html.

[449] Priya Ganapati, Gadget Lab – *Amazon Dumps Sprint for Kindle 2, Embraces AT&T*, Wired, Oct. 23, 2009, *available at* http://www.wired.com/gadgetlab/2009/10/sprint-kindle-att/. Analysts believe Amazon switched to AT&T because AT&T's network uses the same technology standard (GSM/WCDMA) used in many other countries, and the per-unit equipment costs for Amazon are lower if the company can produce a single Kindle model that can be sold in multiple countries. *Id* (citing Forrester Research analyst, Charles Golvin).

[450] Marguerite Reardon, *Sprint Sells Netbooks for a Buck*, CNET NEWS, July 7, 2009, *available at* http://news.cnet.com/8301-1035_3-10280886-94.html. Sprint Nextel and Best Buy sold the HP Mini for 99 cents as a promotion in July 2009, while the same netbook was offered through Verizon Wireless and AT&T for $199. In all cases, the service providers required the purchase of a two-year service contract. The non-bundled price for the netbook at that time was $389.99 from Best Buy. *Id.*

[451] *Sprint Expands 4G Product Portfolio Again Becoming the First Wireless Carrier in America to Offer 3G/4G-Embedded Netbook and Notebook, Dell Inspiron Mini 10 and Dell Inspiron 11z*, Press Release, Sprint Nextel, Oct. 19, 2010, *available at* http://newsroom.sprint.com/article_display.cfm?article_id=1687.

[452] *Overdrive 3G/4G Mobile Hotspot by Sierra Wireless Can Bring Sprint's 4G Speeds to More Than 400 Million Wi-Fi-Enabled Devices*, Press Release, Sprint Nextel, Jan. 6, 2010, *available at* http://newsroom.sprint.com/article_display.cfm?article_id=1333.

[453] *See* Section IV.B.1.a, Service Provider Technology Deployments, *supra*.

hotspots during the second half of 2011.[454] The devices will reportedly receive a software upgrade in 2011 when AT&T's LTE network is deployed.[455]

150. *Machine-to-Machine (M2M) Devices*. Related to service providers' launch of data-only devices are their efforts to differentiate themselves by permitting devices to operate on their networks that have traditionally not had embedded mobile Internet connectivity and which the service providers do not brand or sell directly. Several mobile wireless service providers have created streamlined process for wholesalers to certify data-only mobile computing and M2M devices for use on service provider's networks.[456] For example, through its Open Development program, Verizon Wireless has certified more than 150 non-traditional mobile devices for use on its network, including utility meters, law enforcement devices, and health care devices.[457] In October 2009, the company opened its LTE Innovation Center lab for the design and testing of M2M products that would rely on the LTE network for data connections.[458] In addition, through its Open Device Initiative/M2M Wholesale Business, Sprint has more than 300 certified, third-party embedded devices operating on its network.[459] M2M devices still account for a relatively small percentage of all mobile wireless devices. At the end of 2009, an estimated 4.3 percent of all mobile network connections in the United States were used for M2M communications.[460] According to Sprint, M2M devices generate lower ARPU than mobile consumer-based devices such as smartphones, but there is a potential for millions of M2M units to be connected to mobile networks.[461]

4. Differentiation in Mobile Applications

151. As mentioned above, one way mobile wireless service providers compete is by differentiating themselves from their rivals through the applications that they provide and allow on their networks.[462] For instance, service providers can have applications pre-loaded on the devices they sell, they can offer applications through provider-branded, "walled garden" mobile platforms, and they can allow applications to be downloaded via web browsers or application stores. In recent years, there has been a shift towards allowing consumers to access and download applications through the web and application stores, rather than limiting them to walled gardens – a trend that was catalyzed by the launch of the iPhone in 2007.[463] The ability to access a wider variety of applications and content and to browse

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[454] Sascha Segan, *AT&T Launches First LTE, HSPA+ Modems*, PC World, Oct. 6, 2010, at http://www.pcmag.com/article2/0,2817,2370331,00.asp (*AT&T Launches First LTE, HSPA+ Modems*); *AT&T Announces Plans to Deliver Nation's Most Advanced Mobile Broadband Experience*, Press Release, AT&T, Jan. 5, 2011, *available at* http://www.att.com/gen/press-room?pid=18885&cdvn=news&newsarticleid=31477&mapcode=wireless-networks-general|consumer.

[455] *AT&T Launches First LTE, HSPA+ Modems.*

[456] *See Fourteenth Report*, 25 FCC Rcd at 11501-02, ¶ 147; Verizon Wireless Comments at 106-107.

[457] Verizon Wireless Comments at 106-107.

[458] *See Fourteenth Report*, 25 FCC Rcd at 11501-02, ¶ 147.

[459] *See Fourteenth Report*, 25 FCC Rcd at 11501-02, ¶ 147; Sprint, *Machine-to-Machine*, http://www.sprint.com/wholesale/m2m.shtml (visited Oct. 21, 2010).

[460] *Berg Insight Says Machines Account for 1.4 Percent of Mobile Network Connections Worldwide*, Press Release, Berg Insight, Dec. 14, 2009.

[461] *Interview: Dan Dooley of Sprint*, Global Telecoms Business, Nov. 9, 2009, at http://www.globaltelecomsbusiness.com/Article/2334673/Sectors/25204/Interview-Dan-Dooley-of-Sprint.html.

[462] Applications can be narrowly defined as a software program that runs on a mobile device, or more broadly defined as any functionality on a mobile device, such as text messaging, voice, etc. *Morgan Stanley Mobile Internet Report*, at 134.

[463] *Morgan Stanley Mobile Internet Report*, at 5, 185, 214-215; *Fourteenth Report*, 25 FCC Rcd at 11502-03, ¶ 148; Katherine Rosman, *Y U Luv Texts, H8 Calls*, The Wall Street Journal, Oct. 14, 2010.

the web more openly has become increasing popular with consumers. Recognizing and capitalizing on this trend, service providers have been selling devices that allow easier web browsing and downloading of applications through web browsers and applications stores.[464] As web-friendly smartphones and application stores have become more popular with consumers, mobile wireless service providers have been competing less on the basis of exclusive content or applications available from a provider-branded platform or walled garden, and to a greater extent on, among other factors, the devices they sell and the types and quantity of applications that can be easily accessed on those devices.[465]

152. While service providers have allowed consumers access to a greater range of applications in recent years, many have maintained certain restrictions on the types of mobile applications that consumers can access on their networks. For example, AT&T prohibits, as part of the terms and conditions of its wireless data service plans, the downloading of movies using peer-to-peer file sharing services because such applications can cause extreme network capacity issues and interference with the network.[466] In addition, Verizon Wireless states that the downloading of applications with its data plans is subject to certain terms related to protecting the network and maintaining the quality of service to all users.[467]

153. Some providers have moved to allow certain high-bandwidth, and in some cases previously-prohibited, applications to be used on their networks. For example, after allowing iPhone customers to make VoIP calls on its HSPA network in October 2009,[468] AT&T announced in February 2010 that it would also allow a video streaming application, SlingPlayer Mobile.[469] In addition, in February 2010, Verizon Wireless announced that all of its smartphone customers with a data plan would be able to use their device for unlimited Skype VoIP calling.[470]

154. The types of mobile applications available to consumers are influenced to a large extent by the mobile operating system used on the device. As mentioned above, each of the major smartphone operating system/platform developers has created an application store in which consumers can download, for free or for a fee, applications that have been designed to work on that specific operating system/platform.[471] The level of control or openness exercised by the operating system developers over the types of applications that are available through their application stores varies. For example, Apple must approve the applications designed by third-party developers before they can be sold through the Apple App Store. On the other hand, the launch of applications and content by third-party developers through the Android Market application store requires no approval by either Google or the wireless

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[464] *See Fourteenth Report*, 25 FCC Rcd at 11502-03, ¶ 148. Mobile wireless service providers often require that customers comply with terms and conditions of service, and may approve or reject certain applications developed by third-party application developers for certain devices or operating systems.

[465] *See Fourteenth Report*, 25 FCC Rcd at 11502-03, ¶ 148.

[466] AT&T, *Wireless Data Service Terms and Conditions*, http://www.wireless.att.com/cell-phone-service/legal/plan-terms.jsp (visited Apr. 9, 2010).

[467] Verizon Wireless, *Mobile Broadband Terms & Conditions*, http://b2b.vzw.com/broadband/bba_terms.html (visited Jan. 20, 2011) ("You may not use our Data Plans ... in a manner ... that interferes with network's ability to fairly allocate capacity among users, or that otherwise degrades service quality for other users").

[468] *AT&T Extends VoIP to 3G Network for iPhone*, Press Release, AT&T, Oct. 6, 2009.

[469] *AT&T and Sling Media Collaborate on SlingPlayer Mobile App for 3G Mobile Broadband Network*, Press Release, AT&T, Feb. 4, 2010.

[470] *Verizon Wireless and Skype Join Forces to Create a Global Mobile Calling Community*, Press Release, Verizon Wireless, Feb. 16, 2010.

[471] *See* Section VII.B.2, Mobile Applications, *infra*.

service provider.[472] Google's Android operating system is made available free of charge to handset manufacturers and wireless service providers, and is available on multiple devices and multiple service providers.[473] As a result, many service providers and device manufacturers have designed customized versions of the Android platform for their products. Some commentators have noted that, because of this, it is difficult for third-party application developers to design and test products for use on a fragmented platform can vary by device and network.[474]

155. In December 2010, the Commission adopted rules on Internet openness. The rules require all broadband providers to publicly disclose network management practices, restrict broadband providers from blocking Internet content and applications, and bar fixed broadband providers from engaging in unreasonable discrimination in transmitting lawful network traffic.[475]

V. MOBILE WIRELESS SERVICES: PERFORMANCE

156. The structural and behavioral characteristics of a competitive market are desirable not as ends in themselves, but rather as a means of bringing tangible benefits to consumers such as lower prices, higher quality and greater choice of services. To determine if the market is producing these kinds of positive outcomes, in this section we analyze various metrics including subscriber growth and penetration, usage, pricing levels and trends, investment, and quality of service.

157. As in previous reports, the market performance section of this *Report* tracks the pricing of mobile wireless services using various pricing measures or proxies, including RPM and average revenue per message. In addition, the market performance section of this *Report* supplements the analysis of pricing trends with an analysis of measures of subscribership, net adds, output/usage, revenue, profitability, and the economic impact of mobile wireless service. The analysis of revenue decomposes total service revenue into three segments: voice, messaging, and other data service revenue. The analysis of profitability uses measures of profitability that account for cost data that are not reflected in pricing and revenue data. This *Report* does not track increasingly important usage trends related to mobile data consumption (e.g., revenue per MB) because most carriers and the industry as a whole do not release these data.

A. Subscribership/Connection Levels

158. Mobile wireless subscribers and connections can be measured in various ways, including by type of service and device, by type of pricing plan, by age, and by geographic area. In looking at the number total number of devices connected to a mobile wireless network, we find that mobile wireless connections increased four percent in 2009 to 290.7 million, which translates into a nationwide penetration rate of 93.5 percent.[476] Prepaid and wholesale subscribers as a percentage of all mobile wireless subscribers continued to increase in 2009 from 19.1 percent to 21.8 percent.[477] In addition, the

[472] *Morgan Stanley Mobile Internet Report*, at 156. Customers are still subject to the terms and conditions of their contracts with wireless service providers.

[473] *See Thirteenth Report*, 24 FCC Rcd at 6269, ¶ 172; *Morgan Stanley Mobile Internet Report*, at 158. Wireless service providers are able to customize elements of the platform to promote their own services and content. *Thirteenth Report*, 24 FCC Rcd at 6269, ¶ 172. While it makes the operating system available for free, Google has focused on bringing in revenue through advertising and monetizing user usage information.

[474] Josh Levy, *Open vs. Closed, Google vs. Apple, iPhone vs. Android*, Open Mobile, Oct. 19, 2010, at http://openmobile.posterous.com/open-vs-closed-google-vs-apple-iphone-vs-andr.

[475] Preserving the Open Internet, Broadband Industry Practices, GN Docket No. 09-191, WC Docket No. 07-52, *Report and Order*, FCC 10-201 (rel. Dec. 23, 2010) (*Open Internet Order*).

[476] *See* Section V.A.1, Total Mobile Wireless Connections, *infra*.

[477] *See* Section V.A.3, Mobile Wireless Subscribers by Pricing Plan, *infra*.

number of mobile wireless Internet access subscribers – those subscribing to mobile Internet access service at speeds over 200 kbps in at least one direction – more than doubled, so that, at the end of 2009, more than 55 million subscribers were using services with 3G or 4G networks technologies. Another source indicates that the adoption of various mobile data services – including text messaging, instant messaging, e-mail, and web access – has grown substantially over the past year, with 38 percent of cell phone subscribers using web access and 72 percent using text messaging as of May 2010.[478] Finally, Commission data on sub-national mobile wireless connections by EAs show that EA penetration rates range from a low of 71 percent in the Sacramento-Yolo, CA EA to a high of over 100 percent in 18 EAs.[479]

1. Total Mobile Wireless Connections

159. The data source that the Commission has used for many years to estimate the number of mobile wireless subscribers, NRUF, tracks the number of phone numbers that have been assigned to mobile wireless devices.[480] As the industry becomes more and more data-centric, the use of NRUF has certain limitations that will become increasingly significant. One important limitation is that NRUF is no longer an accurate reflection of the number of individual subscribers. That is because more consumers are using more than one mobile device – particularly non-voice devices, such as Internet access devices (*e.g.*, wireless modem cards, netbooks, and mobile Wi-Fi hotspots), e-readers, tablets, and telematics systems – and many data-only mobile devices have assigned telephone numbers.[481] Thus, NRUF provides an estimate of the number of mobile wireless connections or connected devices. We note that while many mobile wireless devices that are not used for mobile voice services still have a phone number assigned to them, Clearwire's WiMAX mobile and fixed Internet access devices do not have phone numbers assigned to them and are not captured in the NRUF data.[482] We also note that when NRUF is used to calculate a mobile wireless penetration rate, that penetration rate is overstated in terms of the number of individuals that have at least one mobile wireless device. It is possible for the maximum national penetration rate to exceed 100 percent, and, indeed, it does currently exceed 100 percent in certain EAs, as discussed below.[483]

160. Based on NRUF data, we estimate that there were 290.7 million mobile wireless connections at the end of 2009 (see Table 14).[484] This addition of 11.1 million connections from 279.6

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[478] *See* Section V.A.2, Mobile Wireless Subscribers by Type of Service and Device, *infra.*

[479] *See* Section V.A.5, Mobile Wireless Connections by Economic Area (EA), *infra.*

[480] In NRUF, carriers do not report numbers that have been ported to them. Therefore, in order to develop an estimate of mobile wireless subscribership, it is necessary to adjust the raw NRUF data to account for mobile wireless subscribers who have transferred their wireline numbers to wireless accounts. Porting adjustments are developed from the telephone number porting databases managed by Neustar, acting as the administrator of the regional Number Portability Administration Centers (NPACs). The databases contain all ported numbers currently in service. They also contain information about when the number was most recently ported (to a carrier other than the carrier to which the number originally was assigned) or, in some cases, when the database was updated to reflect a new area code. *Trends in Telephone Service*, FCC, Apr. 2005, at 8-2 – 8-3.

[481] As discussed above, many mobile wireless devices that are not used for mobile voice services still have a phone number assigned to them and therefore are counted in the NRUF data. We note, however, that Clearwire's 4G mobile and fixed Internet access devices do not have phone numbers assigned to them and are not counted in the NRUF data. *See* Section III.C.2, Herfindahl-Hirschman Index, *supra.*

[482] As of year-end 2010, Clearwire customers amounted to 4.35 millinon.

[483] *See* Section V.A.5, Mobile Wireless Connections by Economic Area (EA), *infra.*

[484] Commission estimate, based on preliminary year-end 2009 NRUF filings, adjusted for porting. Dividing the total number of mobile wireless connections by the total U.S. population would result in a penetration rate of 93.5 percent. According to the Bureau of the Census, the combined population of the 50 states, the District of Columbia, (continued....)

million (restated) at the end of 2008 represents a four percent growth in the number of subscribers during 2009.[485] Between 2005 and 2009, the number of mobile wireless connections has increased over 36 percent. CTIA also estimates the total number of mobile wireless subscriber connections and found that the number of connections grew 5.8 percent from 270.3 million at the end of 2008 to 285.6 million at the end of 2009.[486] According to CTIA, since the end of 2005, mobile wireless connections increased by approximately 37 percent.[487]

Table 14
NRUF and CTIA - Estimated Mobile Wireless Connections[488]

	NRUF			CTIA
	Connected Devices (millions)	*Increase from previous year (millions)*	*Connections Per 100 People*	*Subscriber Connections (millions)*
2001	128.5	n/a	45	128.4
2002	141.8	13.3	49	140.8
2003	160.6	18.8	54	158.7
2004	184.7	24.1	62	182.1
2005	213.0	28.3	71	207.9
2006	241.8	28.8	80	233.0
2007	263.0	21.2	86	255.4
2008	279.6	16.6	91	270.3
2009	290.7	11.1	94	285.6

2. Mobile Wireless Subscribers by Type of Service and Device

161. While the NRUF and CTIA data report the number of mobile wireless connections or connected devices, they do not distinguish among the various types of mobile wireless service. The Commission's Form 477 data, on the other hand, provide data, on both a nationwide and state-by-state basis, on the number of mobile wireless voice subscribers as well as the number of mobile wireless Internet access subscribers. Providers reported on Form 477 that there were 274.3 million mobile telephone subscribers as of December 2009, an increase of 5 percent from 261.3 million at the end of

(Continued from previous page)
and Puerto Rico, as of July 1, 2009, was estimated to be 311 million. *See* U.S. Census Bureau, *Annual Estimates for the Population of the United States, Regions, States, and Puerto Rico: April 1, 2000 to July 1, 2009*, http://www.census.gov/popest/states/tables/NST-EST2009-01.xls (visited Aug. 17, 2010).

[485] The number of mobile wireless subscribers at the end of 2008, based on NRUF data, originally reported in the *Fourteenth Report* was 277.6 million. However, this figure had not been adjusted for wireline-to-wireless porting. We have therefore revised the year-end 2008 total to 279.6 million and have adjusted the net addition figures based on this total.

[486] *See* Appendix C, Table C-1, *infra*. While the Commission now uses NRUF data as the basis for its estimate of mobile wireless connections for the purposes of this *Report*, we continue to report the CTIA data as a benchmark for comparison because these figures are readily available and are used widely by industry analysts. A detailed explanation of the differences between the NRUF data and CTIA's survey can be found in the *Seventh Report*, 17 FCC Rcd at 13004.

[487] *Id.*

[488] Commission estimates based on NRUF data. *CTIA Year-End 2009 Wireless Indices Report*. In March 2011, CTIA announced there were an estimated 302.9 million mobile wireless subscriber connections as of the end of 2009. CTIA, *Year-End 2010 Top Line Survey Results*, http://files.ctia.org/pdf/CTIA_Survey_Year_End_2010_Graphics.pdf (visited Mar. 31, 2011).

2008.[489] Form 477 also provides data on the number of mobile wireless Internet access subscribers with connections exceeding 200 kbps in various speed tiers, and therefore using 3G or 4G technologies, and on the number of mobile wireless devices in service that are capable of transmitting data at speeds over 200 kbps in at least one direction.[490] Under the Commission's current Form 477 data collection rules, terrestrial mobile wireless providers are required to report, on a state-by-state basis and by speed tier, their number of mobile wireless connections with a device and subscription that permits the user to access the lawful Internet content of his or her choice at data rates exceeding 200 kbps in at least one direction.[491] In addition, such providers report, on a state-by-state basis, their number of devices in service that are capable of sending or receiving information at speeds greater than 200 kbps in at least one direction, regardless of whether the user subscribes to a mobile Internet access plan.[492] As of the end of 2009, approximately 55.8 million mobile wireless Internet access service subscriptions were reported to the Commission on Form 477, more than double the 26.5 million at the end of 2008. In addition, 115.7 million mobile wireless devices in use were reported to be capable of transmitting data at over 200 kbps at the end of 2009, up 35 percent from 86 million at the end of 2008 (see Chart 6). Because reporting practices previously varied among providers to a largely unknown degree, the year-end 2008 and 2009 figures are not directly comparable to figures reported on Form 477 for earlier dates.[493]

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[489] *See* Appendix C, Table C-2, *infra*. These particular Form 477 data do not distinguish those mobile voice subscribers who also have a mobile data or Internet access plan from those who do not.

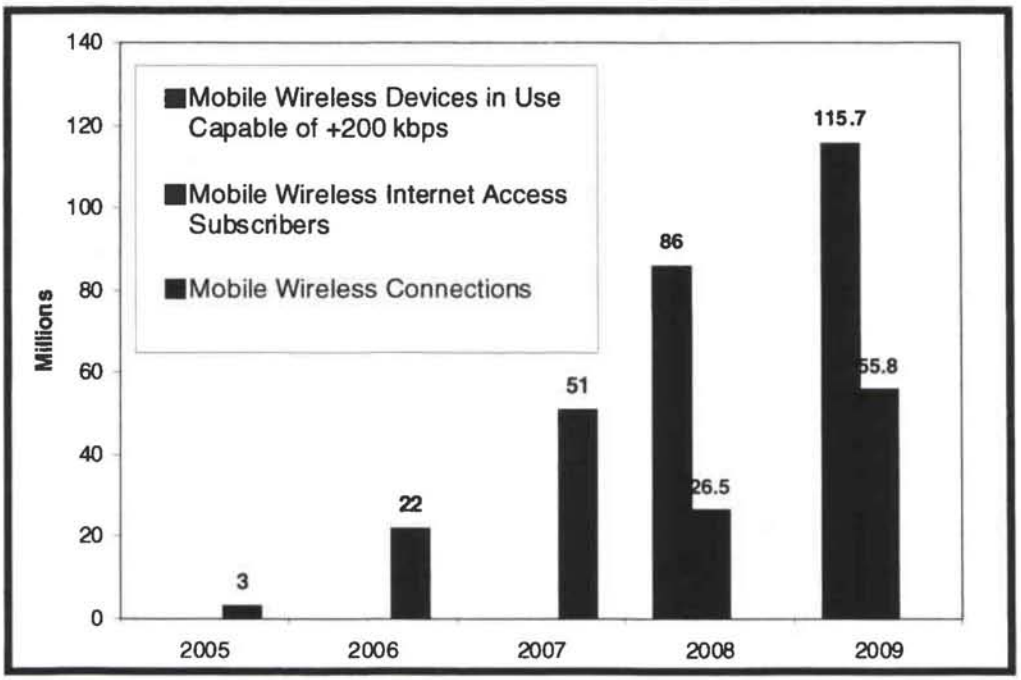
[490] *See* Table C-6, Appendix C, *infra*.

[491] Development of Nationwide Broadband Data to Evaluate Reasonable and Timely Deployment of Advanced Services to All Americans, Improvement of Wireless Broadband Subscribership Data, and Development of Data on Interconnected Voice over Internet Protocol (VoIP) Subscribership, WC Docket No. 07-38, *Report and Order and Further Notice of Proposed Rulemaking*, 23 FCC Rcd 9691, 9700, ¶ 20 (2008) (*Broadband Data Order*).

[492] *Broadband Data Order*, 23 FCC Rcd at 9703, ¶ 23. In addition, mobile wireless broadband providers are required to report the percentage of the total subscribers in each state that are residential (not billed to a corporate, business, government, or institutional account). *Broadband Data Order*, 23 FCC Rcd at 9703 ¶ 24. Terrestrial mobile wireless providers are not required to submit their number of Internet access subscribers broken down on a Census Tract basis, as other providers are required to do. *Broadband Data Order*, 23 FCC Rcd at 9698, ¶ 16. We note that the Form 477 mobile wireless subscriber data do not capture those mobile data users who access the mobile Internet on a casual or *à la carte* basis but do not have a monthly or longer-term subscription to a mobile wireless Internet access service.

[493] For the year-end 2007 and prior reporting periods, Form 477 mobile wireless broadband providers were instructed to report only "the number of subscribers whose mobile device was capable of sending or receiving data at speeds above 200 kbps," and not whether their subscriptions permitted Internet access. Therefore, these numbers are not comparable to the data from year-end 2008 and subsequent periods. *See High-Speed Services for Internet Access: Status as of December 31, 2008*, Industry Analysis and Technology Division, Wireline Competition Bureau, FCC, Feb. 2010, at 3, *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-296239A1.pdf.

Chart 6
Mobile Wireless Internet Access Subscribers and Devices in Use[494]



162. In addition to the Form 477 data on mobile telephone and Internet access subscribers, CTIA provides various estimates of the number of different types of devices in use (see Chart 7). CTIA reported that there were 257 million data-capable mobile handsets and devices in use at the end of 2009, up 13 percent from 228 million at the end of 2008.[495] The number of SMS-capable handsets in use rose from 227.2 million to 238.4 million during 2009, and the number of web-capable devices increased from 202.7 million to 238.4 million during the same period.[496] CTIA also tracks the number of wireless-enabled laptops and aircards in use and found the number increased 65 percent during 2009 from 7.2 million to 11.9 million.[497] In 2009, CTIA began reporting data on the number of smartphones in use and found that, as of December 30, 2009, there were 49.8 million smartphones in service, up from 40.7 million in mid-2009.[498]

Chart 7
Mobile Wireless Connections by Type of Service and Device

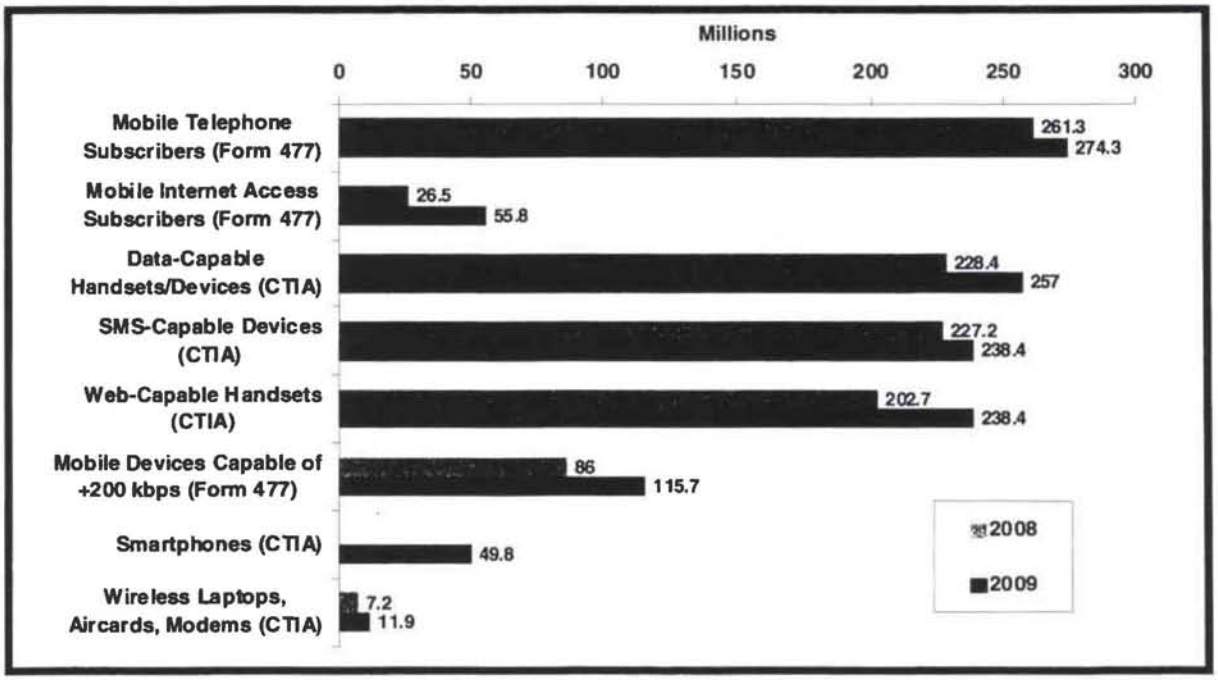
[494] Commission estimates based on Form 477 data. Mobile wireless Internet access subscribers include subscribers whose device and subscription plan allow them to access to the lawful Internet content of their choice at over 200 kbps in at least one direction.

[495] *CTIA Year-End 2009 Wireless Indices Report*, at 10.

[496] *CTIA Year-End 2009 Wireless Indices Report*, at 10.

[497] *CTIA Year-End 2009 Wireless Indices Report*, at 11.

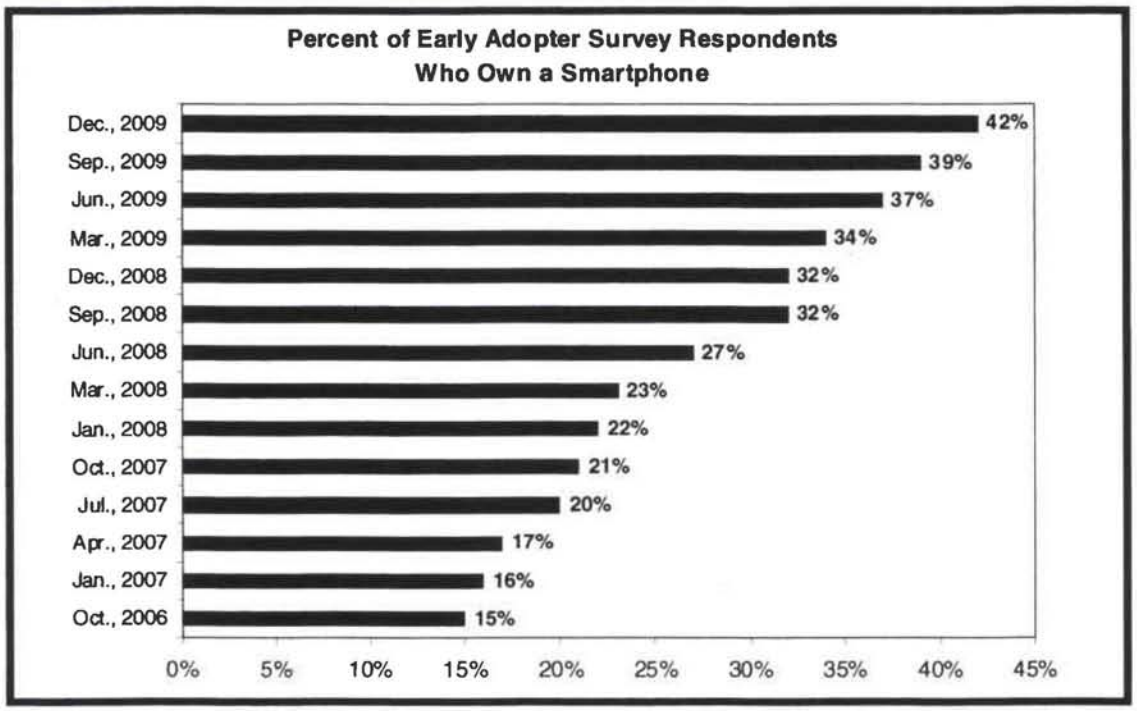
[498] *Id.*



163. In addition, a survey by ChangeWave Research found that 42 percent of its respondents owned a smartphone in December 2009, up from 32 percent in December 2008 and 21 percent in October 2007 (see Chart 8). ChangeWave's results were based on a survey of early adopters and professionals in business, technology, and medicine, rather than a representative sample of the entire population of the United States.[499]

[499] David Lieberman, *FCC Report Inflates Smartphone Usage Estimate, Researcher Says*, USA TODAY, Oct. 25, 2010, at http://content.usatoday.com/communities/technologylive/post/2010/10/fcc-report-inflates-smartphone-usage-estimate-researcher-says/1.

Chart 8
Smartphone Adoption Rates (ChangeWave Survey)[500]



164. In addition to the data on the number of subscribers by type of device, the Pew Internet & American Life Project (Pew) has released data on the percentage of mobile wireless subscribers who use different types of mobile wireless services and applications. As discussed in the *Fourteenth Report*, Pew estimated that 69 percent of American adults used some type of non-voice, mobile data service in April 2009, up from 58 percent in December 2007.[501] In July 2010, Pew released additional data on the number of mobile data users and reported that, as of May 2010, an estimated 40 percent of American adults had used their cell phone to go online (for e-mail, Internet access, or instant messaging), up from 32 percent in April 2009 and 24 percent in December 2007.[502] In addition, Pew estimated that the percentage of cell phone users who used their phones for text messaging, Internet access, or e-mail had increased substantially between December 2007 and May 2010, as shown in Chart 9 below.[503]

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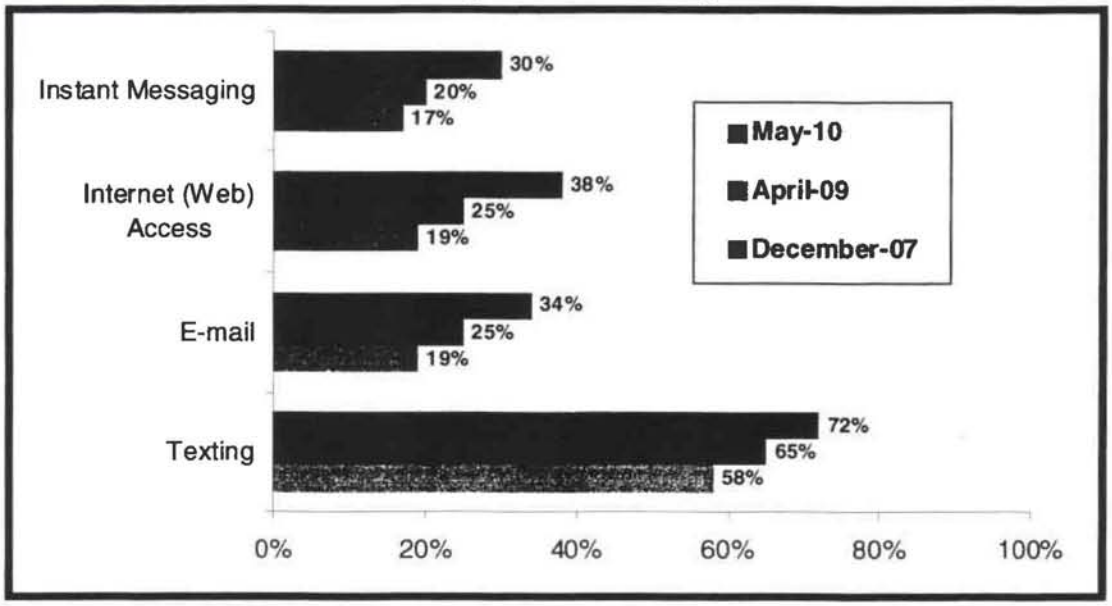
[500] Based on a survey of 4,068 early adopters and professionals in business, technology, and medicine. David Lieberman, *FCC Report Inflates Smartphone Usage Estimate, Researcher Says*, USA Today, Oct. 25, 2010, at http://content.usatoday.com/communities/technologylive/post/2010/10/fcc-report-inflates-smartphone-usage-estimate-researcher-says/1; Paul Carton and Jean Crumrine, *New Survey Shows Android OS Roiling the Smartphone Market*, ChangeWave Research, Jan. 4, 2010, *available at* http://www.changewaveresearch.com/articles/2010/01/smart_phone_20100104.html.

[501] John Horrigan, *Wireless Internet Use, More Than Half of Americans – 56% - Have Accessed the Internet Wirelessly on Some Device, Such as a Laptop, Cell Phone, MP3 Player, or Game Console*, Pew Internet & American Life Project, July 2009 (survey conducted March 26 - April 19, 2009), at 21-22 (*Wireless Internet Use*).

[502] Aaron Smith, *Mobile Access 2010*, Pew Internet & American Life Project, July 7, 2009 (survey conducted April 29 – May 20, 2010), at 7 (*Mobile Access*); *Wireless Internet Use*, at 16.

[503] *Mobile Access 2010*, at 12; *Wireless Internet Use*, at 23.

Chart 9
Mobile Data Service Adoption Rates Among Cell Phone Users[504]



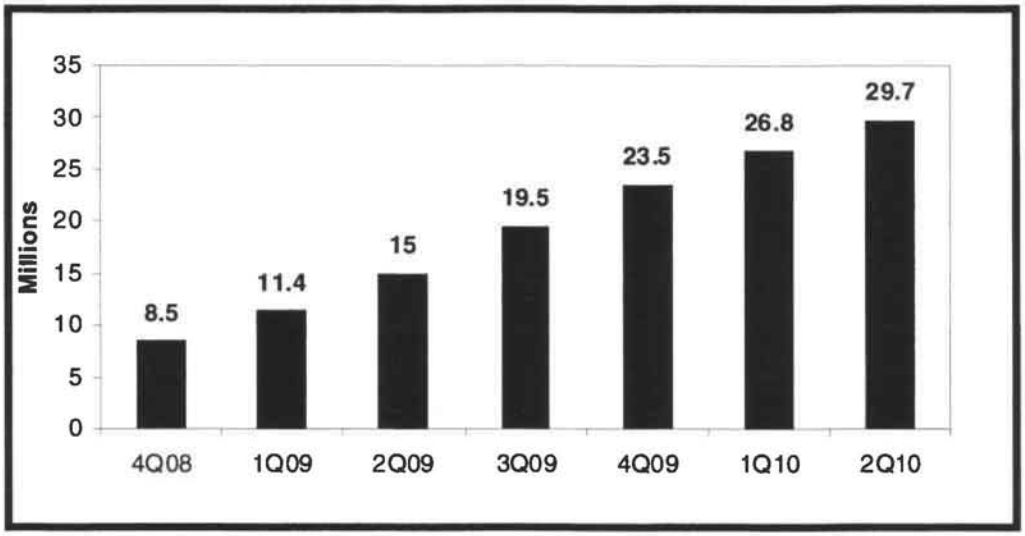
165. Certain individual service providers have reported data on the number of data-capable devices in use by their subscribers. For instance, AT&T reported that, as of the end of 2009, it had 23.5 million postpaid customers using 3G "integrated" devices, those with full Internet access and texting capabilities, up more than 15 million from approximately 8 million at the end of 2008 (see Chart 10). In addition, AT&T had over 1.4 million 3G Laptop Connect Cards in service at the end of 2009, up from 1.2 million at the end of 2008, while the number of Leap mobile broadband laptop cards in service more than tripled during 2009 from approximately 150,000 to nearly 500,000.[505] Verizon Wireless reported that, at the end of 2009, 15 percent of its postpaid subscribers had a smartphone and 11 percent had a multimedia device.[506]

[504] *Mobile Access 2010*, at 7; *Wireless Internet Use*, at 16.

[505] Craig Moffett, *et al.*, *U.S. Telecommunications and Global Telecom Equipment: The Wireless Data Exaflood*, Bernstein Research, June 14, 2010, at 9-10.

[506] Phil Goldstein, *Verizon Benefits from Droid Momentum*, FierceWireless, Jan. 26, 2010, *available at* http://www.fiercewireless.com/story/verizon-notches-2-2m-subs-q4/2010-01-26#ixzz0h2Sz4kWV (citing Verizon CFO Jon Killian). Verizon noted that all of these devices now require a subscription to a data plan. The company expects to continue to see strong growth in wireless data. *Id.*

Chart 10
AT&T 3G Postpaid Integrated Devices[507]



3. Mobile Wireless Subscribers by Pricing Plan

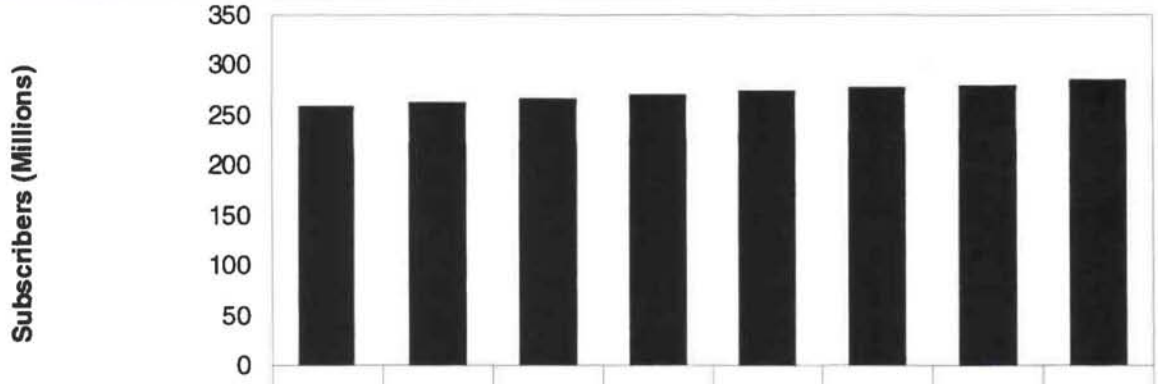
166. While the majority of subscribers in the United States today are postpaid, the prepaid and wholesale segments continued to grow at a faster pace in 2009 than postpaid. According to UBS data, the number of prepaid subscribers grew 17 percent during 2009, with the unlimited prepaid segment growing 58 percent, and the number of wholesale subscribers grew 55 percent (see Chart 11).[508] During the same period, the number of postpaid subscribers grew two percent, and the total number of subscribers grew just under six percent. The increase in unlimited prepaid subscribership levels may reflect the decreasing prices of unlimited prepaid plans, as discussed above, as well as the economic downturn.[509]

[507] "Integrated" devices as defined by AT&T as devices with full Internet and texting capabilities. AT&T Investor Update, 3Q09 Earnings Conference Call, Oct. 22, 2009, *available at* http://www.att.com/Investor/Financial/Earning_Info/docs/3Q_09_slide_c.pdf ; AT&T Investor Update, 4Q09 Earnings Conference Call, Jan. 28, 2010, *available at* http://www.att.com/Investor/Financial/Earning_Info/docs/4Q_09_slide_c.pdf; AT&T Investor Update, 1Q10 Earnings Conference Call, Apr. 21, 2010, *available at* http://www.att.com/Investor/Financial/Earning_Info/docs/1Q_10_slide_c.pdf; AT&T Investor Update, 2Q10 Earnings Conference Call, July 22, 2010, available at http://www.att.com/Investor/Financial/Earning_Info/docs/2Q_10_slide_c.pdf

[508] *US Wireless 411 2Q10*, at 4.

[509] *See* Section V.A.3, Mobile Wireless Subscribers by Pricing Plan, *supra*; Verizon Wireless Comments at 46-49 (citing IDC, Morningstar, UBS, and Credit Suisse First Boston).

Chart 11
Mobile Wireless Subscribers by Pricing Plan[510]



	Q1 2008	Q2 2008	Q3 2008	Q4 2008	Q1 2009	Q2 2009	Q3 2009	Q4 2009
Wholesale	4.496	4.815	4.72	4.727	5.197	5.317	5.456	7.328
Traditional Prepaid	34.839	35.005	35.606	36.78	37.383	37.474	37.781	38.954
Unlimited Prepaid	8.334	8.841	9.221	10.075	12.162	13.611	14.595	15.935
Postpaid	211.687	214.059	216.73	218.752	219.576	220.809	222.186	223.538

167. Mobile wireless service providers also offer family plans that give discounted rates for households with multiple handsets as a way to increase penetration on a household basis.[511] Most family plans include one line at an average of $45 per month for voice service for the first line and additional lines for approximately $10 per month per line, for up to four more lines.[512] As shown in Chart 12, Credit Suisse estimates that 67 percent of all mobile wireless subscribers were part of a family plan in 2009, up from just 35 percent in 2004.[513] In addition, Nielsen estimates that the 66 percent of all non-corporate wireless subscribers were family plan subscribers in the third quarter of 2009, up from 63 percent in the third quarter of 2008.[514] Family plans allow service providers to increase their subscribership levels to other members of the same household or family, such as children, grandparents, or other relatives.

[510] *US Wireless 4114Q09*, at 4.

[511] *See* Section IV.A, Price Rivalry: Developments in Mobile Service Pricing Plans, *supra.*

[512] John C. Hodulik, *et al.*, *MetroPCS - Growth Stays Strong, +CF on the Way*, UBS, UBS Investment Research, May 8, 2009, at 2.

[513] In addition, UBS estimates that roughly two-thirds of AT&T's and Verizon Wireless's postpaid customers subscribe to family plans. John C. Hodulik, *et al.*, *Telecommunications - Prepaid Will Set the Pace in Wireless*, UBS, UBS Investment Research, Mar. 23, 2009, at 6.

[514] The Nielsen Company: Mobile Insights 2009.