

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

In the Matter of)	
)	
Implementation of Section 6002(b) of the)	
Omnibus Budget Reconciliation Act of 1993)	WT Docket No. 09-66
)	(Terminated)
Annual Report and Analysis of Competitive)	
Market Conditions With Respect to Mobile)	
Wireless, Including Commercial Mobile Services)	

FOURTEENTH REPORT

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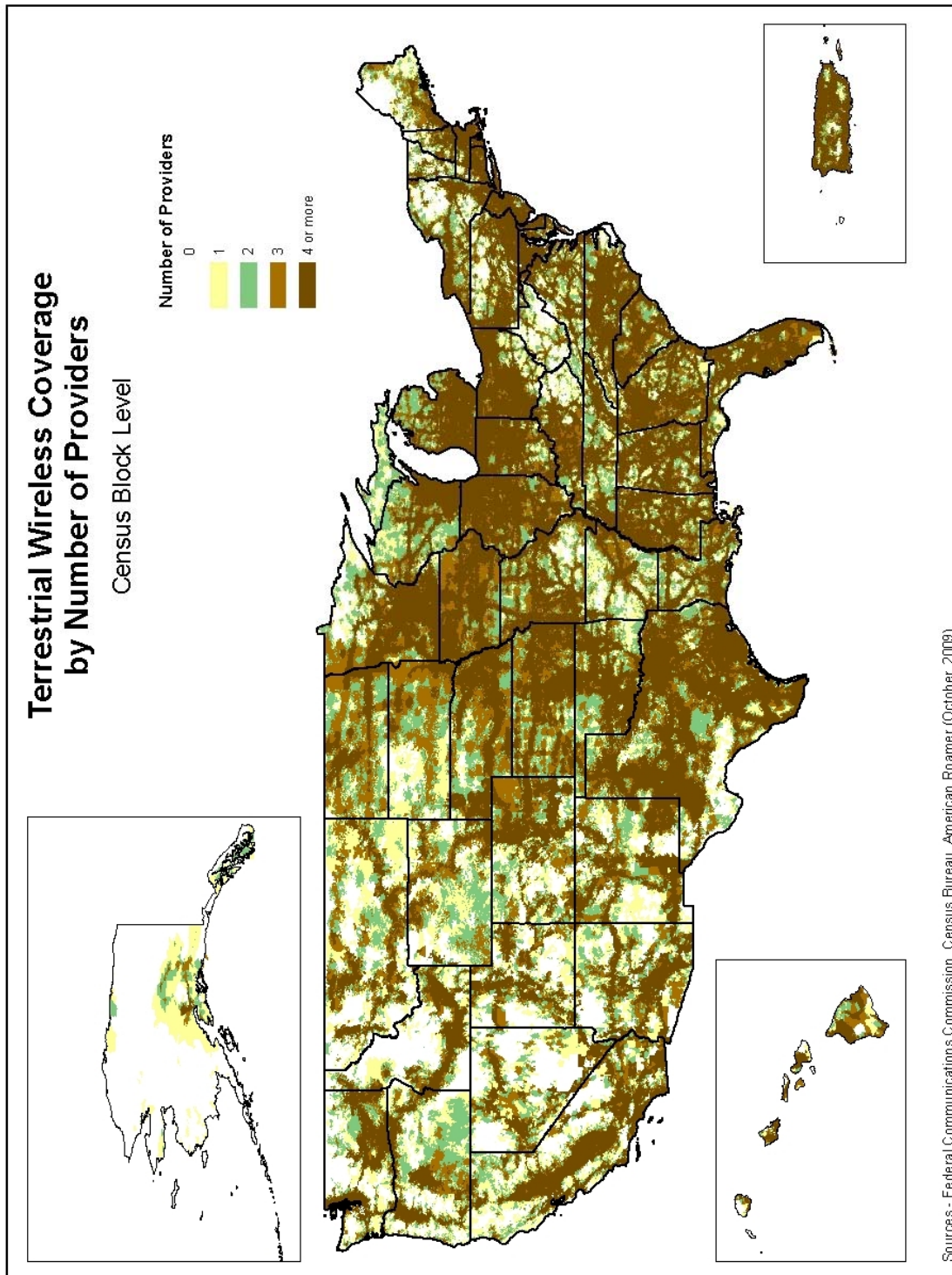
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Map 1: Mobile Wireless Competitors



I. EXECUTIVE SUMMARY

1. In this Mobile Wireless Competition Report, we present our findings regarding the state of competition in the mobile services marketplace, pursuant to Congress's instruction in section 332(c)(1)(C) of the Communications Act. Promoting competition is a fundamental goal of the Commission's policymaking. Competition has played and must continue to play an essential role in mobile – leading to lower prices and higher quality for American consumers, and producing new waves of innovation and investment in wireless networks, devices, and services.

2. In this Mobile Wireless Competition Report to Congress (*Fourteenth Report* or *Report*), we incorporate several important new forms of analysis that reflect fundamental shifts in the mobile marketplace. For example, whereas previous reports analyzed Commercial Mobile Radio Service (CMRS) competition and discussed a variety of metrics – including number of providers, subscribers, usage, and prices – this *Report* integrates an analysis of CMRS into an analysis of all mobile wireless services, such as voice, messaging, and broadband. This *Report* also goes beyond previous reports in reflecting the transformative importance of mobile wireless broadband, which has resulted in a shift from devices that can place traditional phone calls to pocketable devices that can access the entire Internet. Because each of the interrelated segments of the mobile wireless ecosystem has the potential to affect competition, this *Report* analyzes competition across the entire mobile wireless ecosystem, including, for the first time, in-depth analyses of “upstream” and “downstream” market segments, such as infrastructure and devices.

3. As described in this Mobile Wireless Competition Report, the mobile wireless ecosystem is sufficiently complex that any review or analysis of competitive market conditions must take into consideration a multitude of factors. As a result, rather than reaching an overarching, industry-wide determination with respect to whether there is “effective competition,” the *Report* complies with the statutory requirement by providing a detailed analysis of the state of competition that seeks to identify areas where market conditions appear to be producing substantial consumer benefits and provides data that can form the basis for inquiries into whether policy levers could produce superior outcomes.¹ As the mobile wireless marketplace evolves, driven in particular by mobile wireless broadband and data usage, the Commission's analyses and policies with respect to key inputs – such as spectrum – also must evolve in order to ensure a robust level of competition going forward.

4. The *Report* – which reflects market conditions prevailing in 2008 and 2009² – finds evidence of several key trends in the mobile wireless industry:

- *Maturation of the Mobile Voice Segment.* As of the end of 2008, 90 percent of Americans had a mobile wireless device, and Americans used these devices to talk for an average of 709 minutes each month. While usage statistics have generally increased over time, this year marks the first instance of reduced (though still substantial) voice usage, perhaps due to increased reliance on text and multimedia messaging. Voice revenues stayed relatively steady compared to past periods, with average revenue per user (ARPU) slightly decreasing but revenue per minute (RPM) slightly increasing.
- *Transition to a Data-Centric Market.* Data traffic has grown significantly, due to the increased adoption of smartphones and data consumption per device. Indeed, with overall revenue per

¹ For a more detailed discussion of our analysis of effective competition, as required by Section 332(c) of the Communications Act, see paragraphs 11-16 *infra*.

² Where possible, the *Report* uses the most current data available, including network coverage data from American Roamer from the fourth quarter of 2009. In other instances, particularly where year-end metrics are discussed or annual comparisons are made, the *Report* uses year-end 2008 data. See Section II, Introduction, *infra*, for an additional discussion of data timeframes.

mobile customer generally remaining flat the past several years, revenue from newer data services is replacing revenue from traditional services.

- *Proliferation of Devices and Applications.* Handset manufacturers have introduced a growing number of smartphones that provide mobile Internet access and other data services, and use operating systems that provide many of the functionalities of personal computers. The four nationwide providers launched about 67 new smartphones in 2008 and 2009, based upon several different platforms (*e.g.*, Apple iPhone, Android, BlackBerry, Palm, and Windows Mobile). The Android and iPhone platforms have been particularly successful in creating an entire ecosystem of applications and services. As of December 2009, there were over 100,000 applications on the Apple App Store, and 15,000 on the Android Market.
- *Continued Industry Concentration.* Over the past five years, concentration has increased in the provision of mobile wireless services. The two largest providers, AT&T, Inc. (AT&T) and Verizon Wireless, have 60 percent of both subscribers and revenue, and continue to gain share (accounting for 12.3 million net additions in 2008 and 14.1 million during 2009). The two next-largest providers, T-Mobile USA (T-Mobile) and Sprint Nextel Corp. (Sprint Nextel), had a combined 1.7 million net loss in subscribers during 2008 and gained 827,000 subscribers during 2009. One widely-used measure of industry concentration indicates that concentration has increased 32 percent since 2003 and 6.5 percent in the most recent year for which data is available.
- *Robust Capital Investment but Declining Relative to Industry Size.* Providers continue to invest significant capital in networks, despite the recent economic downturn. One source reports capital investment at around \$25 billion in both 2005 and 2008, while another shows that capital investment declined from around \$25 billion to around \$20 billion during the same period and that investment during the first half of 2009 was \$8.9 billion. Because industry revenue has continued to grow, both sources show that capital investment has declined as a percentage of industry revenue over the same period (from 20 percent to 14 percent).³
- *Role of Spectrum for Mobile Broadband.* Especially as mobile wireless data usage grows, spectrum becomes an increasingly pivotal input. In particular, lower-frequency spectrum possesses superior propagation characteristics that create certain advantages in the provision of mobile wireless broadband service, especially in rural areas. Lower-frequency spectrum potentially allows for a higher quality of coverage with fewer cell sites, when compared to other frequency bands used to provide mobile services. Conversely, higher-frequency spectrum may be effective for increasing capacity, particularly within smaller, more densely-populated geographic areas. Recent auctions reflect that lower frequency bands are more highly valued than higher frequencies. A significant portion of spectrum below 1 GHz is held by the two largest providers: 67 percent of the 700 MHz band, and 91 percent of the Cellular band, based on megahertz-POPs (MHz-POPs).⁴

Selected developments and key metrics with respect to the current state of mobile wireless competition are highlighted below:

Number of Providers & Network Deployment

For the third consecutive Report, the Commission has conducted an analysis of service provider coverage

³ All dollar figures included in this *Report* have not been adjusted for inflation (*i.e.*, they are nominal dollars) unless stated otherwise.

⁴ “MHz-POPs” refers to the amount of spectrum in a given license or set of frequencies multiplied by the population covered by the geographic area of the spectrum license. For example, the MHz-POPs of a 20 megahertz license covering a geographic area with a population of 1,000 would be 20,000.

by census block, based on data from American Roamer⁵ and population data from the 2000 Census.⁶

Mobile Voice Providers. The coverage analysis suggests that approximately 284 million people, or 99.6 percent of the U.S. population, are served by one or more mobile voice providers. Approximately 281 million people, or 98.6 percent of the population, are served by at least two mobile voice providers. Approximately 273 million people, or 95.8 percent of the population, are served by at least three mobile voice providers.

Mobile Broadband Providers. Approximately 280 million people, or 98.1 percent of the U.S. population, are served by one or more mobile broadband providers,⁷ according to the coverage analysis. Approximately 255 million people, or 89.5 percent of the U.S. population, are served by two or more mobile broadband providers. Approximately 217 million people, or 76.1 percent of the population, are served by at least three mobile broadband providers. During 2008 and 2009, the four nationwide mobile wireless service providers (AT&T, Verizon Wireless, Sprint Nextel and T-Mobile), as well as other mobile operators, continued to expand service into new markets and to upgrade their networks with mobile broadband technologies. They also announced plans to deploy 4G network technologies.

⁵ We note that the American Roamer analysis likely overstates the coverage actually experienced by consumers, because American Roamer reports advertised coverage as reported to it by many mobile wireless service providers, each of which uses a different definition of coverage. The data do not expressly account for factors such as signal strength, bit rate, or in-building coverage, and they may convey a false sense of consistency across geographic areas and service providers. Nonetheless, the analysis is useful because it provides a quantitative baseline that can be compared across network types, technologies, and carriers, over time. *Connecting America: The National Broadband Plan*, FCC, at 39 (Chapter 4) (rel. Mar. 16, 2010), available at www.broadband.gov (*National Broadband Plan*). We also recognize that an analysis of coverage at the nationwide level provides only a general benchmark. A nationwide average will mask regional disparities in coverage and create an overall picture that does not capture variances across the country. See Section III.C.1, Number of Competitors, *infra*.

⁶ Unless otherwise noted, population data in the *Report* is taken from U.S. Census Bureau (Census Bureau). For purposes of calculating numbers on broader geographic bases, such as the nationwide penetration rate, we use Census Bureau population estimates as of July 1, 2008. See *infra* note 473. For purposes of calculating the extent of service provision based on census blocks, we use 2000 Census population figures because that is the Census Bureau's most recent data about population at the census block level.

⁷ For purposes of this *Report*, "mobile broadband" refers to mobile Internet access and other data services provided using Third Generation (3G) and Fourth Generation (4G) mobile network technologies, CDMA EV-DO, WCDMA/HSPA, and WiMAX. Therefore, this coverage analysis estimates the U.S. population, based on census blocks, covered by these technologies. See Section IV.B.1, Network Coverage and Technology Upgrades and Appendix B, Mobile Wireless Network Technologies, *infra*, for an additional discussion.

3G/4G Deployment by Selected Mobile Wireless Service Providers

Service Provider	3G Deployment	4G Deployment
AT&T	As of October 2009, HSPA network covered 230 million POPs in more than 350 metropolitan areas.	Plans LTE trials in 2010 and deployment in 2011.
Verizon Wireless	As of mid-2009, EV-DO network covered 284 million POPs.	Expects to launch LTE in 25-30 markets in 2010 and to cover 285 million POPs by 2013.
Clearwire	Not applicable.	As of September 2009, WiMAX network covered over 10 million POPs, expected to cover 120 million POPs by end of 2010.
Sprint Nextel	As of August 2009, EV-DO network covered 271 million POPs.	Ownership interest in Clearwire and reselling Clearwire WiMAX service.
T-Mobile	As of August 2009, HSPA network covered 121 million POPs, expected to cover 200 million POPs by year-end 2009.	No U.S.-specific plans.

The following table, again using data from the census block coverage analysis based on American Roamer data, depicts the growth in population coverage for mobile wireless broadband service over the past year:

**Mobile Wireless Broadband Network Population Coverage,
Selected Facilities-Based Providers**

Service Provider	Covered POPs November 2008 (millions)	Covered POPs November 2009 (millions)
AT&T	189.0	212.3
Verizon Wireless	241.7	266.7
Sprint Nextel	218.9	226.9
T-Mobile	88.4	133.9
Alltel	57.7	--
Leap	19.7	79.2
US Cellular	13.1	26.6

Subscribers and Net Adds

With wireless market penetration approaching 90 percent as of the end of 2008, overall wireless industry growth has slowed down. At the end of 2008, based upon Numbering Resource Utilization Forecast (NRUF) data, there were over 277 million mobile wireless subscribers in the United States, up from 263 million at the end of 2007. As of the end of 2008, there were 25.1 million mobile wireless high-speed Internet access subscribers and 86 million mobile high-speed-capable devices in use in the United States.

Mobile Wireless Subscribership								
Year	Subscribers		Subscribers - Increase from Previous Year		Penetration Rate		Penetration Rate – Percent Increase from Previous Year	
	(millions)		(millions)		(percent)		(percent)	
	NRUF*	CTIA	NRUF	CTIA	NRUF	CTIA	NRUF	CTIA
1999	n/a	86	n/a	16.8	n/a	32%	n/a	23%
2000	n/a	109.5	n/a	23.4	n/a	39%	n/a	21%
2001	128.5	128.4	n/a	18.9	45%	45%	n/a	16%
2002	141.8	140.9	13.3	12.4	49%	49%	9%	9%
2003	160.6	158.7	18.8	18	54%	55%	10%	12%
2004	184.7	182.1	24.1	23.4	62%	62%	15%	14%
2005	213	207.9	28.3	25.8	71%	70%	15%	13%
2006	241.8	233	28.8	25.1	80%	78%	13%	11%
2007	263	255.4	21.2	22.4	86%	85%	7%	9%
2008	277.6	270.3	14.6	14.9	90%	89%	5%	5%

*NRUF data is not available for the calendar years prior to 2001.

Industry net new subscriber additions (or “net adds”) totaled between 14.5 and 15 million during 2008, a 33 percent drop from the 2007 net additions.

Net adds have not been distributed evenly among major service providers. The two largest providers garnered 12.3 million net new subscribers during 2008 and 14.1 million during 2009, while the two next-largest providers combined lost 1.7 million subscribers during 2008 and gained 827,000 subscribers during 2009.

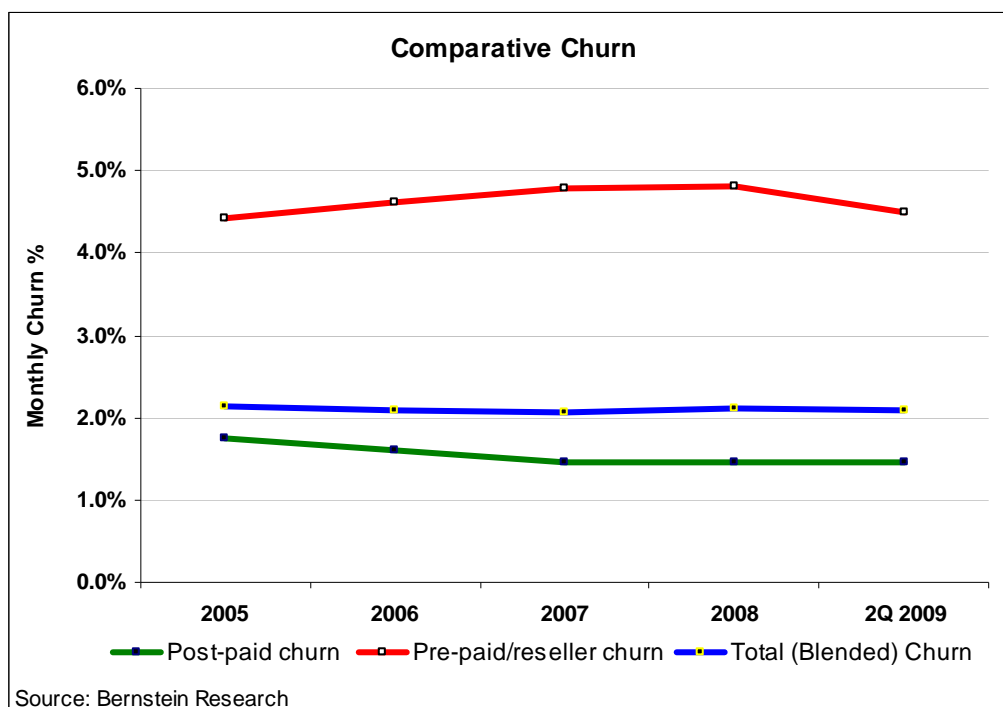
Net Additions by Service Provider

Service Provider	Subscribers Year-End 2008 (Thousands)	2008 Net Additions (Loss)	2008 Percent Increase (Loss)	Subscribers Year-End 2009 (Thousands)	2009 Net Additions (Loss)	2009 Percent Increase (Loss)
AT&T	77,009	6,785	9.7%	85,120	8,111	10.5%
Verizon Wireless**	72,056	5,558	8.4%	91,249	19,193	26.6%
Sprint Nextel	48,338	(4,667)	(8.8%)	48,133	(205)	(0.4%)
T-Mobile	32,758	2,973	10.0%	33,790	1,032	3.2%
Alltel	13,219	(181)	(1.4%)	--	--	--
US Cellular	6,196	74	1.2%	6,141	(55)	(0.9%)
MetroPCS	5,367	1,404	35.4%	6,640	1,273	23.7%
Leap	3,845	981	34.3%	4,954	1,109	28.8%

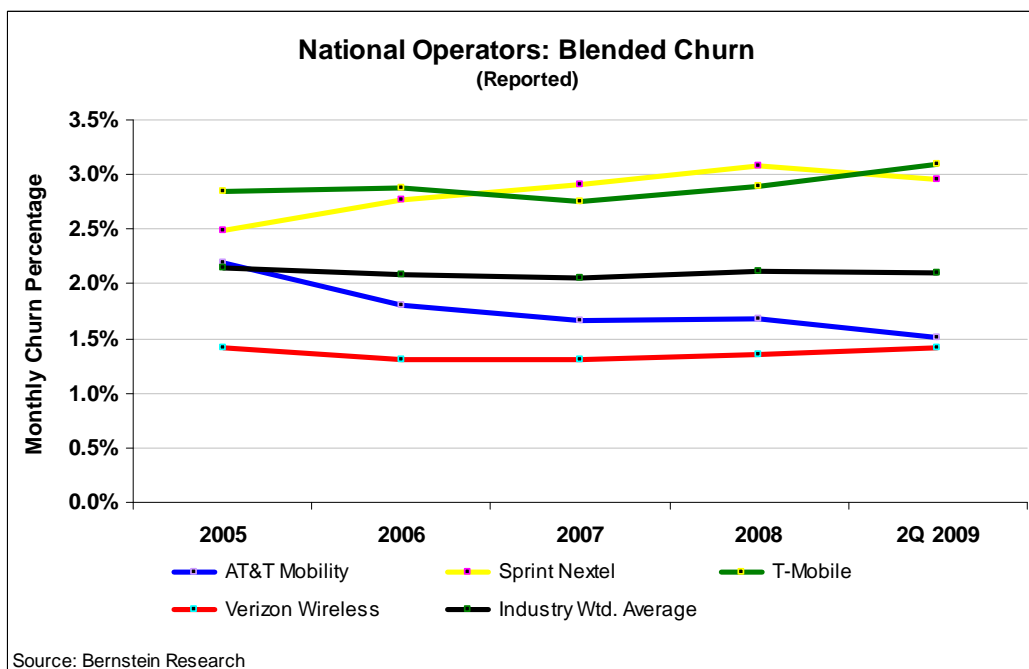
**Verizon Wireless’s 2009 subscriber figures include subscribers added as a result of the Alltel merger. If subscribers from the Alltel acquisition were excluded, Verizon Wireless’s “organic” net adds for 2009 would total approximately 5.97 million, an increase of 8.3 percent.

Churn

During the past year, churn has increased slightly from 1.9 percent to around 2.1 percent per month, with pre-paid churn rates significantly higher than post-paid churn rates. Churn rates of the two largest national service providers are half the rates for the next two largest providers.



Annual Churn is an average for each of the four quarters



Annual Churn is an average for each of the four quarters. Verizon Wireless is combined with Alltel churn.

Usage

In 2008, wireless voice usage per subscriber declined for the first time in 11 years. At the same time, use of text messaging and other wireless data services increased over the previous year. The decline in voice minutes-of-use, coupled with the increase in data use, suggests that although only about 40 percent of consumers currently use data services, these consumers may be substituting data services, such as text messaging, for traditional voice services. The following data describe top-line usage trends for specific

service segments:

Voice: Average minutes-of-use per subscriber per month (MOUs) declined to about 708 minutes for the six months ending in December 2008,⁸ down from 769 minutes in the same period of 2007, and the first decrease in MOUs since 1997.

Text Messaging: The average mobile wireless subscriber sent 388 text messages per month during the second half of 2008, a 169 percent increase from the 144 text messages sent per month during the same period of 2007.

Multimedia Messaging: The average mobile wireless subscriber sent 5.8 multimedia messages (MMS) per month during the second half of 2008, a 152 percent increase from the 2.3 multimedia messages sent per month during the same period of 2007.

Mobile Broadband Services: The wireless industry does not currently report aggregate or per-subscriber mobile broadband/Internet traffic metrics (*i.e.*, megabytes (MB) consumed). Nonetheless, one analyst estimates per-subscriber mobile data traffic by type of device and found that traditional handset users generate, on average, 25 MB of traffic each month, BlackBerry users generate 54 MB, iPhone users generate 275 MB, other smartphone users generate 150 MB, and laptop “aircard” users generate 1.4 gigabytes (GB).

CPI and Unit Prices

Two measures of pricing for wireless services are the Consumer Price Index (CPI) and unit price (revenue per user per month divided by average unit consumption per month). The annual Cellular CPI decreased by approximately 0.2 percent from 2007 to 2008, while the overall CPI increased by 3.8 percent during this period. After many years of declines, voice revenue per minute was \$0.054 in December 2008, an increase of two percent from 2007. This slight increase reflects that a reported decrease in voice ARPU was more than offset by a decrease in minutes of use per subscriber per month (see below).

The price of messaging services, on an average price per unit basis, continued to decline in 2008. Average revenue per text message in 2008 decreased by \$0.014 from the prior year, from \$0.025 in 2007 to \$0.011 per message in 2008. Average revenue per text message was \$0.036 in 2006.

Revenue and ARPU

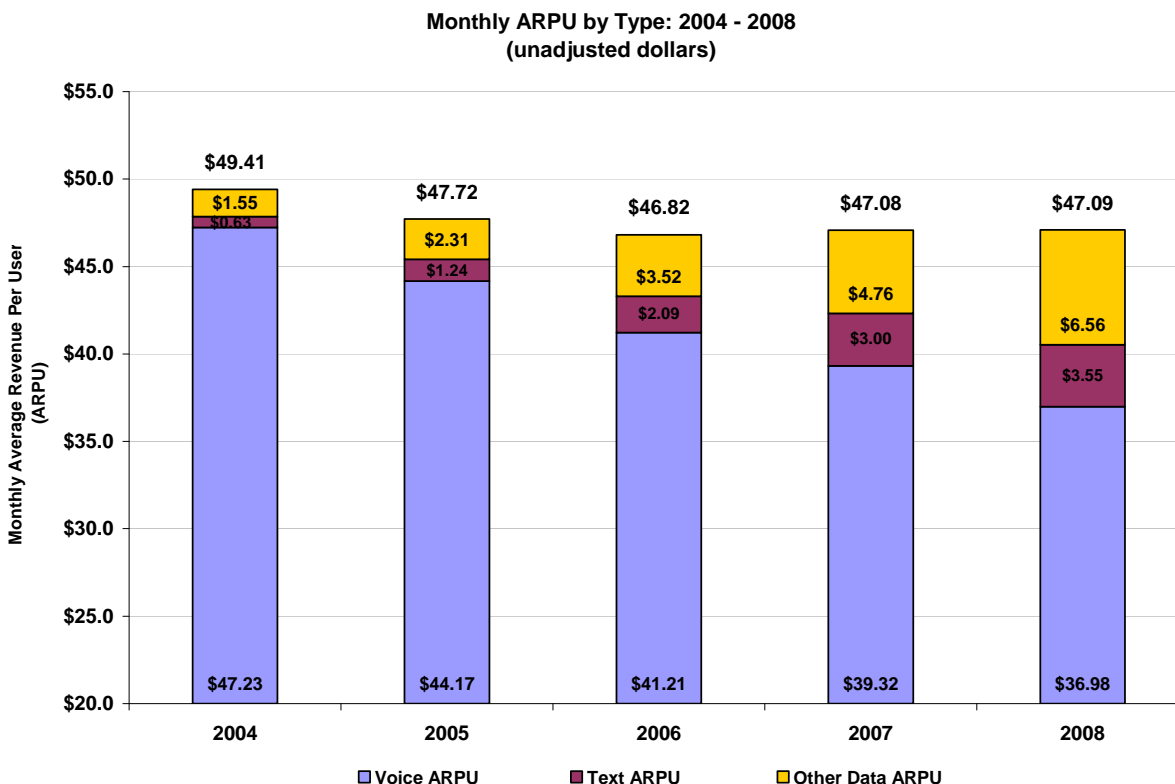
Revenues for the mobile wireless industry have increased each year between 2004 and 2008, although the annual growth rate for industry revenues has been declining since 2007. Total mobile wireless industry revenue grew to \$150.6 billion in 2008, up from \$140.9 billion in 2007 for a 6.9 percent increase (a more modest annual growth rate than the prior year, when industry revenue was \$127.1 billion in 2006). For the first half of 2009, industry revenue totaled \$75.8 billion, a 4.3 percent increase over the first half of 2008.

Voice revenues grew to \$118.3 billion in 2008 from approximately \$117.7 billion in 2007, text messaging revenues grew to \$11.4 billion in 2008 from approximately \$9 billion in 2007, and other data revenues – including MMS and Internet access – grew to \$21.0 billion in 2008 from \$14.3 billion in 2007.

Monthly ARPU remained nearly unchanged between 2007 and 2008, increasing \$0.01 from \$47.08 to \$47.09. The average wireless consumer pays approximately \$565 per year for service and the average household (of 2.5 persons) pays \$1,271 per year for service. An average American household spends about the same proportion of its income on wireless services as it spends on electricity (2.5 percent on wireless services and 2.7 percent on electricity). Total ARPU has generally been flat over the past several years. Voice ARPU, which excludes the portion of ARPU generated by data, continued to decline between 2007 and 2008, decreasing from \$39.32 to \$36.98 per month. Declining monthly voice ARPU was offset by continued growth in monthly ARPU for text and other data services, such as mobile

⁸ Data is averaged over a six-month period.

broadband. Text ARPU increased from \$3.00 in 2007 to \$3.55 in 2008 per month. Monthly ARPU for other data services, such as mobile Internet access and mobile messaging service, also continued to increase, rising from \$4.76 in 2007 to \$6.56 in 2008. In 2008, monthly ARPU for text and other data services accounted for approximately 21 percent of total monthly ARPU, up from approximately 16 percent in 2007, and compared to about 4 percent in 2004.



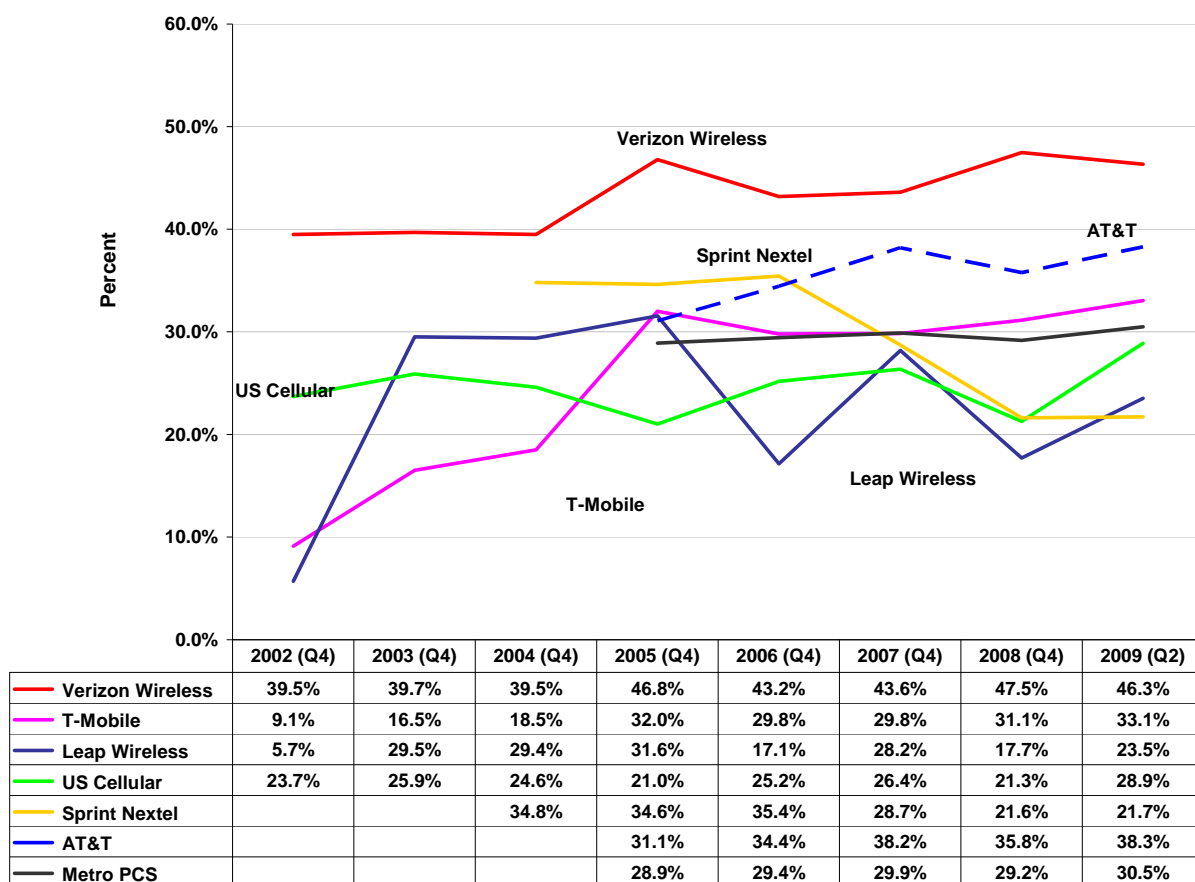
Voice ARPU Calculation incl. Toll revenues

Source: CTIA & Analyst Data, FCC Analysis

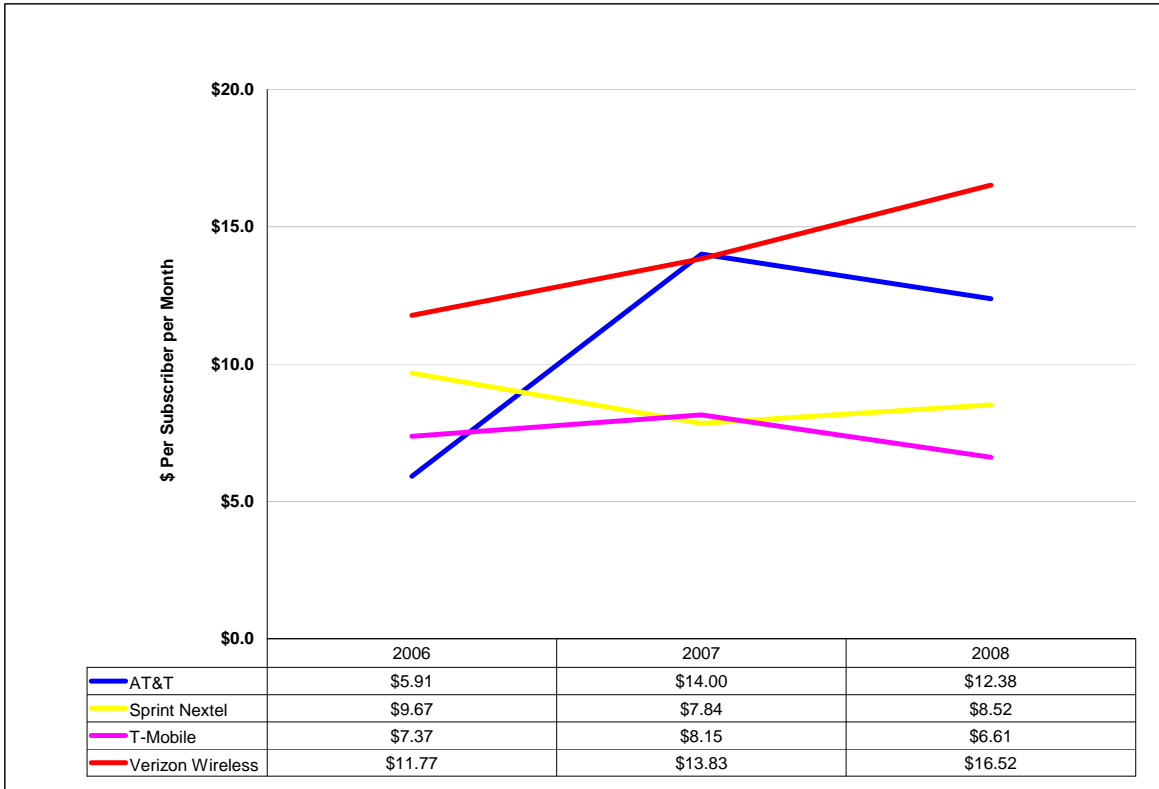
Profitability

Measures of profitability are useful indicators of absolute and relative provider performance, entry and exit conditions, growth conditions, and the intensity of rivalry. Because measuring the profitability of firms in a capital-intensive industry such as the mobile wireless industry is not as straightforward as in other industries, industry analysts often employ more than one measure. Analysts sometimes use Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA) as an indicator of profitability, but this metric does not include the substantial cost of capital investment in tangible assets such as networks or in intangible assets such as spectrum licenses. For the first time, the *Report* includes indicators of service provider profitability – measured by EBITDA margin (EBITDA divided by service revenue), by EBITDA per subscriber, and by EBITDA minus capital expenditures (EBITDA minus CAPEX) per subscriber. While the seven largest mobile wireless service providers all had EBITDA margins over 20 percent during the second quarter of 2009, only four – AT&T, MetroPCS, T-Mobile, and Verizon Wireless – had EBITDA margins greater than 30 percent, and the two largest providers had the highest EBITDA margins. In addition, these two providers had the highest EBITDA minus CAPEX per subscriber of the top four providers in 2007 and 2008.

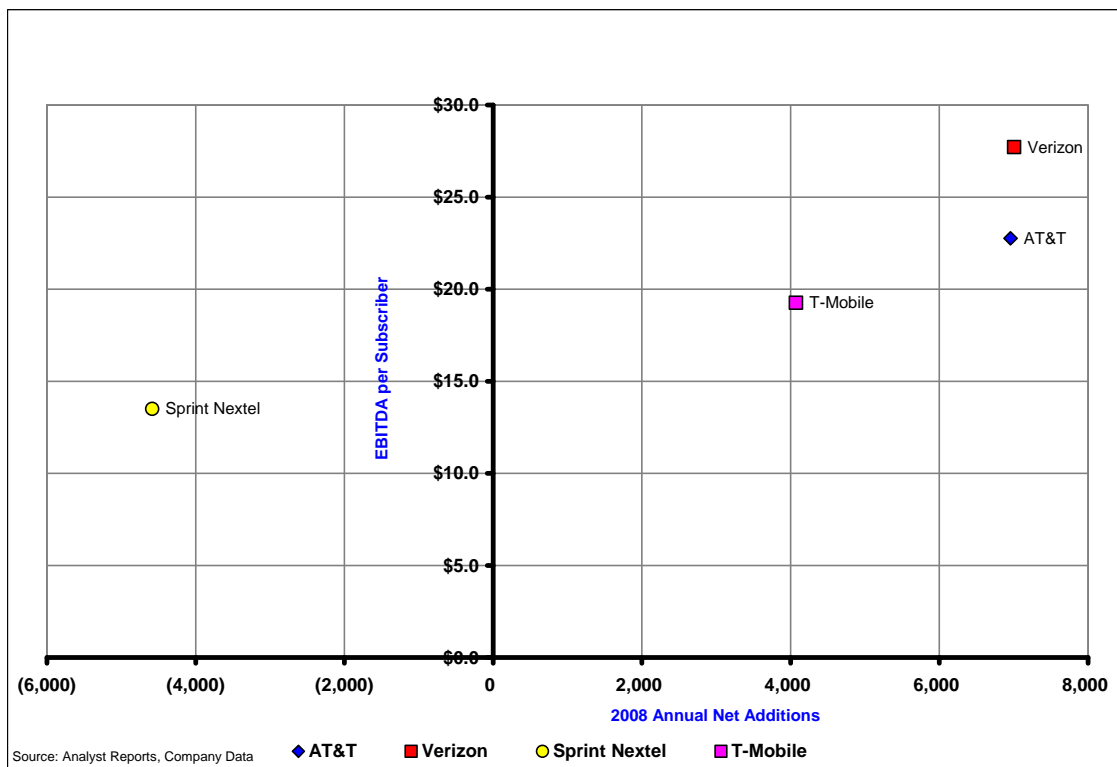
Reported EBITDA Margins: 2002 – 2009 (Selected Providers)



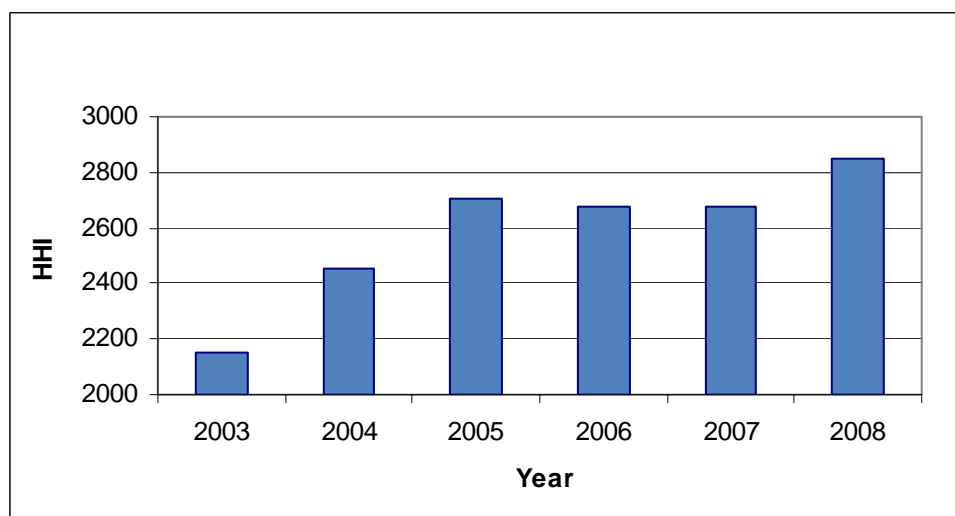
EBITDA minus CAPEX per Subscriber per Month (Selected Providers)



Subscriber Net Additions vs. EBITDA Per Subscriber: 2008

**Market Concentration**

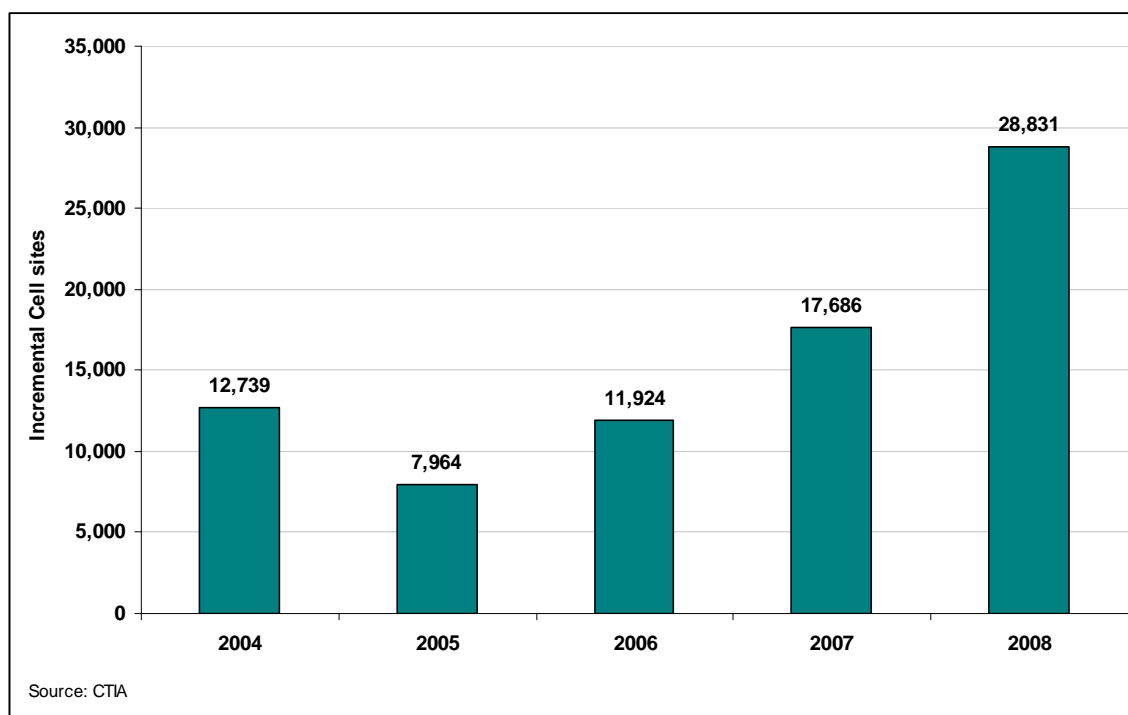
The Herfindahl-Hirschman Index (HHI) is used to measure concentration of mobile wireless service providers. Average HHI (weighted by Economic Area (EA) population) increased in 2008 relative to prior years. Both the lowest EA HHI value and the highest EA HHI value are both higher than preceding years' lowest and highest EA HHI values. The weighted average of the HHIs (weighted by EA population) was 2848 in 2008, an increase from 2674 in 2007. The weighted average HHI has increased by nearly 700 since we first calculated this metric in 2003.

Average Herfindahl-Hirschman Index

Investment

Data from the Census Bureau suggests that, after decreasing by more than 20 percent between 2006 and 2007, capital expenditures by wireless providers rebounded in 2008, increasing by approximately 15 percent over the previous year to more than \$25.5 billion. CTIA–The Wireless Association (CTIA), however, reports that incremental capital investment by wireless operators totaled \$20.2 billion in 2008, a 4.4 percent decrease from the \$21.14 spent in 2007 and a 20 percent decrease from the \$25.2 billion spent in 2005. CTIA also reports that capital investment for the first half of 2009 totaled \$8.9 billion, a seven percent drop from the first half of 2008.

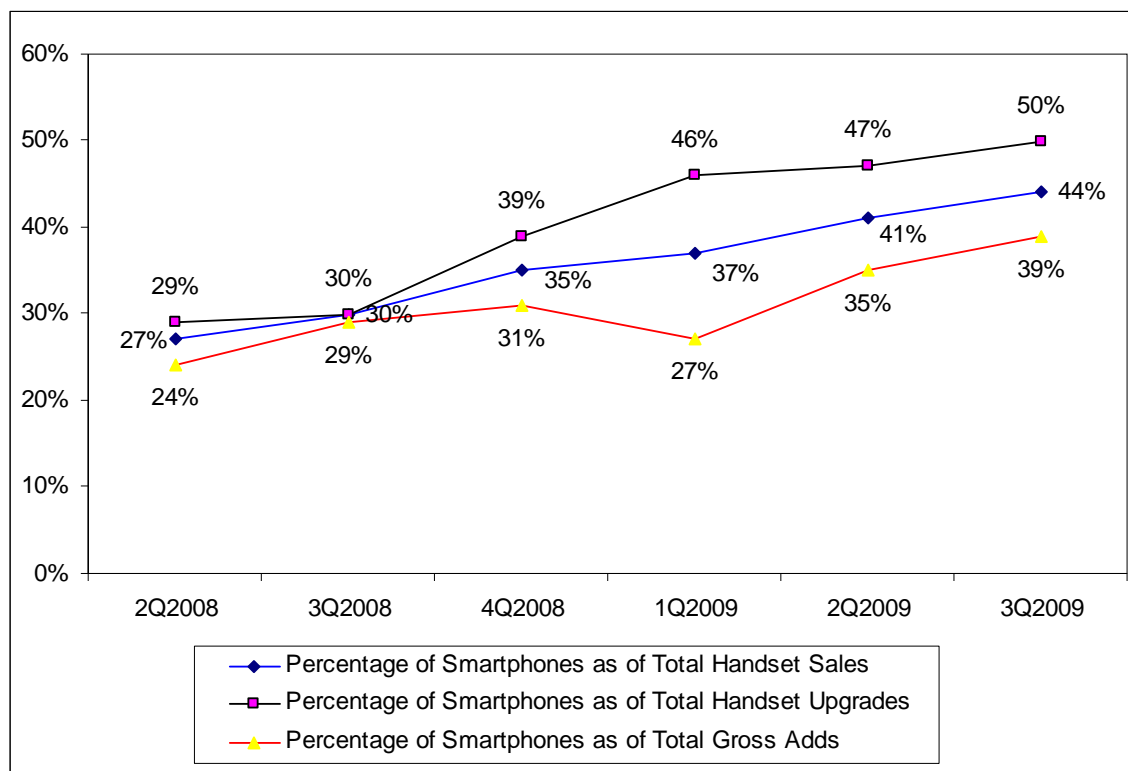
Data from both CTIA and the Census Bureau show that annual capital investment as a percentage of total industry revenue has been declining. According to CTIA data, capital expenditures, as a percentage of total revenue, declined from 22 percent in 2005 to 14 percent in 2008. According to CTIA, 2008 saw an increase in the pace of new cell site deployment, with nearly 29,000 cell sites deployed (compared to about 18,000 the prior year).



Mobile Wireless Handsets/Devices

Wireless handsets have evolved from the more traditional handsets that offer basic features such as voice and text messaging, to smartphones that offer Internet connectivity. Over the past two years, the industry has experienced an increase in smartphone adoption, led by the Apple iPhone. Smartphones accounted for 44 percent of total handsets sold in the third quarter of 2009, up from 27 percent in the second quarter of 2008.

Smartphone Adoption Rates in the United States



The iPhone's share of the smartphone business segment has grown as well, from 5 percent in the first quarter of 2008 to 17 percent in the third quarter of 2009. Google's Android operating system was also a notable development in 2008-2009. The emergence of new smartphone operating systems – Apple, Android, Research in Motion Ltd. (RIM) BlackBerry, Palm, and Windows Mobile – represents a shift in the mobile wireless ecosystem. In addition to launching new smartphones, several service providers began offering a range of data-only devices, including netbook computers with embedded modems, wireless data cards, and mobile Wi-Fi hotspots.

Spectrum

Spectrum is a necessary component of providing mobile wireless service. Sufficient access to spectrum with propagation characteristics suited to the efficient provision of mobile broadband service may be a contributing factor in the ability of a wireless service provider to compete effectively. Access to lower-frequency spectrum may account for some of the disparities in operating economics among providers.

Backhaul

Consumers are increasingly adopting Internet-connected mobile computing devices, such as smartphones, for purposes such as video and Internet browsing. Such data services consume greater amounts of bandwidth than traditional voice services, resulting in a greater need for backhaul capacity. Further, the rollout of 4G networks using Long Term Evolution (LTE) and WiMAX technologies, which support higher data throughput rates and lower latencies, will make access to sufficient backhaul for wireless service even more critical over time. While copper circuits currently serve as the predominant choice for backhaul, fixed wireless (including microwave) and fiber solutions are gaining popularity. Allowing the more efficient installation of fiber facilities, as well as providing for the more flexible use of microwave frequencies for backhaul, may help promote access to backhaul solutions that are critical to the deployment of wireless broadband and other services.

Roaming

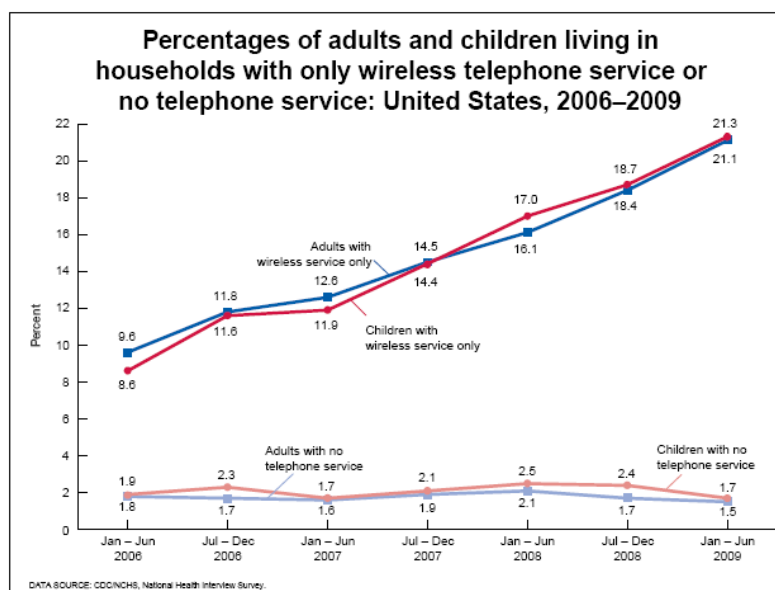
While reported annual roaming traffic has grown, roaming minutes as a percentage of total minutes has dropped significantly. Roaming minutes increased from 13 billion minutes in 1999 to 121.4 billion minutes in 2008. Yet this growth has been much slower than overall traffic growth, which increased from 147.7 billion minutes to 2.2 trillion minutes. Therefore, roaming as a percentage of overall traffic has decreased from 8.8 percent in 1999 to 5.5 percent in 2008, a relative decline of nearly 40 percent.

Service Quality

The J.D. Power and Associates (J.D. Power) 2009 Wireless Call Quality Performance Study (Volume 1) indicates that network quality for the industry overall has held steady since the 2008 study, with the number of problems reported by consumers remaining virtually unchanged at 15 problems per 100 calls.

Intermodal Competition

In the first half of 2009, 22.7 percent of households (or more than one out of every five), were wireless-only, up from 17.5 percent in the first half of 2008, 13.6 percent in the first half of 2007, and 10.5 percent in the first half of 2006. The percentages of adults and children living in such households are depicted in the chart below:



Urban-Rural Comparisons

Roughly 61 million people, or 21 percent of the U.S. population (including Puerto Rico), live in rural counties (defined as counties with a population density of 100 persons or fewer per square mile). These counties comprise 3.1 million square miles, or 86 percent of the geographic area of the United States. Analysis based on American Roamer data shows that 98.5 percent of the U.S. rural population, based on census blocks, receives coverage by at least one mobile wireless voice provider.⁹ In addition, 94.5 percent of the rural population lives in census blocks with two or more mobile voice operators competing to offer service, 83.1 percent live in census blocks with at least three competing mobile voice operators, and 65.5 percent live in census blocks with at least four competing mobile voice operators. The figures on the percentage of the U.S. rural population covered by a certain number of providers are similar to those in the *Thirteenth Report*. In that *Report*, the Commission estimated, based on July 2007 American Roamer data, that 94.2 percent of the rural population had a choice of at least two providers, 82.1 percent

⁹ See *infra* note 5 for a discussion of American Roamer data.

of the rural population had a choice of at least three providers, and 65.2 percent had a choice of at least four providers.

Estimated Mobile Voice Providers in Rural Areas by Census Block

Total Number of Providers in a Block	Number of Rural Blocks	POPs Contained in Rural Blocks	% of Total U.S. POPs	Square Miles Contained in Those Blocks	% of Total U.S. Square Miles
Total for Rural U.S.	4,169,790	60,836,650	21.3%	3,367,687	88.6%
			% of Total Rural U.S. POPs		% of Total Rural US Square Miles
1 or More	3,937,968	59,907,519	98.5%	2,310,870	68.6%
2 or More	3,575,744	57,469,158	94.5%	1,759,319	52.2%
3 or More	2,831,795	50,527,557	83.1%	1,131,548	33.6%
4 or More	1,978,475	39,828,360	65.5%	641,065	19.0%
5 or More	979,198	23,413,805	38.5%	257,068	7.6%
6 or More	220,472	5,327,376	8.8%	50,192	1.5%
7 or More	17,056	369,429	0.6%	3,918	0.1%

Source: Commission estimates based on data supplied by American Roamer, Oct. 2009.

Notes: POPs are from the 2000 Census, and the square miles include the United States and Puerto Rico.

Looking at mobile broadband service, the U.S. population in rural areas is not served by as many mobile broadband providers as other areas of the country. While 76 percent of the total U.S. population lives in census blocks with three or more mobile broadband providers, only 30 percent of the rural population is served by at least three broadband providers. In addition, 58 percent of the total U.S. population lives in census blocks with four or more mobile broadband providers; in rural areas, only ten percent of the population is served by four or more providers.¹⁰

Estimated Mobile Broadband Providers in Rural Areas by Census Block

Total Number of Providers in a block	Number of Blocks	POPs Contained in Those Blocks	% of Rural U.S. POPs	Square Miles Contained in Those Blocks	% of Rural U.S. Square Miles
1 or More	3,422,482	55,990,890	92.0%	1,688,928	50.2%
2 or More	1,889,535	37,592,392	61.8%	706,670	21.0%
3 or More	635,043	18,032,174	29.6%	142,609	4.2%
4 or More	160,703	6,350,563	10.4%	24,500	0.7%

Source: Commission estimates based on data supplied by American Roamer, Nov. 2009 (EV-DO/HSDPA/WiMAX Coverage).

Notes: POPs are from the 2000 Census, and the square miles include the United States and Puerto Rico.

International Comparisons

A comparison of the United States market with other developed markets reveals that consumers in the United States pay relatively more on a monthly basis than most other countries but also consume more airtime and enjoy lower unit rates. Despite the decrease in MOUs from 2007 to 2008, U.S. mobile subscribers continue to lead the world in voice usage by a substantial margin, with Western European

¹⁰ See Section III.C.1, Number of Competitors, *infra*.

subscribers averaging 158 MOUs and Japanese subscribers averaging 139 MOUs, compared to more than 700 minutes in the United States. Japan has the highest average monthly bill (ARPU) for mobile services (\$56.82), followed by the United States (\$51.54). The U.S. average monthly bill is significantly higher than the Western European average (\$33.45). At \$0.05 per minute, mobile calls remained less expensive on a per minute basis in the United States than in Western Europe, where voice RPM averaged \$0.16 at the end of 2008, and Japan, where voice RPM averaged \$0.26 at the end of 2008. At nearly 90 percent, U.S. mobile penetration is lower than average mobile penetration in Western Europe (128 percent) but higher than mobile penetration in Japan (86 percent).

Country	Penetration (% of Pops)	Prepaid (% of Subs)	MOUs	Revenue per Minute (\$)	ARPU (\$)	Data (% of ARPU)
Receiving Party Pays						
USA	88.9	17.1	829	0.05	51.54	25.5
Canada	64.8	21.2	444	0.09	49.24	17.8
Hong Kong	147.6	44.9	447	0.04	20.40	26.7
Singapore	135.8	48.6	377	0.06	32.08	27.3
Calling Party Pays						
UK	125.5	62.0	192	0.12	35.35	27.8
Germany	130.6	56.6	102	0.16	20.59	25.3
Italy	152.7	88.3	131	0.16	26.87	24.7
Sweden	123.6	35.0	206	0.10	28.05	20.9
France	91.9	34.2	246	0.14	44.37	18.3
Finland	127.5	12.7	244	0.12	33.91	18.9
Japan	85.7	1.4	139	0.26	56.82	41.0
South Korea	93.9	3.0	320	0.08	30.34	17.0
Australia	109.9	44.9	218	0.11	34.57	32.4

II. INTRODUCTION

5. In 1993, Congress created the statutory classification of Commercial Mobile Radio Services¹¹ (CMRS) to promote the consistent regulation of mobile radio services that are similar in nature.¹² At the same time, Congress established the promotion of competition as a fundamental goal for CMRS policy formation and regulation. To measure progress toward this goal, Congress required the Commission to submit annual reports that analyze competitive conditions in the industry.¹³

6. Congress called on the Commission to report on “competitive market conditions with respect to commercial mobile services.”¹⁴ In particular, the statute requiring the annual report on CMRS competition states:

The Commission shall review competitive market conditions with respect to commercial mobile services and shall include in its annual report an analysis of those conditions. Such analysis shall include an identification of the number of competitors in various commercial mobile services, an analysis of whether or not there is effective competition, an analysis of whether any of such competitors have a dominant share of the market for such services, and a statement of whether additional providers or classes of providers in those services would be likely to enhance competition.¹⁵

In the *Thirteenth Report*, the Commission found effective competition in the CMRS market based on a variety of metrics, including the number of providers, subscribers, usage, and prices.¹⁶ Since the period covered by the *Thirteenth Report*, CMRS competition has grown stronger by some of the measures previously considered, but weaker by others. To better comply with Congress’s mandate to assess market conditions, this *Report* looks beyond the metrics considered in the *Thirteenth Report* and undertakes a

¹¹ Commercial Mobile Services came to be known as the Commercial Mobile Radio Services, or “CMRS.” CMRS includes a large number of terrestrial services and some mobile satellite services. See 47 C.F.R. § 20.9(10).

¹² The Omnibus Budget Reconciliation Act of 1993, Pub. L. No. 103-66, Title VI, § 6002(b), amending the Communications Act of 1934 and codified at 47 U.S.C. § 332(c). As in the past, this *Report* bases its analysis on a consumer-oriented view of mobile services by focusing on specific product categories, regardless of their regulatory classification. In some cases, this includes an analysis of offerings outside the umbrella of “services” specifically designated as CMRS. However, because these other services can affect competition in the CMRS market and because providers of these other services can compete with CMRS providers, the Commission has indicated that it is important to consider them in the analysis. As the Commission said, paraphrasing the Department of Justice/Federal Trade Commission guidelines on merger review, “When one product is a reasonable substitute for the other in the eyes of consumers, it is to be included in the relevant product market even though the products themselves are not identical.” Application of Echostar Communications Corporation, General Motors Corporation, and Hughes Electronics Corporation (Transferors) and Echostar Communications Corporation (Transferee), *Hearing Designation Order*, 17 FCC Rcd 20559, 20606, ¶ 106 (2002).

¹³ 47 U.S.C. § 332(c)(1)(C).

¹⁴ 47 U.S.C. § 332(c)(1)(C). As noted in previous *Reports*, any individual proceeding in which the Commission defines relevant product and geographic markets, such as an application for approval of a license transfer, may present facts pointing to narrower or broader markets than any used, suggested, or implied in this *Report*. See, e.g., Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, *Twelfth Report*, 23 FCC Rcd 2241, 2252, n. 5 (2008) (*Twelfth Report*).

¹⁵ 47 U.S.C. § 332 (c)(1)(C).

¹⁶ Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, *Thirteenth Report*, 24 FCC Rcd 6185 (WTB 2009) (*Thirteenth Report*).

more expansive and detailed analysis of the mobile wireless industry than past reports.

7. In order to improve upon the competitive analysis of previous *Reports*, the Wireless Telecommunications Bureau, in May 2009, released a *Public Notice* soliciting data and information in order to evaluate the state of competition among providers of CMRS.¹⁷ The *Fourteenth Report Public Notice* sought comment generally on which indicators are useful for analyzing competitive market conditions with respect to CMRS.¹⁸ In August 2009, the Commission released a *Notice of Inquiry (NOI)* seeking to expand and enhance its understanding of mobile wireless competition in various ways.¹⁹ The *NOI* requested input on the analytic framework the Commission should use to examine and describe competition in the mobile wireless market.²⁰ The August 2009 *NOI* also sought information on the competitive effects of vertical relationships between wireless service providers and other markets that supply inputs that are required to produce the services, applications, and content used by consumers.²¹ In particular, it sought comment on the various input segments, the contractual relationships firms in these segments have with providers of mobile wireless services, and the effects of these relationships on mobile wireless competition.²²

8. The *Fourteenth Report* integrates data on market conditions with respect to CMRS into a general analysis of competition in the mobile wireless services marketplace. Many providers of CMRS also offer a variety of mobile data services, including mobile broadband Internet access service, which is not classified as “CMRS,”²³ and other mobile data services whose regulatory status the Commission has not addressed.²⁴ For the *Fourteenth Report*, our analysis of the mobile wireless services industry includes voice, messaging, and broadband services because they often jointly use the same spectrum, network facilities, and customer equipment; and many mobile providers have integrated the marketing of these services, often offering them in bundles. Also, consumers are increasingly substituting among voice, messaging, and data services, and, in particular, are willing to substitute from voice to messaging or data services for an increasing portion of their communication needs.

¹⁷ “Wireless Telecommunications Bureau Seeks Comment on Commercial Mobile Radio Services Market Competition,” WT Docket No. 09-66, *Public Notice*, 24 FCC Rcd 5618 (WTB 2009) (*Fourteenth Report Public Notice*).

¹⁸ *Fourteenth Report Public Notice*, 24 FCC Rcd at 5619-5620.

¹⁹ Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless, including Commercial Mobile Services, *Notice of Inquiry*, 24 FCC Rcd 11357, 11359, ¶ 5 (2009) (*Competition Report NOI*).

²⁰ *Id.*

²¹ *Id.* See Appendix E for a list of commenters.

²² *Competition Report NOI*, 24 FCC Rcd at 11364-11366, ¶¶ 23-27.

²³ In 2007, the Commission classified wireless broadband Internet access service as an information service under the Communications Act and found that wireless broadband Internet access service using mobile technologies was not a “commercial mobile service” as defined in the Act. Appropriate Regulatory Treatment for Broadband Access to the Internet over Wireless Networks, WT Docket No. 07-53, *Declaratory Ruling*, 22 FCC Rcd 5201 (2007).

²⁴ We note that the regulatory classification of a particular wireless service offered by a CMRS carrier is determined on a case-by-case basis. See Amendment of the Commission’s Rules to Permit Flexible Service Offerings in the Commercial Mobile Radio Service, WT Docket No. 96-6, *Second Report and Order and Order on Reconsideration*, 15 FCC Rcd 14680, 14683, ¶ 7, 14687, ¶ 15 (2000). Aside from broadband Internet access service, the regulatory classification of services and applications that rely on Internet Protocol (IP-enabled services) is pending. See IP-Enabled Services, WC Docket No. 04-36, *Notice of Proposed Rulemaking*, 19 FCC Rcd 4863 (2004). In addition, the Bureau has sought comment on a petition seeking clarification on the regulatory classification of text messaging services. See “Wireless Telecommunications Bureau Seeks Comment on Petition for Declaratory Ruling That Text Messages and Short Codes Are Title II Services or Are Title I Services Subject to Section 202 Non-Discrimination Rules,” *Public Notice*, 23 FCC Rcd 262 (WTB 2008).

9. The ongoing transition of mobile wireless services from interconnected mobile voice service to an array of voice, messaging, and broadband services provided on previous and next generation mobile networks has contributed to the growth in diverse mobile wireless market segments that are involved in bringing these information products to consumers. These interrelated market segments form the mobile wireless ecosystem, the various parts of the supply and production network that bring thousands of mobile wireless products to Americans every day. Each of the segments in the mobile wireless ecosystem has the potential to affect competitive and consumer outcomes in the mobile wireless services segment. As a result, unlike previous annual reports on the state of CMRS competition,²⁵ this *Report* analyzes competition across the entire mobile wireless ecosystem, expanding its analysis to include new “upstream” and “downstream” market segments such as device and infrastructure, and how the vertical relationships among these segments affect mobile wireless competition.²⁶

10. Figure 1 below provides an illustration of the mobile wireless ecosystem and the sections of the *Fourteenth Report* in which each of the ecosystem segments is discussed. The input segments are divided into spectrum, towers, network equipment, and backhaul facilities.²⁷ Following these inputs, the transmission of mobile wireless services includes voice services, messaging services,²⁸ and data services (including broadband). The downstream segments include mobile devices, device operating systems, and mobile applications, content, and mobile commerce.²⁹ Mobile devices, the endpoints of mobile networks, are the last of many links in mobile wireless networks that connect consumers to the network. For more and more consumers, mobile devices are evolving from voice-only handsets to handheld computers with sophisticated operating systems capable of supporting many of the same functionalities and software applications of personal computers (*e.g.*, Internet browsers, video players, and e-mail programs). Mobile devices can also include devices that do not even provide circuit-switched voice service, such as modems for portable computers and electronic books. The final layer of the mobile wireless ecosystem consists of the information products that are transmitted over mobile data networks and directly consumed by subscribers. These information goods include mobile applications, content (*e.g.*, video and music files, web sites, photos, and documents), and mobile commerce (*e.g.*, electronic shopping and financial transactions using a mobile device). It is recognized that these input segments can affect entry, competition, output, or prices in the provision of mobile wireless services. The importance of the downstream segments to consumers’ mobile wireless experience is increasing with the deployment of mobile broadband networks that support Internet-based applications.

²⁵ See Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, *First Report*, 10 FCC Rcd 8844 (1995); *Second Report*, 12 FCC Rcd 11266 (1997); *Third Report*, 13 FCC Rcd 19746 (1998); *Fourth Report*, 14 FCC Rcd 10145 (1999); *Fifth Report*, 15 FCC Rcd 17660 (2000); *Sixth Report*, 16 FCC Rcd 13350 (2001); *Seventh Report*, 17 FCC Rcd 12985 (2002); *Eighth Report*, 18 FCC Rcd 14783 (2003); *Ninth Report*, 19 FCC Rcd 20597 (2004); *Tenth Report*, 20 FCC Rcd 15908 (2005); *Eleventh Report*, 21 FCC Rcd 10947 (2006); *Twelfth Report*, 23 FCC Rcd 2241; *Thirteenth Report*, 24 FCC Rcd 6185. The reports can also be found on the Commission’s website at http://wireless.fcc.gov/index.htm?job=cmrs_reports.

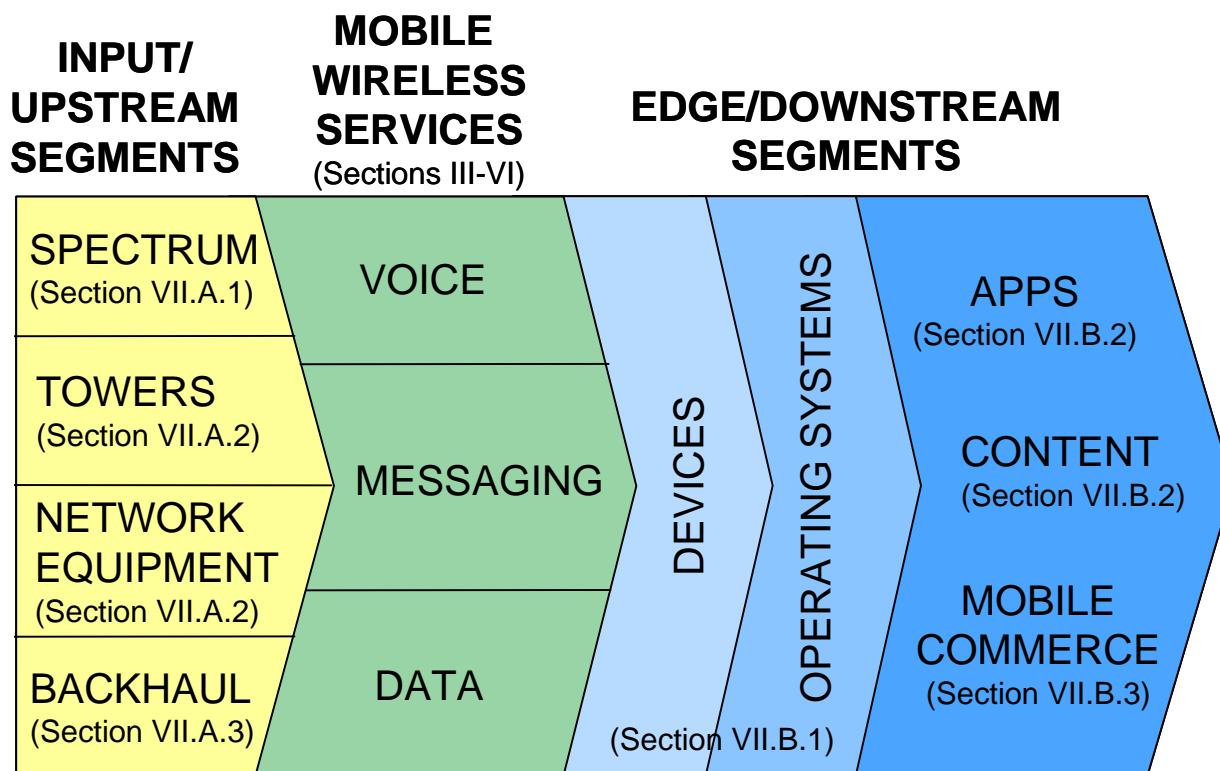
²⁶ Commenters have supported expansion of the analysis of the mobile wireless ecosystem. See, *e.g.*, California PUC Reply at 2; New Jersey Division of Rate Council Comments at 4.

²⁷ Spectrum, towers, network equipment, and backhaul facilities can be viewed as input or upstream markets because of their input relation to mobile wireless networks.

²⁸ Messaging includes text and multimedia (photo and video) message services, also referred to as SMS (Short Message Service) and MMS (multimedia messaging services), respectively.

²⁹ Mobile devices, device operating systems, and mobile applications, content, and mobile commerce can be viewed as edge or downstream markets because they are products that utilize mobile wireless services.

Figure 1. Mobile Wireless Ecosystem



11. In this *Report*, the discussion of the middle part of the mobile wireless ecosystem – mobile wireless services – includes a detailed analysis of mobile wireless service market conditions, including an analysis of whether there is effective competition in the CMRS market, as required by Section 332(c) of the Act. As discussed above, the statute requires an identification of the number of competitors in the various commercial mobile services, an analysis of whether any of the competitors have a dominant share of the market for the services, and a statement of whether additional providers or classes of providers in the services would be likely to enhance competition. In May 2009, the Wireless Telecommunications Bureau released a *Public Notice* seeking comment on which indicators are the most relevant for analyzing competitive market conditions and whether any specific criteria should be used to more precisely define a standard of effective competition.³⁰

12. This competitive analysis of mobile wireless services in the *Fourteenth Report* considers data that provide information on whether any wireless service provider is exercising undue market power – the ability to profitably charge prices above cost for a sustained period of time due to a lack of competitive constraints.³¹ This analysis has been organized in four distinct categories: market structure, provider conduct, market performance, and consumer behavior.³² First, within market structure, the

³⁰ *Fourteenth Report Public Notice*, 24 FCC Rcd at 5619-5621.

³¹ See Dennis W. Carlton and Jeffrey M. Perloff, *Modern Industrial Organization* (4th ed.), Addison, Wesley, Longman, Inc., 2005, at 8, 249-251 (*Modern Industrial Organization*).

³² This organization is a variant of the Structure-Conduct-Performance framework in economics. We employ this framework as a taxonomy to organize the data, and we recognize the modern critique of economists that this framework is a descriptive model and some of its assumptions are not found in current economic models. See, e.g., *Modern Industrial Organization* at 2, 268. Numerous commenters supported the use of this framework. See, e.g., (continued....)

number of competitors is analyzed and measures of concentration are calculated because there is some relation between the ability to exercise market power and market concentration, *i.e.*, without competitors or potential entry, there can be no competitive constraints on market power. The *Report* also investigates entry and exit of wireless service providers, the potential for any antitrust violations in the mobile wireless market, and the existence of any intermodal sources of competition. These factors provide additional valuable information on the amount of competitive pressure existing in the mobile wireless services market that can serve to restrain exercises of market power. Entry and exit conditions may affect the number of competitors that can enter and compete in the market, and, as discussed above, this in turn can influence whether any firm can exercise undue market power. Mergers, a type of exit, are closely reviewed by the Commission because mergers can potentially form stronger competitors that restrain competitors from exercising market power. At the same time, a merger may increase the risk that the merged firm may itself exercise undue market power. Last, although mobile wireless services have some unique characteristics, we regularly assess whether intermodal sources of competition (*e.g.*, wireline, fixed wireless, and satellite communication services) can or will place competitive pressure on mobile wireless service providers.

13. Second, price and non-price rivalry are examined as part of provider conduct. We discuss product differentiation, network investment and technology upgrades, advertising and marketing, and innovation because such non-price modes of competition can impose significant competitive constraints, especially in high technology industries that experience rapid innovation.

14. Third, the section on market performance evaluates evidence of the outcomes of competitive conditions in the mobile wireless industry from the consumer's point of view, focusing on the benefits to consumers of competition, such as lower prices, higher consumption, and better quality. In contrast, the sections on market structure, provider conduct, and consumer behavior examine various structural and behavioral determinants of such market outcomes. Within market performance, prices of services across competitors provide more direct evidence of competitive outcomes and the strength of competitive rivalry than do measures of concentration. The study of prices also provides evidence of any unusual increases or upward trends in prices. In addition, the quantity of services consumed is analyzed because exercises of undue market power are often accompanied by observable restrictions on the quantity of services produced.³³

15. Accordingly, this *Report* complies with the statutory requirements for analyzing competitive market conditions with respect to commercial mobile services by employing the competition analysis described above. We analyze the extent of competitive pressure and rivalry present in the mobile wireless market, the benefits received by consumers, and trends in indicators of firm rivalry and consumer benefits over time. This analysis of competitive conditions also tries to identify areas where competition is strong and also areas that could benefit from increased competition. In some cases, the *Report* provides data that can form the basis for in-depth proceedings, special oversight, or targeted regulations that could promote competition and consumer welfare.

16. The mobile wireless ecosystem is sufficiently complex such that no single definition of effective competition adequately encompasses both general indicators of competition and challenges inherent in the mobile wireless industry, such as spectrum availability, network interconnection issues,

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Mercatus NOI Comments at 2; CTIA NOI Comments at 72-75, and Verizon Wireless NOI Comments at 2, 7, 8, and 12.

³³ See Ernest Gellhorn, *Antitrust Law and Economics* (4th ed.), West Publishing, 1994, at 117 (stating "Market shares are not synonymous with market power; they should mark the beginning for careful analysis, not the end of it.") (*Antitrust Law and Economics*). See also, Michael Whinston, *Antitrust Policy toward Horizontal Mergers*, in *Handbook of Industrial Organization*, Volume 3, edited by Mark Armstrong and Robert Porter, at 2411-2414; Massimo Motta, *Competition Policy: Theory and Practice*, Cambridge University Press, at 117 (*Competition Policy*).

and network access issues.³⁴ Further, there is no definition of “effective competition” that is widely accepted by economists or competition policy authorities such as the U.S. Department of Justice (DOJ).³⁵ The DOJ’s position on competition policy is in agreement with the approach taken in the *Fourteenth Report*.³⁶ The DOJ states, “[t]he operative question in competition policy is whether there are policy levers that can be used to produce superior outcomes, not whether the market resembles the textbook model of perfect competition.”³⁷ We note as well that the Commission’s first seven Annual CMRS Competition Reports did not include an overall conclusion regarding whether or not the CMRS marketplace was effectively competitive. Instead, they provided an analysis and description of the CMRS industry’s competitive metrics and trends. Thus, this *Report* returns to the approach of those Reports, but with an expanded and more detailed analysis of the entire mobile wireless ecosystem.

17. *Structure of the Report.* The *Fourteenth Report* addresses the markets and market segments that constitute the mobile wireless ecosystem. The mobile wireless services market, including CMRS, is addressed in Sections III - VI. These sections follow the market structure-provider conduct-market performance-consumer behavior competitive analysis framework described above. The input segments of the mobile wireless services market are analyzed in Section VII.A and the handset/device market, mobile applications, and mobile commerce are analyzed in Section VII.B. Intermodal Competition is discussed in Section VIII. Differences across Geographic Markets, including Urban-Rural Comparisons and International Comparisons, are addressed in Section IX. The Appendices discuss spectrum available for mobile wireless services (Appendix A), provide an extended discussion on mobile wireless network technologies (Appendix C), and present tables and maps (Appendix D).

18. *Data Timeframes.* The *Fourteenth Report* focuses on conditions prevailing in the mobile wireless industry during 2008 and 2009. Given that the industry is dynamic and that market conditions are rapidly evolving, we strive to use the most recent data available in our analysis. In cases where our analysis relies on annual year-end metrics – such as with subscribership levels, penetration rates, and concentration – we use, and have included in the *Report*, year-end 2008 data. In other cases, where our analysis is based on metrics reported quarterly or semi-annually, we have included data through the second or third quarter of 2009, or mid-2009, respectively. The *Report*’s analysis of network coverage and the number of providers is based on data provided by American Roamer in October 2009 (for voice or overall network coverage) and November 2009 (for mobile broadband and next-generation network coverage). Many sections of the *Report* also discuss major industry developments, where relevant, that occurred during 2009 and early 2010.

19. *Dollar Amounts.* Dollar figures stated in this *Report* have not been adjusted for inflation (*i.e.*, they are nominal dollars) unless stated otherwise.

³⁴ See *e.g.*, *Ex Parte* Submission of the United States Department of Justice, GN Docket No. 09-51, at 11 (filed Jan. 4, 2010) (stating that “[w]e do not find it helpful to define an abstract notion of whether or not broadband markets are ‘competitive.’”); AT&T PN Comment at 10 (stating that “[r]eal world markets are incredibly complex and cannot be simplified to ‘silver bullet’ or bright-line indicator metrics”). We also note that the Commission’s first seven Annual CMRS Competition Reports did not include an overall conclusion regarding whether or not the CMRS marketplace was effectively competitive.

³⁵ See *Ex Parte* Submission of the United States Department of Justice, GN Docket No. 09-51 at 11 (filed Jan. 4, 2010).

³⁶ See *id.*

³⁷ *Id.*

III. MOBILE WIRELESS SERVICES: INDUSTRY STRUCTURE

A. Introduction

20. *Mobile Wireless Services.* The *Fourteenth Report* provides an analysis of competition in the mobile wireless services industry. Providers of mobile wireless services offer an array of mobile voice and data services, including interconnected mobile voice services, text and multimedia messaging, and mobile broadband Internet access services. The *Report* considers information and data on the mobile wireless services industry as a whole as well as on each of the individual segments where appropriate. From the standpoint of competitive analysis, the *Report* considers, for several reasons, the mobile wireless services industry as a whole rather than providing separate competitive analyses of all of the various segments.

21. First, a mobile wireless service provider may offer voice and data services using the same spectrum and network infrastructure. Therefore, it is difficult to extricate the cost structure of different services, which would be essential in determining comparative profitability or other important analyses.

22. Second, consumers typically receive mobile voice and data services on a single end-user device and purchase these services from a single provider. Although mobile data services are not always offered in conjunction with mobile voice service (e.g., mobile Internet access on a laptop computer or the wireless network connection for an e-reader such as Amazon.com Inc.'s (Amazon) Kindle), mobile wireless subscribers who use their handsets for data services typically purchase these services as either an add-on to voice services or as part of a bundled voice and data plan; in some cases, they may not be able to purchase data services independent of voice services. The combination of these factors may affect competition across the entire mobile wireless services industry and impact consumer choice with respect to these services.

23. Third, the availability of certain data employed in this *Report* reflects the entire mobile wireless services industry and not the individual segments. For example, the NRUF data provide an estimate of all mobile wireless devices in use that have a telephone number assigned to them.³⁸ This includes traditional mobile handsets used primarily or exclusively for voice calls, as well as smartphones that are used for both voice and data services and devices used exclusively for data services, such as wireless modem aircards or e-readers.³⁹ The NRUF data do not distinguish by the type of device used.

24. Defining the appropriate size of the local geographic area for mobile wireless services is necessary to assess competition. A basic economic principle for defining the scope of the relevant geographic area for a competitive analysis is to include the customers of a geographic area who face similar competitive alternatives. Because mobile wireless consumers are generally not willing to search for competitive alternatives that do not serve their local areas, the relevant geographic area is a local area. Accordingly, assessing competition in mobile wireless services at the national level could overstate the level of competition and industry concentration because the total number of providers in the entire United States exceeds the number of providers that compete with each other in any single region in which a consumer searches for a wireless provider. For example, two facilities-based providers that do not have overlapping network coverage do not directly compete with each other.

25. Defining the appropriate extent of the local geographic area for mobile wireless services is a highly complex exercise due to various factors, including: (1) the variety of geographic schemes used to license different spectrum bands; (2) the wide variation in providers' geographic footprints; (3) the relatively large number of licensed providers; and (4) the difficulty of collecting accurate information on the geographic coverage of each mobile operator's network in its license area(s). In this *Report*, we base

³⁸ See Section V.A, Subscribership Levels, *infra*.

³⁹ Even though data-only devices, such as wireless modem cards, mobile Wi-Fi devices, and e-readers, are not used to make circuit-switched voice calls, they are typically assigned telephone numbers because that is the method wireless service providers use to establish accounts and provide access to their networks.

our analysis of market concentration on uniform geographic areas that may be broader or narrower than the relevant geographic markets employed in other analyses conducted by the Commission. We estimate network coverage and the number of competitors serving an area using census blocks, and we provide concentration measures at the level of EAs. EAs are geographic units defined by the U.S. Department of Commerce that define geographic economic markets using data on commuting patterns. Although the Commission typically uses smaller geographic areas to calculate HHIs when it evaluates the competitive consequences of certain transactions, we use EAs in this *Report* to maintain continuity with past *Reports* and to ensure that we do not compromise the confidential information found in the NRUF data.⁴⁰

B. Overview of Service Providers

1. Facilities-Based Providers

26. Facilities-based mobile wireless service providers offer mobile voice, messaging, and/or data services using their own network facilities. Most facilities-based providers currently offer circuit-switched mobile voice services that are interconnected with the public switched telephone network (PSTN). Many of the data and messaging services offered by facilities-based providers rely only on IP-based, packet-switched networks, while other services may continue to connect to the PSTN. Most mobile wireless voice providers also offer data-only services – such as mobile wireless Internet access for portable computers or mobile Wi-Fi hotspot⁴¹ connections – that are not bundled in a service plan with a mobile voice service. Certain mobile wireless service providers, such as Clearwire Corporation (Clearwire), offer mobile broadband data services but do not offer circuit-switched mobile voice services.⁴² Facilities-based providers compete with each other in offering individual mobile wireless services, as well as bundles of complementary services (*e.g.*, mobile voice, text, and data services) in the same service plan designed to meet the voice and data communication needs of customers.

27. As of year-end 2008, there were four facilities-based mobile wireless service providers in the United States that industry observers typically describe as “nationwide”: AT&T, Sprint Nextel,⁴³ T-Mobile,⁴⁴ and Verizon Wireless.⁴⁵ When a facilities-based provider is described as being nationwide, it does not literally mean that the provider’s network covers the entire land area or entire population of the United States.⁴⁶ The four facilities-based providers that analyst reports typically describe as nationwide all have mobile wireless networks that cover in excess of 86 percent of the U.S. population in large proportions of the western, mid-western, and eastern United States.⁴⁷ A map of the combined coverage

⁴⁰ See also Section III.C.2, Concentration Measures, *infra*.

⁴¹ Mobile Wi-Fi hotspot devices, such as the Novatel MiFi, can provide mobile broadband Internet access to multiple Wi-Fi-enabled devices, such as netbooks, MP3 players, and smartphones.

⁴² Fixed wireless services, such as those offered by Stelera Wireless, are currently not included in our analysis of mobile wireless services.

⁴³ Sprint Nextel was created by the merger of Sprint Corp. and Nextel Communications, Inc. See *Tenth Report*, 20 FCC Rcd at 15931, ¶ 60.

⁴⁴ T-Mobile USA is a wholly-owned subsidiary of Deutsche Telekom AG (Deutsche Telekom).

⁴⁵ Verizon Wireless is the brand name of Cellco Partnership. See Cellco Partnership, SEC Form 10-Q, filed Oct. 29, 2009, at 5. Verizon Wireless is a joint venture of Verizon Communications, Inc. (Verizon) and Vodafone Group PLC (Vodafone). Verizon owns 55 percent of Verizon Wireless, and Vodafone owns 45 percent. See Verizon Communications, Inc., SEC Form 10-K, filed Feb. 24, 2009, at 3.

⁴⁶ Rather, a nationwide network covers a sufficiently large percentage of the population such that it would be inappropriate to categorize it as a regional network.

⁴⁷ These providers have spectrum holdings in different bands, including cellular, SMR, PCS, AWS, 700 MHz, and 2.5 GHz (both BRS licenses and EBS spectrum leases). Their respective holdings are discussed in more detail in Section VII.A.1, Spectrum, and Appendix A, *infra*.

areas of these four facilities-based providers can be found in Appendix D.

28. The next tier of facilities-based providers consists of companies that provide mobile wireless services on a regional, multi-metro, or local basis. Two facilities-based providers – Leap Wireless International, Inc. (Leap) and MetroPCS Communications Inc. (MetroPCS) – provide service in multiple large and medium-sized metropolitan areas across the nation. United States Cellular Corporation (US Cellular) is a large regional provider that serves regions in the western, mid-western, and eastern United States.⁴⁸ Clearwire, a recent entrant to the mobile wireless services market, provides mobile wireless broadband services in several metropolitan areas across the country.⁴⁹ A large, former regional provider, Alltel Corporation (Alltel), was acquired by Verizon Wireless in January 2009.⁵⁰

29. There are over one hundred small facilities-based providers throughout the country that typically provide service in a single geographical area, many of them rural areas. Cincinnati Bell Wireless, one of the larger of these providers, provides service within the Cincinnati area of Ohio. Cellular South provides service in the southeastern part of the United States, primarily Mississippi. The total number of smaller, facilities-based providers remained unchanged between April 2008 and October 2009.⁵¹ Non-nationwide service providers typically rely on roaming agreements with nationwide facilities-based providers to extend their facilities-based network coverage.⁵²

30. The population covered by the mobile wireless networks of the top eight facilities-based providers appears below. Table 1 presents mobile wireless voice network coverage, and Table 2 presents mobile wireless broadband network coverage. In addition, subscriber figures for the top eight service providers appear in Table 3 and Chart 1. From these data, we see that the four nationwide service providers account for 90 percent of the nation's mobile wireless subscribers (including Mobile Virtual Network Operator (MVNO) subscribers), with AT&T and Verizon Wireless accounting for 60 percent.⁵³ The remaining, non-nationwide service providers account for ten percent (see Chart 1). Table C-4 in Appendix C provides a list of the 16 largest facilities-based service providers.

⁴⁸ United States Cellular Corp., SEC Form 10-K, filed Feb. 29, 2009, at 1 (stating that US Cellular has 185 geographical markets covering 26 states).

⁴⁹ Clearwire is discussed in more detail in Section III.E.1, Entry, *infra*.

⁵⁰ See Section III.E.2, Exit, *infra*.

⁵¹ American Roamer database, Apr. 2008 and Oct. 2009. The calculation excludes the top-16 facilities-based providers at each date.

⁵² See Section IV.B.1.c, Roaming, *infra*.

⁵³ These shares are not necessarily representative of the shares in individual EAs. See Section V.B, Penetration Rates Across Economic Areas (EAs), *infra*, for a discussion of EA penetration rates. See also, MetroPCS PN Comments at 2.

Table 1
Mobile Wireless Network Coverage, Selected Facilities-Based Providers: Voice Networks⁵⁴

Service Provider	Covered POPs October 2008 (millions)	Covered POPs October 2009 (millions)
Verizon Wireless	252.9	270.5
AT&T	260.1	262.8
Sprint Nextel	256.6	258.0
T-Mobile	237.6	246.2
Alltel ⁵⁵	77.4	--
MetroPCS	56.0	84.6
Leap	53.9	80.5
US Cellular	41.8	41.7

Table 2
Mobile Wireless Network Coverage, Selected Facilities-Based Providers: Broadband Networks⁵⁶

Service Provider	Covered POPs November 2008 (millions)	Covered POPs November 2009 (millions)
Verizon Wireless	241.7	266.7
Sprint Nextel	218.9	226.9
AT&T	189.0	212.3
T-Mobile	88.4	133.9
Alltel ⁵⁷	57.7	--
Leap	19.7	79.2
US Cellular	13.1	26.6

⁵⁴ American Roamer database, Oct. 2008 and Oct. 2009; population figures based on census blocks using 2000 Census data.

⁵⁵ Verizon Wireless and Alltel closed their transaction on January 9, 2009. *See* Section III.E, Recent Entry and Exit, *infra*.

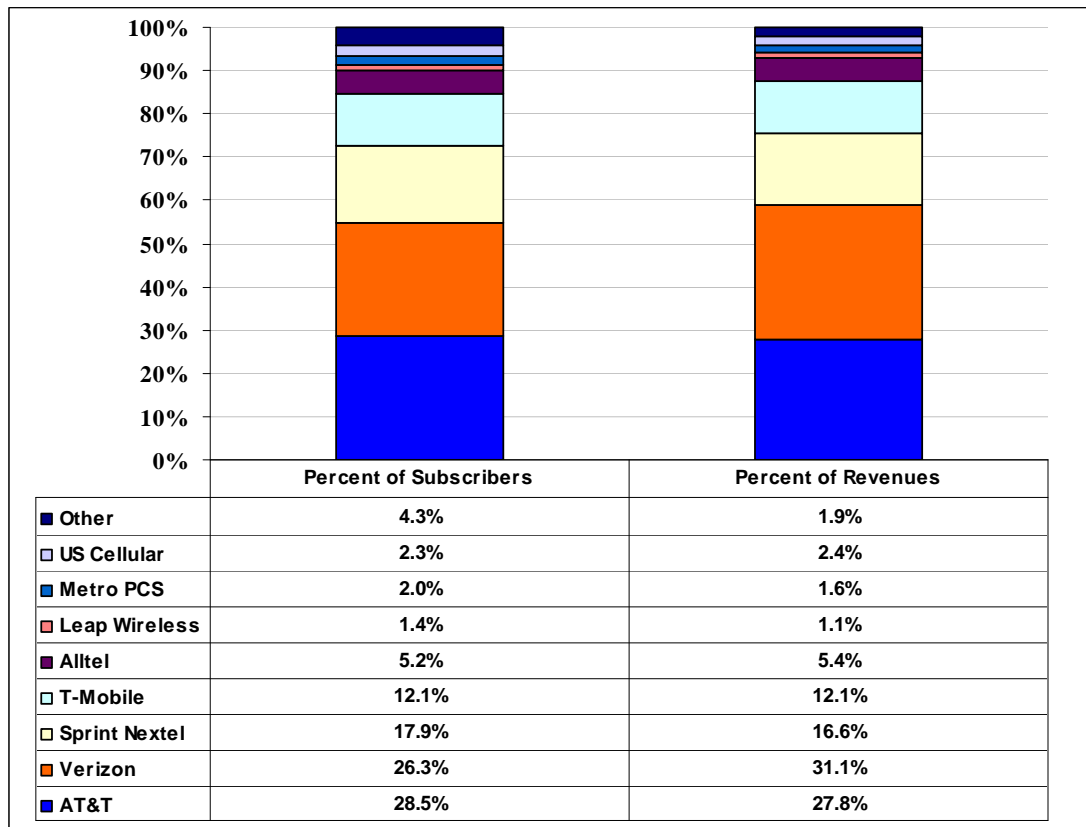
⁵⁶ Includes coverage by WCDMA/HSPA and EV-DO networks. American Roamer database, Nov. 2008 and Nov. 2009; population figures based on census blocks using 2000 Census data.

⁵⁷ Verizon Wireless and Alltel closed their transaction on January 9, 2009.

Table 3
Mobile Wireless Subscribers: Selected Facilities-Based Service Providers⁵⁸

Service Provider	Q4 2008 (millions)	Q2 2009 (millions)
Verizon Wireless	72.1	87.7
AT&T	77.0	79.6
Sprint Nextel	48.3	47.9
T-Mobile	32.8	33.5
Alltel ⁵⁹	14.1	--
MetroPCS	5.4	6.3
US Cellular	6.2	6.2
Leap	3.8	4.5

Chart 1
Service Provider Share of Subscribers (Year-End 2008) and Revenues (4Q 2008)⁶⁰



⁵⁸ John C. Hodulik, *et al.*, *US Wireless 411 – Version 31.0*, UBS Investment Research, UBS, Mar. 23, 2009, at 13 (*US Wireless 411 4Q08*); John C. Hodulik, *et al.*, *US Wireless 411 – Version 33.0*, UBS Investment Research, UBS, Aug. 14, 2009, at 13 (*US Wireless 411 2Q09*). Verizon Wireless Q2 2009 subscriber figure includes Alltel.

⁵⁹ Verizon Wireless and Alltel closed their merger transaction on January 9, 2009.

⁶⁰ *US Wireless 411 4Q08*; Company SEC 10-K filings. These shares are not necessarily representative of the shares in individual EAs.

2. Resale/MVNO Providers

31. A reseller purchases mobile wireless services from facilities-based providers and resells the services to consumers. Many resellers are referred to as Mobile Virtual Network Operators (MVNOs) because they typically do not own any network infrastructure or spectrum licenses. Verizon Wireless provides a definition of an MVNO:

“MVNOs execute a contract with [the facilities-based provider] to buy wireless service from [the facilities-based provider] to resell under their own brand to customers and perform all marketing, billing, collections and customer service for the customers they activate. MVNOs establish and maintain the relationship with its customers. MVNOs own the relationship with their customers and establish their own calling plans and pricing.”⁶¹

MVNOs may target their service and product offerings at specific demographic, lifestyle, and market niches that have particular needs or interests. Their customers typically include a relatively large proportion of consumers who have a low income, are relatively price sensitive, do not want to commit to multiyear subscription contracts, have low usage needs, or do not want to buy a bundle that contains unwanted data services.

32. MVNOs are not counted as separate competitors from their hosting facilities-based providers in our analysis of market structure. MVNOs are mobile wireless service competitors which, like facilities-based providers, compete for subscribers. However, because MVNOs purchase their mobile wireless services in wholesale contracts from facilities-based providers, the ability of MVNOs to compete against their host facilities-based provider is limited. Also, MVNOs do not compete through network investments and upgrades as do facilities-based providers.⁶² Subscriber figures of MVNOs are usually accounted for in the subscriber figures of the hosting facilities-based provider and are categorized as “wholesale” subscribers.⁶³ For these reasons, many industry analysts focus on facilities-based service providers to characterize market developments that define the state of competition in the mobile wireless industry.⁶⁴ Many MVNOs are privately-held companies and do not report their subscribers. For purposes of this *Report*, the Commission does not count any MVNO or reseller as a competitor in the mobile wireless market when it calculates market concentration.⁶⁵

33. At least 60 MVNOs were operating in the United States in the first quarter of 2010.⁶⁶ The largest MVNO is Tracfone. At the end of 2009, Tracfone had over 14 million subscribers, making it the fifth largest mobile wireless service provider in the United States after the four nationwide facilities-

⁶¹ Verizon Wireless, *Authorized Retailers and MVNOs*, <http://www.verizonwireless.com/b2c/aboutUs/reseller/authorizedAgentIndex.jsp> (visited Jan. 11, 2010).

⁶² See Section IV.B.1, Network Coverage and Technology Upgrades, *infra*.

⁶³ Robert F. Roche and Lesley O'Neill, *CTIA's Wireless Industry Indices, Semi-Annual Data Survey Results: A Comprehensive Report from CTIA Analyzing the U.S. Wireless Industry, Mid-Year 2009 Results*, Nov. 2008, at 11 (*CTIA Mid-Year 2009 Wireless Indices Report*) (“[s]ubscribers to [MVNOs] are accounted for in the results reported by the facilities-based companies that support the [MVNO] offerings.”)

⁶⁴ See, e.g., Glen Campbell, *Get Ready for the Wireless Revenue Bounce*, Bank of America, Global Wireless Matrix 4Q09, Dec. 13, 2009, at 10 (*Bank of America Global Wireless Matrix 4Q09*); John C. Hodulik, et al., *US Wireless 411, Version 34.0*, UBS, Nov. 16, 2009 (*US Wireless 411 3Q09*). However, TracFone has received some attention due to its size in the prepaid market. See Phil Cusick, et al., *Prepaid Wireless Services, Just Who is TracFone Anyway?*, Macquarie Research, June 10, 2009, at 1 (*Macquarie - Just Who is TracFone Anyway?*).

⁶⁵ See Section III.C, Horizontal Concentration, *infra*.

⁶⁶ See Table C-7, Appendix C. CTIA estimates that there are at least 43 MVNOs. CTIA PN Comments at 6.

based service providers.⁶⁷ Tracfone is owned by América Móvil, S.A.B. de C.V., a wireless service provider in Latin America and Puerto Rico, and offers mobile wireless services using the networks of AT&T and Verizon Wireless.⁶⁸ Tracfone had 3.2 million net customer additions in 2009, 1.2 million of which were added in the fourth quarter alone.⁶⁹

34. Another large MVNO, Virgin Mobile USA, was acquired by Sprint Nextel in the fourth quarter of 2009.⁷⁰ Some mobile wireless service providers offer service both as MVNOs and facilities-based providers. For instance, Sprint Nextel offers mobile wireless voice and data services using its own networks and has entered an MVNO agreement with Clearwire to resell WiMAX service from Clearwire.⁷¹

3. Narrowband Data Providers

35. Narrowband data and paging services comprise a specialized market segment of mobile wireless industry. These services include two-way messaging, and machine-to-machine and other telemetry communications, and are consumed primarily by businesses, government users, and other institutions. According to Commission licensing databases there is approximately seven megahertz of spectrum allocated to narrowband and paging services, and there are hundreds of licensees for these services. Licensees include citizens, firms, and local and State governments. For instance, USA Mobility provides paging and two-way messaging products to the business, government, and health care sectors.⁷² USA Mobility states that, due to competition from mobile wireless service providers (using Cellular and broadband PCS spectrum), they expect demand for their messaging services to decline in the near future.⁷³ Another narrowband provider, Space Data Corp., provides commercial telemetry services across the south-central United States to energy, utility, and transportation companies.⁷⁴ SkyTel offers machine-to-machine services including tracking services, automated reading of utility meters, power grid communication services, wireless security services, and point of sale communication services.⁷⁵

4. Mobile Satellite Service Providers

36. Mobile Satellite Services (MSS) providers also offer mobile wireless services by providing satellite-based communications to mobile devices. Traditionally, MSS has involved voice and narrowband data services, but licensees are increasing the number and variety of broadband service offerings.⁷⁶ MSS services are generally targeted to users that require service in remote areas, in disaster

⁶⁷ América Móvil, S.A.B. De C.V., SEC Form 6-K, filed Feb. 3, 2010, at 4.

⁶⁸ See Phil Cusick, *et al.*, *Macquarie - Just Who is TracFone Anyway?*, at 1; TracFone, *About Us*, <http://www.tracfone.com/about.jsp?nextPage=about.jsp&task=about> (visited Jan. 11, 2010).

⁶⁹ América Móvil, S.A.B. De C.V., SEC Form 6-K, filed Feb. 3, 2010, at 16.

⁷⁰ *Sprint Nextel Completes Acquisition of Virgin Mobile USA*, Press Release, Sprint Nextel, Nov. 24, 2009. Prior to this acquisition, Sprint Nextel held an approximate 13 percent interest in Virgin Mobile USA. *Sprint Nextel to Acquire Virgin Mobile USA*, Press Release, Sprint Nextel, July 28, 2009.

⁷¹ Sprint Nextel, SEC Form 10-Q, filed Nov. 6, 2009, at 7.

⁷² See USA Mobility, *Wireless Messaging – Products and Services*, <http://www.usamobility.com/products/messaging/> (visited Jan. 18, 2010); *Tenth Report*, 20 FCC Rcd at 15923, ¶ 33.

⁷³ USA Mobility Inc., SEC Form 10-K, Feb. 25, 2010, at 4.

⁷⁴ Space Data Corp., *Overview of SkySite Network*, <<http://www.spacedata.net/technology.htm>> and <http://www.spacedata.net/company.html> (visited Jan. 15, 2008); *Tenth Report*, 20 FCC Rcd at 15923, ¶ 34.

⁷⁵ See Skytel, *Powering Innovations using SkyTel's Network-on-Demand Communications Platform*, <http://www.skytel.com/index.html> (visited Apr. 20, 2010).

⁷⁶ See generally *Thirteenth Report*, 24 FCC Rcd at 6302-09, ¶¶ 253-73; SkyTerra Communications, Inc., Transferor, And Harbinger Capital Partners Funds, Transferee, Applications for Consent to Transfer of Control of SkyTerra (continued....)

response situation, or other places where terrestrial mobile wireless network access may be limited.⁷⁷ Examples of MSS consumers include the oil industry, maritime users, public safety agencies, and other government/military operations.

37. While terrestrial mobile wireless service providers and satellite mobile wireless service providers both provide mobile wireless voice and data services, the Commission has recognized that terrestrial mobile wireless services and MSS have different characteristics and involve different consumer benefits, coverage, prices, product acceptance, and distribution methods.⁷⁸ The two services, at the present time, are not perfectly interchangeable, appear to be imperfect substitutes for one another, and appeal to different market segments.⁷⁹ The mobile satellite service industry, however, is undergoing major technological and structural changes.⁸⁰ As with the rest of the telecommunications sector, technological advances in the mobile satellite industry are shifting the locus of consumer demand and competition to broadband services.⁸¹ Several MSS providers also have stated plans to offer high-speed data services, especially in connection with terrestrial networks using their Ancillary Terrestrial Component (ATC) authority.⁸² Such services in the future could potentially enhance competition in the provision of mobile terrestrial wireless services.⁸³ As of the end of 2009, however, no mobile services have been offered using ATC.⁸⁴

38. While the *Twelfth* and *Thirteenth Reports* discussed MSS spectrum, providers, and networks,⁸⁵ the Commission's forthcoming *Annual Report and Analysis of Competitive Market Conditions with Respect to Domestic and International Satellite Communication Services* will include a more detailed discussion of MSS, including ATC services.⁸⁶ Accordingly, this *Report* does not include a further discussion of MSS, and does not include MSS in its analysis of the mobile wireless services industry.

C. Horizontal Concentration

39. The level of market concentration can be measured by the number of competitors, shares

(Continued from previous page) —————

Subsidiary, LLC, IB Docket No. 08-184, *Memorandum Opinion and Order and Declaratory Ruling*, DA 10-535, ¶¶ 33-36 (rel. Mar. 26, 2010) (*SkyTerra/Harbinger*).

⁷⁷ See *Thirteenth Report*, 24 FCC Rcd at 6301, ¶ 247; SIA PN Comments at 2-3.

⁷⁸ *Thirteenth Report*, 24 FCC Rcd at 6301, ¶ 247. See also, SIA PN Comments at 2.

⁷⁹ *Thirteenth Report*, 24 FCC Rcd at 6301, ¶ 247. See also, SIA PN Comments at 2; Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the LBand, 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, 1984, ¶ 39 (2003), modified sua sponte, *Order on Reconsideration*, 18 FCC Rcd 13590 (2003), on reconsideration, *Memorandum Opinion and Order and Second Order on Reconsideration*, 20 FCC Rcd 4616 (2005), further recon. pending.

⁸⁰ See generally *SkyTerra/Harbinger*, ¶¶ 40-54.

⁸¹ *Id.* at ¶ 40.

⁸² *Id.* at ¶¶ 33-36, 40.

⁸³ *Id.* at ¶ 62.

⁸⁴ Some fixed wireless services are being offered, under ATC authority, by Open Range Communications, which is leasing spectrum from MSS licensee Globalstar LLC.

⁸⁵ See *Twelfth Report*, 23 FCC Rcd at 2345-2352, ¶¶ 259-289; *Thirteenth Report*, 24 FCC Rcd 24 at 6298-6309, ¶¶ 240-273,

⁸⁶ See "IB Invites Comment for Third Annual Report to Congress on Status of Competition in Satellite Services Market," *Public Notice*, 24 FCC Rcd 5424, 5426 (2009).

of subscribers or sales, or the distribution of competitors' respective shares of subscribers or sales. A high market concentration will occur whenever a small number of competitors each possess a relatively large share of subscribers or sales. In conjunction with entry conditions and the degree of rivalry among providers, market concentration affects the likelihood that a single provider unilaterally, or a group of providers through coordinated action, could successfully exercise market power that results in profitable and sustainable price increases.

1. Number of Competitors

40. In this section, we estimate the percentage of the U.S. population served by facilities-based mobile wireless service providers in more than 8 million U.S. census blocks.⁸⁷ This analysis is based on provider coverage maps provided to the Commission through a contract with American Roamer, an independent consulting firm that tracks service provision for mobile voice and mobile data services.⁸⁸ We note that the American Roamer analysis likely overstates the coverage actually experienced by consumers, because American Roamer reports advertised coverage as reported to it by many mobile wireless service providers, each of which uses a different definition of coverage.⁸⁹ The data do not expressly account for factors such as signal strength, bit rate, or in-building coverage, and they may convey a false sense of consistency across geographic areas and service providers.⁹⁰ Nonetheless, the data are useful for benchmarking mobile network deployment across the United States, especially over time.

41. Map 2 below depicts the number of facilities-based providers operating across the United States. More detailed regional maps are available in Appendix D.

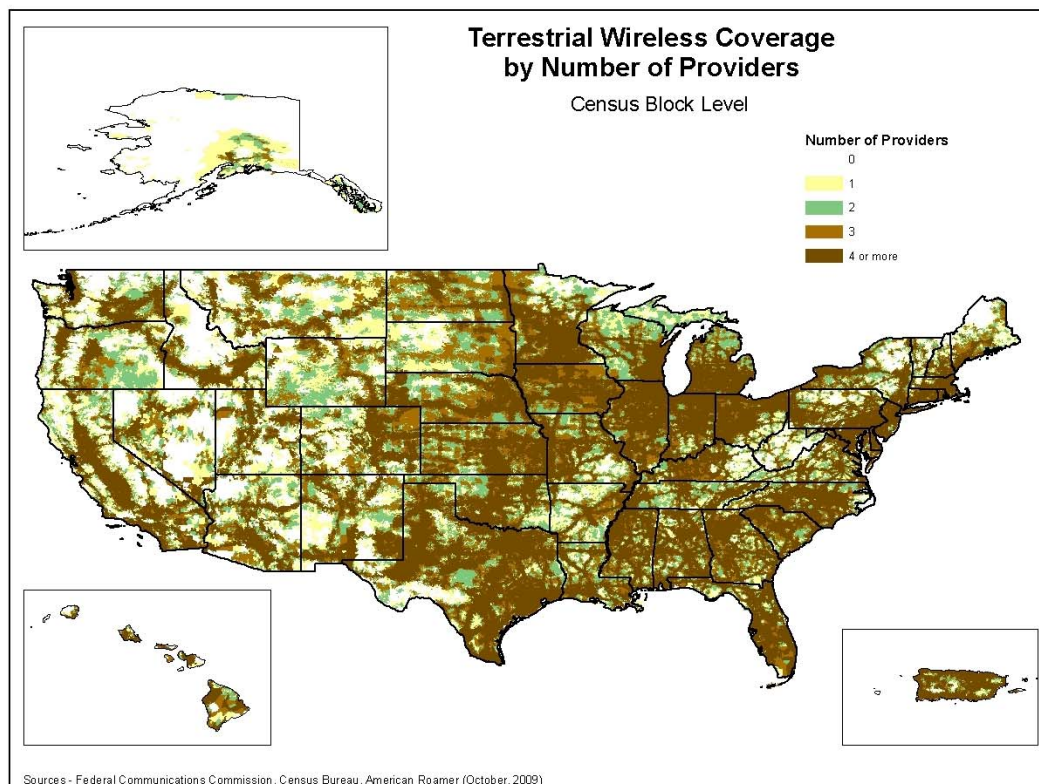
⁸⁷ A census block is the smallest geographic unit for which the Census Bureau tabulates decennial census data. See, U.S. Census Bureau, *Glossary Of Basic Geographic And Related Terms - Census 2000*, <http://www.census.gov/geo/www/tiger/glossary.html#glossary> (visited Dec. 15, 2008). Many blocks correspond to individual city blocks bounded by streets, but blocks – especially in rural areas – may include many square miles and may have some boundaries that are not streets. The Census Bureau established blocks covering the entire nation for the first time in 1990. Previous censuses back to 1940 had blocks established only for part of the nation. Over 8 million blocks are identified for Census 2000. U.S. Census Bureau, *Question & Answer Center*, <http://www.census.gov> (visited Oct. 2, 2008). The mean size of a census block is .0460 square miles, and its median size is 0.016 square miles with a range of 0.0000001 to 8,081 square miles; its mean population is 34.3 people, while its median population is 8.0 people, with a range of 0 to 23,373 people. Commission analysis is based on Census 2000 “Summary File 1 (SF 1),” U.S. Census Bureau, *United States Census 2000*, <http://www.census.gov/Press-Release/www/2001/sumfile1.html> (visited Dec. 15, 2008).

⁸⁸ American Roamer provides data on carriers under contract as coverage boundary maps based on the coverage boundaries provided to them by mobile wireless network operators. American Roamer began in 1985 as the original vendor of custom printed roaming guides for cellular carriers, but has since evolved into a provider of data and mapping for the mobile wireless industry. See American Roamer, <http://www.americanroamer.com> (visited Dec. 16, 2008).

⁸⁹ *National Broadband Plan*, at 39 (Chapter 4).

⁹⁰ *Id.*

Map 2
Mobile Wireless Competitors⁹¹



42. Estimates of the total number of competitors by aggregate census block coverage, by population coverage, and by land area coverage are shown below. Table 4 presents coverage by all mobile wireless service providers, and Table 5 shows the extent of coverage in areas of the country excluding Federal lands. Table 6 and Table 7 present coverage by mobile wireless voice and broadband providers, respectively. Due to confidentially agreements with American Roamer, we cannot provide details about the census blocks served by individual facilities-based providers.

⁹¹ An enlarged version of this map can be found in Appendix D.

Table 4
Estimated Mobile Wireless Service Providers by Census Block, Including Federal Land⁹²

Total Number of Providers in a Block	Number of Blocks	POPs Contained in Those Blocks	% of Total US POPs	Square Miles Contained in Those Blocks	% of Total US Square Miles
Total for US	8,262,363	285,230,516	100.0%	3,799,408	100.0%
1 or more	8,001,159	284,122,621	99.6%	2,782,734	73.2%
2 or more	7,608,107	281,287,053	98.6%	2,207,144	58.1%
3 or more	6,801,227	273,236,840	95.8%	1,547,456	40.7%
4 or more	5,812,155	259,248,116	90.9%	999,147	26.3%
5 or more	4,009,938	210,574,568	73.8%	480,056	12.6%
6 or more	1,334,038	70,492,955	24.7%	122,594	3.2%
7 or more	300,215	20,000,444	7.0%	15,436	0.4%

Table 5
Estimated Mobile Wireless Service Providers by Census Block, Excluding Federal Land⁹³

Total Number of Providers in a Block	Number of Blocks	POPs Contained in Those Blocks	% of Total US POPs Excluding Those on Federal Land	Square Miles Contained in Those Blocks	% of Total US Square Miles Excluding Federal Land
Total for US	7,794,199	280,371,248	100.0%	2,652,534	100.0%
1 or more	7,630,576	279,465,237	99.7%	2,209,609	83.3%
2 or more	7,321,670	276,981,583	98.8%	1,876,215	70.7%
3 or more	6,604,650	269,434,807	96.1%	1,375,448	51.9%
4 or more	5,683,440	256,008,675	91.3%	918,467	34.6%
5 or more	3,950,485	208,505,981	74.4%	453,357	17.1%
6 or more	1,316,617	69,684,129	24.9%	118,040	4.5%
7 or more	297,391	19,784,321	7.1%	14,900	0.6%

43. Table 4 and Table 5 present estimates of how many competitors serve the U.S mobile wireless services market. Table 4 includes federally-owned or administered land, and Table 5 excludes

⁹² Commission estimates based on American Roamer database, Oct. 2009 and Nov. 2009. The estimates include Clearwire's mobile WiMAX network coverage from November 2009. Population and land area are based on census blocks. POPs are from the 2000 Census, and square miles include the United States and Puerto Rico.

⁹³ Commission estimates based on American Roamer database, Oct. 2009 and Nov. 2009. The estimates include Clearwire's mobile WiMAX network coverage from November 2009. Population and land area are based on census blocks. POPs are from the 2000 Census, and square miles include the United States and Puerto Rico. In this analysis, Federal lands consist of lands owned or administered by the Federal Government, including the Bureau of Land Management, the Bureau of Reclamation, the U.S. Department of Agriculture Forest Service, the Department of Defense, the U.S. Fish and Wildlife Service, the National Park Service, the Tennessee Valley Authority, and other agencies. Only areas of one square mile (640 acres) or more are included. Indian lands are not included in Federal lands. See U.S. Department of the Interior, *Federal Lands of the United States*, <http://www.nationalatlas.gov/mld/fedlanp.html> (visited Dec. 16, 2008).

such lands. Including or excluding Federal lands results in a similar number of competitors by population coverage; however, due to the large quantity of sparsely-populated Federal lands, the analysis shows significantly greater percentages of land coverage when Federal lands are excluded. For example, approximately 40.7 percent of the total U.S. land area is covered by three or more facilities-based providers, compared to approximately 51.9 percent of the land area when Federal lands are excluded. As the Commission has recognized, “[i]n many locations, covering certain government land may be impractical, because these lands are subject to restrictions that prevent a licensee from providing service or make provision of service extremely difficult. We also note that government lands often include only very small portions of the population in a license area.”⁹⁴ Federally-owned lands constitute nearly 30 percent of the approximately 3.6 million square mile land area of the United States.⁹⁵ A map showing the extent of Federal lands, with American Indian Reservations and Alaska Native Village Statistical Areas, can be found in Appendix D.

44. Table 4 shows that approximately 284 million people, or 99.6 percent of the total U.S. population, are served by at least one facilities-based provider, according to our census block level analysis using American Roamer data. Approximately 273 million people, or 95.8 percent of the total U.S. population, are served by three or more competitors offering mobile wireless service in the census blocks in which they live, and approximately 259 million people, or 90.9 percent of the U.S. population, live in census blocks served by four or more competitors.

45. Table 5, shows that approximately 279 million people, or 99.7 percent of the U.S. population, excluding those on Federal lands, are served by at least one facilities-based provider, according to the analysis. Approximately 269 million people, or 96.1 percent of the total U.S. population, are served by three or more competitors offering mobile wireless service in the census blocks in which they live, and approximately 256 million people, or 91.3 percent of the U.S. population, live in census blocks served by four or more competitors. Approximately 17 percent of the land area of the United States, when Federal lands are excluded, has no mobile wireless network coverage.⁹⁶

⁹⁴ Service Rules for the 698-746, 747-762 and 777-792 MHz Bands; Revision of the Commission’s Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems; Section 68.4(a) of the Commission’s Rules Governing Hearing Aid-Compatible Telephones; Biennial Regulatory Review – Amendment of Parts 1, 22, 24, 27, and 90 to Streamline and Harmonize Various Rules Affecting Wireless Radio Services; Former Nextel Communications, Inc. Upper 700 MHz Guard Band Licenses and Revisions to Part 27 of the Commission’s Rules; Implementing a Nationwide, Broadband, Interoperable Public Safety Network in the 700 MHz Band; and Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communications Requirements Through the Year 2010, *Second Report and Order*, 22 FCC Rcd 15289, 15350, ¶ 160 (2007).

⁹⁵ See U.S. Department of the Interior, *Federal Lands and Indian Reservations*, <http://www.nationalatlas.gov/printable/fedlands.html> (visited Jan. 18, 2010).

⁹⁶ See Table 5; RTG PN Comments at 2.

Table 6
Estimated Mobile Wireless Voice Providers by Census Block, 2009⁹⁷

Total Number of Providers in a Block	Number of Blocks	POPs Contained in Those Blocks	% of Total US POPs	Square Miles Contained in Those Blocks	% of Total US Square Miles
Total for US	8,262,363	285,230,516	100.0%	3,799,408	100.0%
1 or more	8,000,570	284,121,970	99.6%	2,782,606	73.2%
2 or more	7,607,934	281,286,168	98.6%	2,207,056	58.1%
3 or more	6,800,716	273,209,240	95.8%	1,547,420	40.7%
4 or more	5,806,406	258,958,719	90.8%	998,978	26.3%
5 or more	3,959,641	207,724,511	72.8%	478,046	12.6%
6 or more	1,087,150	54,416,664	19.1%	113,421	3.0%
7 or more	61,020	2,087,253	0.7%	8,632	0.2%

Table 7
Estimated Mobile Wireless Broadband Providers by Census Block, 2009⁹⁸

Total Number of Providers in a block	Number of Blocks	POPs Contained in Those Blocks	% of Total US POPs	Square Miles Contained in Those Blocks	% of Total US Square Miles
1 or More	7,464,539	279,756,929	98.1	2,150,171	56.6
2 or More	5,662,923	255,187,772	89.5	1,073,018	28.2
3 or More	3,878,519	217,078,155	76.1	390,208	10.3
4 or More	2,457,193	165,393,450	58.0	139,625	3.7

46. The analysis estimates that approximately 284 million people, or 99.6 percent of the U.S. population, are served by one or more mobile voice providers, as depicted in Table 6. Equivalently, 1.1 million people, or 0.4 percent of the U.S. population, are not served by any mobile service provider. Approximately 273 million people, or 95.8 percent of the population, are served by at least three mobile voice providers.⁹⁹ Approximately 259 million people, or 90.8 percent of the population, are served by at least four mobile voice providers.¹⁰⁰

47. Table 7 shows the extent of mobile broadband coverage, which includes EV-DO, WCDMA/HSPA, or mobile WiMAX networks. Approximately 280 million people, or 98.1 percent of the U.S. population, are served by one or more mobile broadband providers. The percentage of the population served by at least two mobile broadband providers increased from 73 percent in May 2008 to

⁹⁷ Commission estimates are based on American Roamer database, Oct. 2009. The estimates exclude Clearwire's mobile WiMAX network coverage. Population and land area are based on census blocks. POPs are from the 2000 Census, and square miles include the United States and Puerto Rico.

⁹⁸ Commission estimates are based on American Roamer database, Nov. 2009. The estimates include coverage by all EVDO, EVDO Rev. A, HSPA/UMTS/WCDMA, and mobile WiMAX networks. Population and land area are based on census blocks. POPs are from the 2000 Census, and square miles include the United States and Puerto Rico.

⁹⁹ Equivalently, 12 million people, or 4.2 percent of the U.S. population, are not served by three or more mobile service providers.

¹⁰⁰ Equivalently, 26 million people, or 9.2 percent of the U.S. population, are not served by four or more mobile service providers.

nearly 90 percent in November 2009.¹⁰¹ In addition, the percentage of the population served by three or more providers increased from 51 percent in May 2008 to 76 percent in November 2009.¹⁰² Table 7 also shows that approximately 58 percent of the population is served by at least four mobile broadband providers.¹⁰³

2. Concentration Measures

48. Measures of industry concentration aim to relate industry structure to industry performance. They can be useful indicators when evaluated together with firm conduct and actual industry performance. The number of competitors and shares of subscribers or sales are the most elementary measures of industry concentration.¹⁰⁴

49. *Herfindahl-Hirschman Index (HHI)*. The HHI, a measure of market concentration, is employed by the Commission because it is the most widely-accepted measure of concentration in competition analysis.¹⁰⁵ In particular, it allows a comparison of different distributions of providers' shares of subscribers using a common index. The range of the HHI is the positive numbers up to 10,000, with 10,000 representing a monopoly, the highest degree of concentration. Fewer competitors and higher shares of subscribers result in higher HHI index values.¹⁰⁶ As a benchmark for comparison, the value of the HHI for a hypothetical market in which there are four facilities-based providers with equal shares of subscribers is 2500; if there are three facilities-based providers with equal shares of subscribers the value is 3333. For context, the DOJ antitrust guidelines consider a market to be "highly concentrated" if the post-merger HHI exceeds 1800.¹⁰⁷ DOJ antitrust scrutiny is typically applied to a merger if it would trigger an increase in the HHI of 100 or greater when the post-merger HHI is between 1000 and 1800, and an increase of 50 or greater when the post-merger HHI is above 1800.¹⁰⁸ As described below, the Commission has previously used a higher screen, 2800 for the HHI and 100 for the change in HHI, in

¹⁰¹ See *Thirteenth Report*, 24 FCC Rcd at 6258, ¶ 146, Table 10.

¹⁰² *Id.*

¹⁰³ The estimated percentage of the population covered by four or more mobile broadband providers was not provided in the *Thirteenth Report*.

¹⁰⁴ Due to confidentiality requirements, the Commission does not publish subscriber share data for local markets. See Section III.B, Overview of Service Providers, *supra*, for estimates and a discussion of subscriber shares at a nationwide level.

¹⁰⁵ The HHI is calculated by summing the squares of all provider subscriber shares in the EA. When a single firm is the sole supplier in the relevant market (a pure monopoly), the HHI attains its maximum value of 10,000 (100×100). If there are ten providers, each with ten percent of the market, the value of HHI would be 1,000 [$(10)^2 \times 10$]. As the structure of a market becomes progressively more atomistic, the value of HHI approaches 0.

¹⁰⁶ The value of the HHI decreases as the number of firms increases (provided that no existing firm's share of subscribers increases). For a given number of firms, the value of the HHI can increase as the inequality in subscriber shares increases. For example, if four carriers are identified as participants in the relevant markets and each carrier accounts for 25 percent of total sales, the value of HHI would be 2500 [$(25)^2 \times 4$]. If there are still only four carriers but the top carrier has a 40 percent subscriber share while each of the remaining three carriers has 20 percent, the value of HHI increases from 2500 to 2800 [$(40)^2 + (20)^2 \times 3$]. If the number of carriers increases to five, each with a 20 percent subscriber share, the value of the HHI declines to 2000 [$(20)^2 \times 5$].

¹⁰⁷ U.S. Department of Justice and the Federal Trade Commission, *Horizontal Merger Guidelines*, Rev. Apr. 8, 1997, at § 1.51, available at http://www.justice.gov/atr/public/guidelines/horiz_book/hmg1.html (visited Apr. 21, 2010) (*Horizontal Merger Guidelines*). In April 2010, the FTC proposed that an HHI above 2500 be the guideline for a market to be considered highly concentrated in the *Horizontal Merger Guidelines*. See FTC, *Horizontal Merger Guidelines, For Public Comment*, (rel. Apr. 20, 2010), available at <http://www.ftc.gov/os/2010/04/100420hmg.pdf>.

¹⁰⁸ *Horizontal Merger Guidelines*, at § 1.51.

reviewing mergers of mobile providers.¹⁰⁹

50. *HHI Methodology.* As in previous *Reports*, we apply the HHI to the shares of subscribers held by facilities-based mobile wireless providers at the level of EAs, calculating shares of subscribers from the providers' numbers of subscribers.¹¹⁰ Hence, we use a facilities-based provider's number of subscribers as a proxy for the provider's actual output (*i.e.*, minutes of use, MBs, etc.). The number of subscribers served by each provider is determined based on the Commission's year-end 2008 NRUF data, which track phone number usage information for the United States.¹¹¹ We emphasize that, in using the EA as the basis for calculating shares of subscribers in this *Report*, we are not concluding that the EA is the appropriate geographic market for other purposes.¹¹²

51. *Current HHI values.* As shown in Table 8, the weighted average of the HHIs (weighted by EA population) was 2848 at the end of 2008, up from 2674 at the end of 2007—an increase of 174, or 6.5 percent, year over year.¹¹³ The 2008 HHI data reflect several mergers that were completed during 2008,¹¹⁴ including the mergers of AT&T/Aloha (February 2008), T-Mobile/Suncom (February 2008), Verizon Wireless/Rural Cellular (August 2008), and Verizon Wireless/Alltel (January 2009).¹¹⁵ From 2003 (the first year the Commission calculated HHI using this methodology) to 2008, the average HHI has increased from 2151 to 2848, an increase of 697 (see Table 8 and Chart 2). The lowest EA HHI values and the highest EA HHI values both increased in 2008 relative to the 2007 HHI values.¹¹⁶ For 2008, the value of the HHI for individual EAs ranges from a low of 2123 in EA 63 (covering parts of southeastern Wisconsin) to a high of 8263 in EA 4 (covering parts of Vermont and New York). The increase in the 2008 HHI values relative to the 2007 HHI values could be attributed to fewer competitors and/or a greater inequality in the shares of subscribers held by providers. A merger can increase the HHI due to there being fewer providers in an EA and due to an increase in the subscribers in an EA of the post-merger provider. The change in the HHI from 2007 to 2008 may also reflect changes in subscribers that did not result because of a merger.

52. The HHI values can be viewed in the context of the “HHI screen” used by the Commission in its analysis of mergers and license transactions. The Commission employed an HHI

¹⁰⁹ Applications of AT&T Wireless Services, Inc. and Cingular Wireless Corporation For Consent to Transfer Control of Licenses and Authorizations, File Nos. 0001656065, *et al.*, *Memorandum Opinion & Order*, 19 FCC Rcd 21522, 21568 ¶ 108 (2004).

¹¹⁰ See Section III.A, Introduction, *supra*. Although the Commission typically uses 734 CMAs to calculate HHIs when it evaluates the competitive consequences of certain transactions, we use 172 EAs to calculate HHIs in this Report. We use EAs in this *Report* to maintain continuity with past *Reports* and to avoid compromising the confidential information found in the NRUF data. The subscribers of MVNOs are included with the subscribers of their hosting facilities-based providers.

¹¹¹ The methodology used to compile NRUF data is described in Section V.A, Subscribership Levels, *infra*.

¹¹² For instance, in the Commission's review of the transfers and assignments of mobile wireless licenses, it has typically used CMAs, which generally are smaller than EAs, as the relevant geographic market for calculating HHIs.

¹¹³ See Appendix C, Table C-3, *infra*, for EA subscribership levels, penetration rates, and population densities. The weighted average assigns proportionately greater (less) weight to EAs that have a higher (lower) population. The simple average (not weighted by population) is 3775. If one weights by market output shares (*i.e.* number of subscribers) a similar figure is obtained.

¹¹⁴ See *Thirteenth Report*, 24 FCC Rcd at 6259, ¶ 151.

¹¹⁵ The Verizon/Alltel transaction was approved by the Commission in November 2008 and closed on January 9, 2009. See Section III.E, Recent Entry and Exit, *infra*. The HHI calculations allocate to Verizon Wireless those Alltel subscribers that are not to be divested under the order.

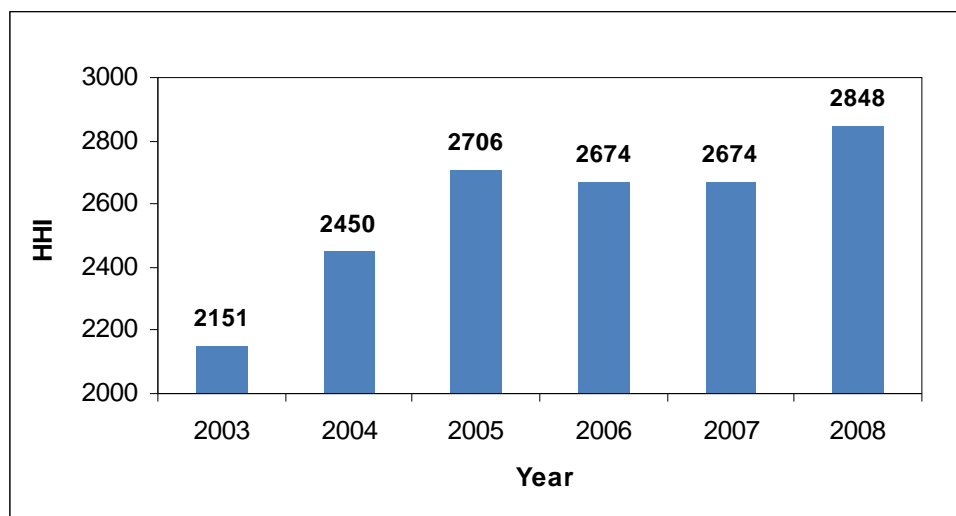
¹¹⁶ See *Thirteenth Report*, 24 FCC Rcd at 6212, ¶ 46. The lowest EA value was 1795 in EA 28 and the highest was 6272 in EA 121.

screen in its review of transactions during 2009, including the *AT&T/Centennial* transaction.¹¹⁷ The HHI screen identified service areas in which (1) the post-transaction HHI would be both greater than 2800 and would increase by at least 100, or (2) the post-transaction HHI would have increased by at least 250. Service areas that met these criteria were flagged and subject to a further case-by-case competitive analysis.¹¹⁸

Table 8
Mobile Wireless Market Concentration¹¹⁹

	Herfindahl-Hirschman Index					
	<i>Fourteenth Report</i>	<i>Thirteenth Report</i>	<i>Twelfth Report</i>	<i>Eleventh Report</i>	<i>Tenth Report</i>	<i>Ninth Report</i>
<i>Year</i>	2008	2007	2006	2005	2004	2003
<i>Average</i>	2848	2674	2674	2706	2450	2151
<i>High</i>	8263	6272	6551	9042	7064	7155
<i>Low</i>	2123	1795	1609	1605	1554	1325

Chart 2
Average HHI of EAs¹²⁰



¹¹⁷ Applications of AT&T Inc. and Centennial Communications Corp. For Consent to Transfer Control of Licenses, Authorizations, and Spectrum Leasing Arrangements, *Memorandum Opinion and Order*, 24 FCC Rcd 13915 (2009) (*AT&T-Centennial Order*).

¹¹⁸ The service areas that met the screen were not subject to an automatic divestiture condition. In some cases, the parties agree to a voluntary divestiture of service areas that meet the HHI screen, in which case no further competitive analysis is necessary.

¹¹⁹ Population-weighted average of 172 EAs based on Commission estimates using NRUF and Census Bureau population data.

¹²⁰ Based on data shown in Table 8.

53. HHI values tend to vary with the population density of different markets. Specifically, market concentration in EAs tends to increase as the EA population declines. Chart 3 shows the relationship between EA population densities and HHI values. The most concentrated EAs tend to be in rural areas, while major metropolitan areas lie in the least concentrated EAs. The median HHI value of EAs that lie within population density bands decreases as the population density increases (see Chart 4). This phenomenon likely reflects greater demand and greater cost efficiencies (per-user mobile wireless network deployment costs tend to decrease with increases in the population density) in more densely-populated areas.

Chart 3
Plot of EA HHI Values on EA Population Densities

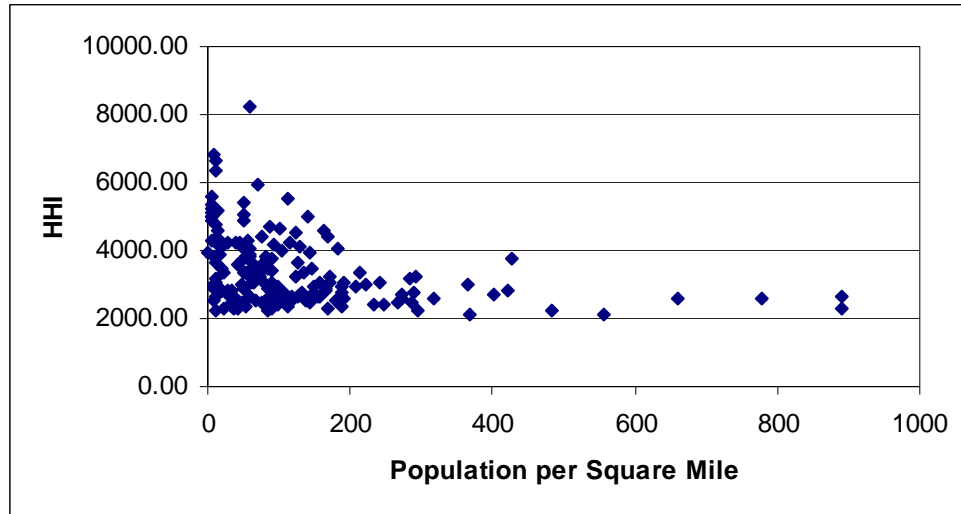
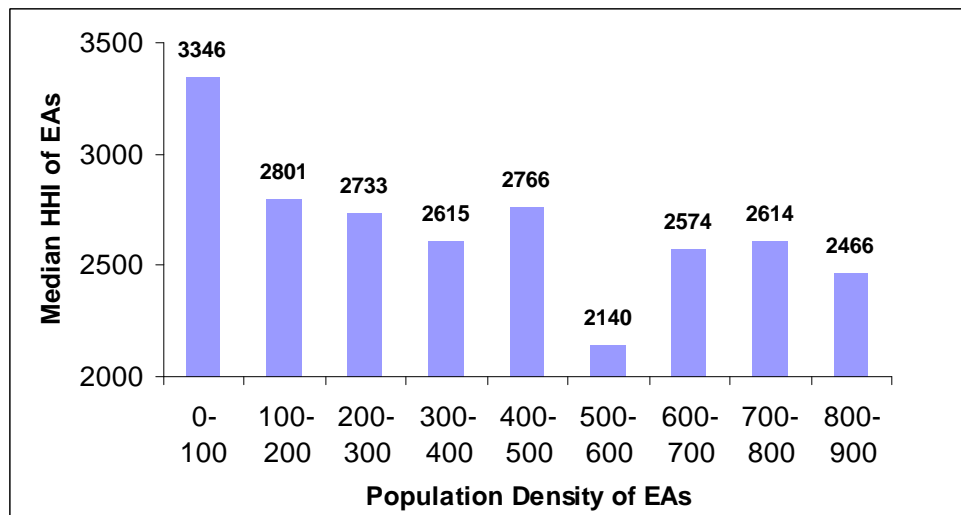


Chart 4
Median HHI of EAs in Population Density Bands¹²¹



54. Apart from differences in population, EAs also vary significantly with regard to other

¹²¹ The highest population density, 891, occurs in EA 34 (Tampa-St. Petersburg-Clearwater, FL), and the lowest population density, 1, occurs in EA 171 (Anchorage, AK).

determinants of market demand and facilities-based provider costs, such as per-capita income, the age distribution of the population, and the size and composition of the business sector.¹²² The economic determinants of industry concentration are discussed further in Section III.D, Entry and Exit Conditions below.

55. *Relation between HHI and Market Power.* Shares of subscribers and measures of concentration are not synonymous with market power – the ability to charge prices above the competitive level for a sustained period of time.¹²³ High market concentration may be a reasonable proxy for significant market power when a reduction in the number of competitors or an increase in their shares of subscribers result in significantly fewer constraints on the market power of the remaining firms. However, market concentration, by itself, is an imperfect indicator of market power. This *Report* analyzes the strength of other factors, besides market concentration, which constrain market power. These include entry and exit conditions, the degree of price and non-price rivalry, and innovative activity that undercuts the market power of non-innovators by increasing product diversity and quality and lowering costs. While mobile wireless service prices and price margins are assessed below,¹²⁴ this *Report* does not contain a summary estimate of market power – *i.e.*, a numerical estimate of price mark-up over cost – due to the complexities of estimating market power in an industry with high fixed costs that are recovered gradually over time, difficulties with analyzing pricing plans for bundles of services, and the difficulties in obtaining accurate and suitable cost data. Our merger review process uses a market-by-market analysis of market concentration as one of many indicia used to find evidence of market power.

D. Entry and Exit Conditions

56. Actual entry and exit occurs in the context of underlying regulatory, market, and technological conditions that directly influence the total number of firms that can compete successfully in a market. Entry and exit conditions are relevant for determining *if* entry or exit will occur, and *when* entry or exit will occur – both of which are important for competition.

57. We distinguish regulatory from non-regulatory entry and exit conditions in order to distinguish spectrum and infrastructure policies from basic market factors. Regulatory entry conditions tend to be related to access to the inputs necessary to offer mobile wireless services. They include spectrum policy, which affects the total spectrum capacity available for mobile wireless services, and tower-siting regulations, which affect whether and how quickly mobile wireless networks can be deployed or expanded.¹²⁵ Regulatory delay at the policy or licensee level can cause delay of entry and therefore is, in itself, a kind of adjustment cost¹²⁶ or entry barrier.¹²⁷ Non-regulatory or market conditions

¹²² The Commission conducted a regression analysis of data at the EA level in September 2008, which indicates that concentration in the mobile wireless market (measured by the HHI) tends to decline with increases in market size, population density, per capita income, and percentage of the population living in urban areas.

¹²³ See Jonathan B. Baker and Timothy Bresnahan, “Economic Evidence in Antitrust: Defining Markets and Measuring Market Power” in *Handbook of Antitrust Economics*, ed. Paolo Buccirossi, (Cambridge: MIT Press, 2008), 15. See also, *Antitrust Law and Economics*, at 117.

¹²⁴ See Section IV.A, Price Rivalry: Developments in Mobile Service Pricing Plans, *infra*.

¹²⁵ See Sections VII.A.1, Spectrum and VII.A.2, Infrastructure Facilities, *infra*, for a further discussion.

¹²⁶ Adjustment costs are costs that delay entry or delay entry by incumbents into new markets. See Dennis W. Carlton, *Why Barriers to Entry are Barriers to Understanding*, AMERICAN ECONOMIC REVIEW, 2004, 94: 2, at 468-469 (*Barriers to Understanding*). See also R. Preston McAfee, *et al.*, *What Is a Barrier to Entry?*, AMERICAN ECONOMIC REVIEW, 2004, 94: 2, at 463 (*What Is a Barrier to Entry?*).

¹²⁷ One example of a regulatory delay would be the clearing of a spectrum band. Economists argue that some operating licenses and other legal restrictions that serve to limit access to the market are barriers to entry, *i.e.*, they create positive economic profits for incumbents. See Jean Tirole, *The Theory of Industrial Organization*, MIT Press, 1988, at 305 (*The Theory of Industrial Organization*). See also, Hal R. Varian, *Intermediate Microeconomics: A Modern Approach*, W. W. Norton and Company, 1999, at 395 (*Intermediate Microeconomics*). Legal entry (continued....)

that influence entry and exit can be summarized by expected post-entry profitability and its associated risk factors, which in turn have several main market determinants that are discussed below.¹²⁸

1. Regulatory Entry and Exit Conditions

58. *Spectrum.* Spectrum bandwidth is a vital input to the production of mobile wireless services. For an entering firm to employ spectrum that was previously unemployed in the mobile wireless services market, it must be able to access such spectrum. The effective supply of spectrum capacity that is available for mobile wireless service depends on several aspects of spectrum policy, including allocation and licensing policies, as well as interference and technical rules. First, increasing the total supply of spectrum bandwidth that the Commission allocates for mobile wireless service and licenses to mobile wireless service providers can increase network capacity and reduce the degree of frequency reuse required to achieve a given capacity.¹²⁹ Therefore, spectrum policies affect the ability of potential entrants to access spectrum and hence the technological, economic, and legal resources required to expand capacity.¹³⁰ Second, interference and technical rules can affect both spectrum access and spectrum efficiency, and, hence, overall network capacity.¹³¹ Spectrum is discussed in more detail in Section VII.

59. *Tower Siting.* State and local zoning rules for erecting wireless towers or attaching equipment to pre-existing structures can affect the deployment of mobile wireless networks. In particular, delays in zoning approvals can lengthen the process of cell site acquisition and deployment, thereby increasing costs for new or existing providers to enter into new markets. The Commission reported that in 2009, of 3,300 pending zoning applications for wireless facilities, over 760 (nearly one quarter) had been pending for more than a year and 180 had been pending for more than three years.¹³² In November 2009, the Commission issued a *Declaratory Ruling* that sets time frames for state and local zoning authorities to act on a zoning application –90 days for collocations and 150 days for all other towers.¹³³ If a zoning authority does not act within the appropriate time period, and the parties have not agreed to extend the review period, the applicant can file for relief in federal court.¹³⁴ Furthermore, the *Declaratory Ruling* acts to reduce regulatory barriers to entry by finding that it is a violation of the Communications Act for a state or local government to deny a wireless service facility-siting application because service is available from another provider.¹³⁵

(Continued from previous page) —————

conditions that are not included under regulatory entry conditions could include corporate tax rates, a factor that directly affects profit calculations and hence entry conditions.

¹²⁸ See *Modern Industrial Organization* at 12, 61-62. See also, *The Theory of Industrial Organization*, at 34; George S. Ford, et al., *Competition After Unbundling: Entry, Industry Structure, and Convergence*, FEDERAL COMMUNICATIONS LAW JOURNAL, 2007, 59: 2, at 342 (*Competition After Unbundling*).

¹²⁹ See Theodore S. Rappaport, *Wireless Communications: Principles and Practice* (2nd ed.), Prentice Hall, 2002, at 58.

¹³⁰ Further discussion and data on the market for spectrum, recent spectrum auctions, upcoming spectrum auctions, and spectrum policy can be found in Section VII.A.1, Spectrum, *infra* and Appendix A, *infra*.

¹³¹ See FCC, Spectrum Policy Task Force, Report of the Spectrum Efficiency Working Group, 2002, at 16, (*Spectrum Policy Task Force Report*). A discussion of the Commission's flexible licensing policies and their effects on network deployment can be found in Section IV.B.1, Network Coverage and Technology Upgrades, *infra*.

¹³² Petition for Declaratory Ruling to Clarify Provisions of Section 332(c)(7)(B) to Ensure Timely Siting Review and to Preempt Under Section 253 State and Local Ordinances that Classify All Wireless Siting Proposals as Requiring a Variance, WT Docket No. 08-165, *Declaratory Ruling*, 24 FCC Rcd 13994, 14005 ¶ 33 (2009).

¹³³ *Id.* at 13995, ¶ 4.

¹³⁴ *Id.* at 13995 ¶ 4, 14013 ¶ 49.

¹³⁵ *Id.* at 13995-96, ¶ 5.

2. Non-Regulatory Entry and Exit Conditions

60. Non-regulatory entry and exit conditions are market-determined conditions that affect a firm's ability to enter into or exit from a market. Service provider entry and exit decisions are primarily determined by market profitability estimates.¹³⁶ Profitability depends on many factors, including providers' costs, market demand projections, market supply and capacity projections, the intensity of rivalry, and market risks.¹³⁷ Some of the major entry costs include (1) spectrum licenses or spectrum leasing costs; (2) network coverage costs such as site acquisition and preparation costs, site construction and leasing costs, network equipment costs, backhaul transport¹³⁸ costs, and other potential interconnection and roaming costs; (3) the costs of offering customers a portfolio of attractive wireless devices; and (4) the costs of marketing and distributing wireless services and devices. Below, we briefly discuss these major costs of deploying a network and gaining a customer base. On the demand side, population, population density, income, other socioeconomic variables, and macroeconomic conditions affect the service revenue projections of potential entrants.

61. Market-determined costs, like regulatory entry conditions, can affect both *if* entry will occur and *when* entry will occur. Entry costs, on a per subscriber basis, are generally less in the mobile wireless industry than in the wireline industry.¹³⁹ A high level of network deployment costs (a type of fixed cost¹⁴⁰ of building network capacity) in relation to the number of customers may limit the number of firms that can enter and survive in a market.¹⁴¹ For example, areas with a low population density tend to have fewer facilities-based competitors (and higher concentration) than areas that have a high population density.¹⁴² For an entrant to survive in the market, the market must be large enough for a potential entrant to recoup its network deployment costs over time from service revenues. Costs that

¹³⁶ High economic profits encourage entry to the market, low economic profits discourage entry, and prolonged negative economic profits induce exit from the market. See *Intermediate Microeconomics*, at 394-395, 503; *Modern Industrial Organization*, at 61, 76. See also, *Competition After Unbundling*, at 334.

¹³⁷ See *Competition After Unbundling*, at 344. See also, Andreu Mas-Colell, et al., *Microeconomic Theory*, Oxford University Press, 1995, at 383-384, 423.

¹³⁸ The backhaul transport link generally refers to the communications link between the cell site radio equipment and the core network.

¹³⁹ See, e.g., *Ex Parte* Submission of the United States Department of Justice, GN Docket No. 09-51 (Economic Issues in Broadband Competition, A National Broadband Plan for our Future), at 14; and Jonathan E. Nuechterlein and Philip J. Weiser, *Digital Crossroads, American Telecommunications Policy in the Internet Age*, MIT Press, 2005, at 274.

¹⁴⁰ Fixed costs are costs that are associated with fixed factors in production and are generally incurred independent of the quantity of output. However, fixed costs can change if maximum production capacity is changed. They can be financed in many ways, including over time. See *Intermediate Microeconomics*, at 353.

¹⁴¹ See W. Kip Viscusi, et al., *Economics of Regulation and Antitrust* (3rd ed.), MIT Press, 2000, at 150 (*Economics of Regulation and Antitrust*). See also, *Competition Policy*, at 51, 76. See also, Avner Shaked and John Sutton, *Product Differentiation and Industrial Structure*, THE JOURNAL OF INDUSTRIAL ECONOMICS, Vol. 36, No. 2 (Dec. 1987), at 131, 141 (arguing that markets are concentrated because market demand is high and the advancing technological frontier requires recurrent fixed costs). See also, *Competition After Unbundling*, at 332, 337. For the use of fixed costs to estimate market concentration, see, e.g., *Modern Industrial Organization*, at 41; *Economics of Regulation and Antitrust*, at 150. For the relevance of the size of sunk costs to predict market concentration, see *Competition Policy*, at 76-79; *Competition After Unbundling*, at 337; and *Barriers to Understanding*, at 467. See also, Written Statement of George S. Ford, Ph.D., Chief Economist, Phoenix Center for Advanced Legal & Economic Public Studies, Before the House of Representatives, Committee on Energy and Commerce, Subcommittee Telecommunications and the Internet, Hearing on "An Examination of Competition in the Wireless Industry," May 7, 2009, at 5, (estimating that three to five nationwide carriers will be able to provide mobile services, including mobile broadband).

¹⁴² See Section III.C, Horizontal Concentration, *infra*.

delay entry, sometimes referred to as “adjustment costs,” are relevant for estimating exactly when entry will occur.¹⁴³ A role of competition policy is to estimate how the timing of entry depends on various costs and to determine whether there are any relevant regulatory policy tools that can reduce entry delay.¹⁴⁴

62. *Spectrum.* A potential facilities-based entrant to a wireless service market can obtain spectrum in several ways including purchasing spectrum at Commission auctions, purchasing spectrum in the secondary market, and leasing spectrum in the secondary market. For instance, in the two recent major spectrum auctions, the average spectrum price ranged from \$0.53/MHz/Pop for the AWS-1 (Advanced Wireless Service) band (1700/2100 MHz band) in Auction 66 to \$1.28/MHz/Pop for the 700 MHz band in Auction 73.¹⁴⁵ At these prices, aggregating a significant regional spectrum footprint would involve an outlay of hundreds of millions of dollars and a national footprint would require billions of dollars. Leasing spectrum in the secondary market can reduce initial spectrum acquisition costs, distributing the costs over time. Some companies such as Spectrum Bridge, Inc. provide online market places for spectrum exchange.¹⁴⁶ Additional information about spectrum can be found in Section VII.A.1.

63. *Network Coverage.* To create a customer base, a new facilities-based entrant must provide network coverage that is sufficient to attract new customers, including enticing customers to switch from existing service providers.¹⁴⁷ Major network deployment costs include cell site acquisition, preparation, engineering, and construction. Network cost studies analyze cost scenarios under diverse sets of assumptions. One network cost study estimates that the total capital cost of deploying a cell site, on average, can be upwards of \$200,000.¹⁴⁸ Regional wireless providers typically have hundreds or thousands of sites and national providers have tens of thousands of sites. A new entrant would therefore need to invest tens or hundreds of millions of dollars in capital expense for a regional network (depending on the size of the regions) and billions of dollars for a national network. We note that roaming on competitors’ networks can offer entrants access to greater network coverage while they are deploying their own networks. Providers, including new entrants to a mobile wireless market that typically deploy their planned networks gradually, may seek access to networks besides their own in order to achieve a competitive level of coverage while their network is being built out. Roaming can increase network coverage by allowing the entrant’s customers to have network coverage when they travel outside of the range of the entrant’s own network.¹⁴⁹

64. Entrants often use backhaul provided by other firms, especially if construction of separate

¹⁴³ See *Barriers to Understanding*, at 468; *What is a Barrier to Entry?*, at 463.

¹⁴⁴ See, e.g., *Barriers to Understanding*, at 469; Malcolm B. Coate, *Theory Meets Practice: Barriers to Entry in Merger Analysis*, REVIEW OF LAW AND ECONOMICS, vol. 4, Feb. 2008, at 190 (*Theory Meets Practice*); *What is a Barrier to Entry?*, at 463-465. The difference between an adjustment cost and a barrier to entry (*i.e.* a permanent asymmetry in firms’ costs) may, in practice, be a matter of degree, depending on the length of the delay caused by the adjustment cost. See *What is a Barrier to Entry?*, at 464 (arguing that economies of scale are not barriers to entry), and 465 (arguing that sunk costs cause firms to delay entry because of their option value).

¹⁴⁵ Calculated by dividing the total net auction revenue by spectrum bandwidth and by the population in the year 2000.

¹⁴⁶ Spectrum Bridge Inc.’s online market exchange, SpecEx, can be accessed at <http://www.specex.com/Default.aspx> (visited Apr. 21, 2010).

¹⁴⁷ A scale effect can occur when positive network externalities increase with the size of the network, a relationship known as “network effects.” See *Competition Policy*, at 82 (stating that greater network coverage, by increasing the pool of network users, increases the quality of the service, and, hence, the benefits consumers derive from the good).

¹⁴⁸ See Comments of Mobile Satellite Ventures Subsidiary LLC, WT Docket No. 06-150, Service Rules for the 698-746, 747-762 and 777-792 MHz Bands (filed June 20, 2008), at 49 (*MSV 700 MHz Comments*).

¹⁴⁹ See Section IV.B.1.c, Roaming, *infra*, for an additional discussion of roaming.

backhaul facilities is not cost-justified given the size of the market. Backhaul can be a significant cost for new entrants; estimates of average monthly costs range from hundreds of dollars (for a T1 line) to \$6,000.¹⁵⁰ The costs can vary widely by market and provider, and may affect the ability of entrants to compete successfully.

65. Overall cell site and backhaul costs also depend on the spectrum held by new entrants.¹⁵¹ For instance, a new entrant with more spectrum bandwidth would be able to reduce its cell site and backhaul costs by deploying fewer cell sites and potentially fewer backhaul transmission lines for a given traffic volume. Additionally, a new entrant utilizing spectrum only in higher frequency bands may need to deploy more infrastructure, including cell sites to cover the same land area and therefore incur higher cell site costs, compared to providers using lower band spectrum. Additional discussions on cell site deployment and backhaul facilities can be found in Sections VII.A.2-3.

66. *Handsets and Devices.* Mobile handsets and devices are the end points of mobile wireless networks that connect consumers to the networks.¹⁵² They directly affect the quality of a consumer's mobile wireless experience, and, hence, they factor into a consumer's choice of a wireless provider. Depending on the market strategy of the entrant, its portfolio of handsets and devices may be a significant non-price factor affecting its ability to compete for customers.¹⁵³ Although handset manufacturers sell many handsets to any service provider with a compatible network, some handsets are subject to exclusivity arrangements that restrict their distribution to a single service provider in the United States.¹⁵⁴ Exclusive handset arrangements held by existing providers can create a kind of adjustment cost for potential entrants if lack of access to the exclusive technology delays the entry of potential entrants.¹⁵⁵

67. *Marketing and Distribution.* The ability of a potential entrant to compete for customers is also influenced by its expenditures on marketing and the development of its Internet and non-Internet sales and distribution networks. Marketing expenditures help to distribute product information and promote brand recognition. Marketing expenditures are a significant factor of non-price competition in the mobile wireless industry.¹⁵⁶ The size of a provider's sales and distribution networks is one measure of the provider's penetration of the market. An entrant that has an existing customer base for other

¹⁵⁰ See *MSV 700 MHz Comments*. See also, Space Data Corporation Comments, WT Docket No. 06-150, PS Docket No. 06-229, Exhibit A (filed June 20, 2008) (backhaul cost ranging from \$2,500 to \$6,000); Clearwire NOI Comments at 8.

¹⁵¹ See Section VII.A.1, Spectrum, *infra*.

¹⁵² See Sections IV.B.3, Differentiation in Mobile Wireless Handsets/Devices and VII.B.1, Mobile Wireless Handsets/Devices and Operating Systems, *infra*, for a more detailed discussion of handsets and devices.

¹⁵³ According to the Nielsen Company's Mobile Insights survey, in the first quarter of 2009, the specific handset was the seventh ranking factor in consumers' choice of a provider. Roger Entner, *When Choosing A Carrier Does the iPhone Really Matter?*, NIELSEN WIRE, Aug. 10, 2009 (citing data from The Nielsen Company's Mobile Insights survey).

¹⁵⁴ See Section VII.B.1, Mobile Wireless Handsets/Devices and Operating Systems, *infra*.

¹⁵⁵ Lack of access to a particular good due to a legal restriction may have an effect on potential entrants similar to the good having a high price. However, see *Competition Policy*, at 378 (stating that it is well-known that exclusivity agreements can benefit innovation and consumers; the trade-offs must be evaluated in a case-by-case cost-benefit analysis).

¹⁵⁶ See *Barriers to Understanding*, at 467 (Advertising, like investments that raise product quality, is as common a competitive behavior in high-technology industries as price competition is in industries that are characterized by less product innovation). See also, *Modern Industrial Organization*, at 80 (If an incumbent has never had any rivals [*i.e.* it is a monopolist] then asymmetries in advertising costs between the incumbent and entrant can constitute a barrier to entry, because the monopolist has never had to bear these costs). However, the wireless telephony/broadband market is not a monopoly, and incumbent providers incur significant advertising costs as a component of their rivalry.

telecommunication services (for example, Cox Communications, discussed below) may expect to have lower expenditures on marketing, sales, and distribution than an entrant that does not have a customer base in potentially complimentary telecommunication services that can be marketed in bundles. Marketing and advertising expenditures are discussed in Section IV.B.

E. Recent Entry and Exit

1. Entry

68. Data and information about the stages a firm has completed in the entry process can provide valuable information for estimating the timeframe during which entry will be completed. Entry normally proceeds through several stages that require a significant period of time to complete, including raising financial capital, acquisition of spectrum rights,¹⁵⁷ deployment of the mobile wireless network, and a product launch stage during which a customer base is gained. Analysis of when entry will occur can be likened to a “pipeline” that is marked by increasing financial commitments and the completion of the various stages.¹⁵⁸ In particular, estimating the date of potential entry is one factor in a more comprehensive entry analysis that predicts how soon there will be new rivals who are in a position to place competitive constraints on the existing competitors.¹⁵⁹ Below we summarize entry commitments that are large enough to be consistent with entry that could introduce new competitive constraints at the regional or national level.

69. *Clearwire Corporation.* Clearwire is an independent corporation in which Sprint Nextel is a majority shareholder.¹⁶⁰ In November 2008, with the Commission’s approval of the Sprint Nextel-Clearwire transaction, Sprint Nextel transferred its 2.5 GHz spectrum (both Broadband Radio Service (BRS) licenses and Educational Broadband Service (EBS) leases) and WiMAX network assets to Clearwire, which had significant holdings of 2.5 GHz spectrum.¹⁶¹ The Sprint Nextel-Clearwire transaction was valued at \$3.3 billion.¹⁶² Clearwire holds 2.5 GHz spectrum in all markets across the United States. Comcast Corporation, Time Warner Cable Inc., Bright House Networks LLC, Google, and Intel Corporation agreed to invest \$3.2 billion in Clearwire.¹⁶³ In November 2009, Clearwire reached an agreement with some of its investors to invest an additional \$1.56 billion, with approximately two-thirds of this sum attributable to Sprint Nextel and the remainder attributable to Comcast, Time Warner Cable, Intel, Eagle River Holdings, and Bright House Networks.¹⁶⁴ Clearwire’s services consist primarily of wireless (mobile and fixed) broadband data in the 2.5 GHz BRS/EBS band; they offer a fixed wireless VoIP service, but not an interconnected mobile voice service.¹⁶⁵ Clearwire valued its spectrum license holdings at \$4.49 billion in the third quarter of 2009, including the 2.5 GHz spectrum licenses that were

¹⁵⁷ We note that acquisition of spectrum, in itself, is not necessarily a good predictor of timely entry into a market. For a discussion of the discrepancy between the spectrum license coverage of some facilities-based providers and their network coverage, see Section VII.A.1, Spectrum, *infra*.

¹⁵⁸ See *Theory Meets Practice*, at 206.

¹⁵⁹ *Id.* at 190.

¹⁶⁰ Sprint Nextel Corporation, SEC Form 10-Q, filed Nov. 11, 2009, at 13.

¹⁶¹ Sprint Nextel Corporation, SEC Form 10-K, filed Feb. 27, 2009, at 3.

¹⁶² *Id.*

¹⁶³ See NCTA NOI Comments at 3.

¹⁶⁴ Clearwire Corp., SEC Form 10-Q, filed Nov. 10, 2009, at 26.

¹⁶⁵ Clearwire Corp., SEC Form 10-K, filed Mar. 26, 2009, at 3, 9 (“Mobile WiMAX technology enables us to offer mobile and fixed communications services over a single wireless network.”); Clear, *Mobile Internet*, <http://www.clear.com/shop/services/mobile> (visited Apr. 20, 2010); Clear, *Home Internet*, <http://www.clear.com/shop/services/home> (visited Apr. 20, 2010).

transferred from Sprint Nextel to Clearwire.¹⁶⁶

70. Clearwire is currently operating and continuing to deploy a mobile wireless network using the 802.16e mobile WiMAX technology.¹⁶⁷ As of December 31, 2009, Clearwire's U.S. WiMAX network covered 27 markets and approximately 34.5 million people; it had approximately 392,000 wireless broadband Internet subscribers (under the brand "CLEAR") and 46,000 wholesale subscribers.¹⁶⁸ In its other 30 markets, covering 7.2 million people, Clearwire offered fixed and portable wireless broadband service using a propriety network technology standard.¹⁶⁹ Clearwire has stated that it plans to upgrade the networks in the majority of these legacy markets to WiMAX technology over the next year.¹⁷⁰

71. Clearwire has wholesale service agreements with its investors.¹⁷¹ For example, Clearwire has an MVNO agreement with Sprint Nextel under which Sprint Nextel can purchase (at wholesale) mobile broadband data services from Clearwire for resale to consumers, and Clearwire can purchase (at wholesale) 3G CDMA mobile wireless voice and data services from Sprint Nextel for resale to consumers. Sprint Nextel states that amounts attributable to its resale agreements with Clearwire were immaterial as of the third quarter of 2009.¹⁷²

72. *Leap and MetroPCS.* The entry of current facilities-based providers into new geographic markets is an important form of entry.¹⁷³ Leap and MetroPCS are metropolitan area service providers that have recently invested in new markets. Leap states that its business model is to keep "costs low by engineering high-quality, efficient networks covering only the urban and suburban areas where its potential customers live, work and play enabling it to sell its wireless minutes for less than it costs other carriers to produce theirs,"¹⁷⁴ and "provide customers with unlimited wireless services for a flat rate without requiring a fixed-term contract or a credit check."¹⁷⁵ Leap, which holds many PCS licenses and AWS licenses (acquired at the 2006 auction) in markets throughout much of the country has expanded its coverage from approximately 53.9 million people in October 2008 to 80.5 million in October 2009, an increase of 26.6 million. MetroPCS states that it provides mobile wireless services in "selected major metropolitan areas in the United State[s,]" and it provides "a variety of wireless communications services to our subscribers on a no long-term contract, paid-in-advance, flat-rate, unlimited usage basis."¹⁷⁶ MetroPCS, which holds PCS and AWS spectrum in many markets throughout the United States, has expanded its facilities-based coverage from October 2008, when it covered approximately 56.0 million

¹⁶⁶ Clearwire Corp., SEC Form 10-Q, filed Nov. 10, 2009, at 3.

¹⁶⁷ *Id.* at 29.

¹⁶⁸ Clearwire Corp., SEC Form 10-K, filed Feb. 24, 2010, at 2.

¹⁶⁹ *Id.*

¹⁷⁰ *Id.*

¹⁷¹ Clearwire Corp., SEC Form 10-Q, filed Nov. 10, 2009, at 30.

¹⁷² See Sprint Nextel Corporation, SEC Form 10-Q, filed Nov. 11, 2009, at 7.

¹⁷³ For example, the *Twelfth Report* discusses how, following the acquisition of new spectrum holdings in 2006, T-Mobile, Leap, and MetroPCS entered new markets. See *Twelfth Report*, 23 FCC Rcd at 2265, ¶ 75. See also, Cellular South, *About Us*, <https://www.cellularsouth.com/aboutus/index.html> (visited Jan. 4, 2010) (stating that, since 2006, Cellular South has significantly increased the size of its regional coverage).

¹⁷⁴ Leap, *About Leap*, http://www.leapwireless.com/11_about_leap.htm (visited Jan. 13, 2010).

¹⁷⁵ Leap Wireless International Inc., SEC Form 10-K, filed Mar. 1, 2010, at 1. Verizon Wireless claims that Leap and MetroPCS have been achieving penetration rates of between 8 and 13 percent in markets where they have been active for five or more years. See Verizon Wireless PN Comments at 4.

¹⁷⁶ MetroPCS Communications Inc., SEC Form 10-K, filed Mar. 1, 2010, at 5.

people, to 84.6 million people in October 2009, an increase of 28.6 million. According to American Roamer 2008 and 2009 data, the coverage of Leap does not generally overlap with the coverage of MetroPCS, except near Philadelphia, PA and between Fresno and Sacramento, CA.

73. *Cox Communications.* Cox Communications (Cox) invested more than \$500 million in spectrum in the AWS and 700 MHz bands and the development of infrastructure in 2006 and 2008.¹⁷⁷ In 2008, Cox announced plans to deploy a 3G mobile wireless network in selected regions of the United States.¹⁷⁸ In 2009, Huawei Technologies announced that it had signed a contract with Cox Communications to supply CDMA 1x and EV-DO network infrastructure and equipment for a Cox Communications mobile wireless network.¹⁷⁹ Cox Enterprises, the parent company of Cox Communications, states that its planned mobile wireless services will be bundled with other Cox products and will initially be targeted at its existing customer base.¹⁸⁰ Similarly, an industry press report asserts that Cox's mobile wireless network deployment plans would focus on deploying in geographic markets where it already offers other products.¹⁸¹ Cox currently has about 6 million customers for its cable and broadband products.¹⁸²

2. Exit

74. Exit of service providers, whether through mergers, acquisitions, or discontinuance, affects the structure of the mobile wireless market and potentially exerts both negative and positive effects on competitive performance and consumer welfare, depending on details of the pre- and post-exit competitors in the market. The main potential negative effect of the exit of a competitor is that with fewer competitors remaining in the market, there is an increased possibility of higher prices, reduced quality of services, or a slower rate of innovation. The main potential positive effects of the exit of a competitor occur in the context of a merger or acquisition that creates a stronger competitor due to cost efficiencies or greater network coverage.¹⁸³ Since mergers and acquisitions can exhibit these positive and negative effects simultaneously, merger analysis typically involves a detailed analysis to evaluate the magnitude of the opposing effects and determine whether, on balance, the effects of the merger are positive or negative. If the cost savings generated by consolidation endow the merged provider with the ability to compete more effectively, consolidation could result in lower prices and new and innovative

¹⁷⁷ *Cox to Launch Next Generation Bundle with Wireless in 2009*, Press Release, Cox, Oct. 27, 2008. Cox holds the spectrum through the SpectrumCo LLC joint venture, the entity that purchased the AWS spectrum at the Commission's 2006 AWS-1 Auction and originally included three other cable operators. The other operators subsequently left the SpectrumCo venture, and Cox is the only remaining member. Marguerite Reardon, *Cox Wireless Coming in March*, CNET NEWS, Jan. 14, 2010, available at http://news.cnet.com/8301-30686_3-10434831-266.html.

¹⁷⁸ *Cox to Launch Next Generation Bundle with Wireless in 2009*, Press Release, Cox, Oct. 27, 2008; NCTA NOI Comments at 2.

¹⁷⁹ *See Huawei to Provide CDMA Technology for Cox Communications' Wireless Network*, Press Release, Huawei Technologies, Apr. 1, 2009. *See also*, Amol Sharma and Sarah Silver, *Huawei Tries to Crack U.S. Market*, WALL STREET JOURNAL, Mar. 26, 2009, at B2.

¹⁸⁰ *See Cox Enterprises, 2008 Annual Report*, at 3, available at <http://www.corporatereport.com/cox2008/index.html> (visited Apr. 20, 2010).

¹⁸¹ *See Amol Sharma and Vishesh Kumar, Cox Plans to Launch a Cellular Network*, WALL STREET JOURNAL, Apr. 8, 2009, at B5.

¹⁸² *See Cox, Cox Communications Fact Sheet*, <http://ww2.cox.com/aboutus/oklahomacity/newsroom/press-resources/fact-sheet.cox> (visited Jan. 4, 2010).

¹⁸³ *See Competition Policy*, at 238. *See also*, Daniel Birke and G. M. Peter Swann, *Network Effects and the Choice of Mobile Phone Operator*, JOURNAL OF EVOLUTIONARY ECONOMICS, 2006, 16: 65 – 84.

services for consumers.¹⁸⁴ However, if the consolidation substantially increases the size of the firm, there may be reduced competitive pressure on the firm, potentially leading to higher consumer prices or lower incentive to improve its consumer services.¹⁸⁵ Service providers in non-overlapping geographic markets are not considered competitors for present purposes.

75. *Mergers and Acquisitions.* Facilities-based providers have expanded their network coverage and capacity through mergers and acquisitions, as well as through increased investment and expansion of their existing assets. Through the years, the four nationwide facilities-based providers have all employed mergers or acquisitions as a growth strategy to realize nationwide networks.¹⁸⁶ A summary of significant mergers or acquisitions since 2005 involving a nationwide facilities-based provider and the exit of another facilities-based provider appears in Table 9.¹⁸⁷ The table provides an overview and background for the transactions discussed in detail below and indicates that each of the four nationwide facilities-based providers has used mergers or acquisitions to expand coverage since 2005. In many instances, the entities that were combined had not previously competed in the same geographic market; as a result these transactions resulted in the expansion of the coverage of the newly combined entity. In markets where the entities were significant competitors, the Commission may have required divestitures in specified markets as conditions of the transaction in order to prevent competitive harm.¹⁸⁸ Below we summarize these transactions and report on the status of divestitures that were required in some recent transactions.

Table 9
Selected Mergers and Acquisitions: 2005-2009

Year of Commission Approval	Merger
2005	Sprint/Nextel
2007	AT&T/Dobson
2008	AT&T/Aloha T-Mobile/Suncom Verizon Wireless/Rural Cellular Verizon Wireless/Alltel Sprint Nextel/Clearwire
2009	AT&T/Centennial

76. *Sprint Nextel – Sprint/Nextel and Sprint Nextel/Clearwire.* In 2005, Sprint combined its PCS and BRS holdings with Nextel’s Specialized Mobile Radio (SMR), PCS, and 2.5 GHz (BRS licenses

¹⁸⁴ See Jonathan B. Baker, *Developments in Antitrust Economics*, JOURNAL OF ECONOMIC PERSPECTIVES, 1999, 13: 1, 182.

¹⁸⁵ See *Economics of Regulation and Antitrust*, at 126.

¹⁸⁶ See Section III.B.1, Facilities-Based Providers, *supra*, for a discussion of the term “nationwide.”

¹⁸⁷ The Commission must consent to the transfer of control or assignment of all non pro-forma spectrum licenses used to provide wireless telecommunications services. 47 C.F.R. § 1.948.

¹⁸⁸ See, e.g., *AT&T-Centennial Order*, 24 FCC Rcd at 13915.

and EBS leases) spectrum holdings to create Sprint Nextel.¹⁸⁹ As discussed above, in 2008, Sprint Nextel and Clearwire combined their 2.5 GHz spectrum holdings into a new company, also named Clearwire. The Commission consented to this transaction in November 2008, and the companies closed their transaction later that month.¹⁹⁰

77. *AT&T – AT&T/Dobson, AT&T/Aloha, and AT&T/Centennial.* As mentioned in last year's *Report*, in November 2007, following Commission approval, AT&T acquired Dobson Communications Corporation, which held cellular, PCS, and AWS licenses and related assets, subject to divestitures in four markets.¹⁹¹ In February 2008, following Commission approval, AT&T acquired the 700 MHz spectrum holdings of Aloha Spectrum Holdings Company, which had acquired the licenses at auction in 2003.¹⁹²

78. More recently, on November 5, 2009, the Commission consented with conditions to AT&T's acquisition of Centennial Communications Corp. (Centennial).¹⁹³ On November 6, 2009, AT&T completed its acquisition of Centennial, with Centennial shareholders receiving approximately \$945 million in cash in exchange for their shares.¹⁹⁴ Centennial held cellular, PCS, and AWS spectrum and EBS leases. Using GSM-track technology, Centennial provided voice and data wireless service to approximately 633,100 wireless customers in two geographic clusters in the mainland United States in parts of Indiana, Michigan, and Ohio (the Midwest cluster) and parts of Louisiana, Mississippi, and Texas (the Southeast cluster).¹⁹⁵ It also provided mobile wireless service to approximately 424,400 subscribers in Puerto Rico and the U.S. Virgin Islands using CDMA-track technology.¹⁹⁶

79. The Commission determined that competitive harm was unlikely in most mobile wireless markets as a result of the *AT&T/Centennial* transaction, and that the public interest, convenience, and necessity were served by the transaction, subject to certain conditions imposed on the transaction in the Commission's *Memorandum Opinion and Order*.¹⁹⁷ To remedy likely anti-competitive harms in particular geographic markets stemming from the proposed transaction, the Commission required AT&T to divest virtually all of Centennial's mobile wireless assets in seven geographic markets, six in Louisiana and one in Mississippi.¹⁹⁸ The Commission also determined that the public interest would be served by requiring AT&T to honor the terms of Centennial's existing roaming agreements, and in some cases to

¹⁸⁹ The Commission consented to that merger in August, 2005. Applications of Nextel Communications, Inc. and Sprint Corporation For Consent to Transfer Control of Licenses and Authorizations, File Nos. 0002031766, *et al.*, WT Docket No. 05-63, *Memorandum Opinion and Order*, 20 FCC Rcd 13967 (2005).

¹⁹⁰ Sprint Nextel Corporation and Clearwire Corporation, Applications for Consent to Transfer Control of Licenses, Leases, and Authorizations, WT Docket No. 08-94, *Memorandum Opinion and Order*, 23 FCC Rcd 17570 (2008) (*Sprint Nextel-Clearwire Order*). See also, *Thirteenth Report*, 24 FCC Rcd at 6218, ¶¶ 59-60.

¹⁹¹ Applications of AT&T Inc. and Dobson Communications Corporation For Consent to Transfer Control of Licenses and Authorizations, File Nos. 0003092368 *et al.*, WT Docket No. 07-153, *Memorandum Opinion and Order*, 22 FCC Rcd 20295 (2007) (*AT&T-Dobson Order*).

¹⁹² Application of Aloha Spectrum Holdings Company LLC (Assignor) and AT&T Mobility II LLC (Assignee) Seeking FCC Consent For Assignment of Licenses and Authorizations, *Memorandum Opinion and Order*, 23 FCC Rcd 2234, 2337 ¶ 13 (2008); *Twelfth Report*, 23 FCC Rcd at 2241 ¶ 64.

¹⁹³ *AT&T-Centennial Order*.

¹⁹⁴ *AT&T Completes Acquisition of Centennial Communications*, Press Release, AT&T, Nov. 6, 2009. See also, AT&T Inc., SEC Form 8-K, filed Nov. 6, 2009.

¹⁹⁵ *AT&T-Centennial Order*, 24 FCC Rcd at 13919, ¶ 8.

¹⁹⁶ *Id.* at 13919, ¶ 9.

¹⁹⁷ *Id.* at 13981, ¶ 166.

¹⁹⁸ *Id.* at 13961, ¶ 111. The DOJ required divestiture in an additional market. *Id.* at 13926, ¶ 23.

potentially extend their duration beyond the terms in the original roaming contracts.¹⁹⁹ The Commission determined that the transaction, subject to the previously discussed conditions, would likely result in public interest benefits, including increasing the variety and quality of service and product offerings available to users of the Centennial wireless network,²⁰⁰ reducing the roaming fees of subscribers,²⁰¹ increasing the seamless network coverage available to subscribers,²⁰² and decreasing the amount of time required to upgrade the Centennial network to 3G and 4G quality and capacity.²⁰³

80. *T-Mobile – T-Mobile/Suncom.* In February 2008, following Commission approval, T-Mobile expanded its coverage footprint through its acquisition of Suncom, which held PCS spectrum and had operated in four states, Puerto Rico, and the U.S. Virgin Islands serving more than 1.1 million customers.²⁰⁴

81. *Verizon Wireless – Verizon Wireless/Rural Cellular Corporation and Verizon Wireless/Alltel.* In August 2008, following Commission consent that required divestitures in four markets, Verizon Wireless acquired Rural Cellular Corporation, which held cellular and PCS licenses covering markets in 12 states.²⁰⁵

82. In June 2008, Verizon Wireless announced that it had agreed to acquire the equity of Alltel for approximately \$5.9 billion and an aggregate transaction value of \$28.1 billion based on Alltel's projected net debt at closing of \$22.2 billion.²⁰⁶ Alltel held Cellular, SMR, PCS, and 700 MHz spectrum holdings, and was serving more than 13 million customers in markets in 34 states, including 57 primarily rural markets that Verizon Wireless did not serve.²⁰⁷ Verizon Wireless claimed that it expected to realize synergies with a net present value, after integration costs, of more than \$9 billion driven by reduced capital and operating expense savings.²⁰⁸ Verizon Wireless believed that the synergies of the merger would generate incremental cost savings of \$1 billion in the second year after closing.²⁰⁹ According to Verizon Wireless' Chief Executive Officer, the transaction would "create an enhanced platform of network coverage, spectrum and customer care to better serve the growing needs of both Alltel and Verizon Wireless customers for reliable basic and advanced broadband wireless services."²¹⁰ Verizon

¹⁹⁹ *Id.* at 13968, ¶ 129.

²⁰⁰ *Id.* at 13955-57, ¶¶ 94, 99, 100.

²⁰¹ *Id.* at 13955, ¶ 95.

²⁰² *Id.*

²⁰³ *Id.* at 13956, ¶¶ 96-98.

²⁰⁴ Applications of T-Mobile USA, Inc. and SunCom Wireless Holdings, Inc. For Consent to Transfer Control of Licenses and Authorizations and Petition for Declaratory Ruling that the Transaction is Consistent with Section 310(b)(4) of the Communications Act, *Memorandum Opinion and Order*, 23 FCC Rcd 2515, 2526 ¶ 27 (2008); *Twelfth Report*, 23 FCC Rcd at 2272, ¶¶ 67-68.

²⁰⁵ Applications of Cellco Partnership d/b/a Verizon Wireless and Rural Cellular Corporation, for Consent to Transfer Control of Licenses, Authorizations, and Spectrum Manager Leases, and Petitions for Declaratory Ruling that the Transaction is Consistent with Section 310(b)(4) of the Communications Act, WT Docket No. 07-208, *Memorandum Opinion and Order and Declaratory Ruling*, 23 FCC Rcd 12463, 12465 ¶ 3 (2008) (*Verizon-RCC Order*); *Thirteenth Report*, 24 FCC Rcd at 6217, ¶¶ 57-58.

²⁰⁶ *Verizon Wireless To Acquire Alltel; Will Expand Nation's Most Reliable Wireless Network*, Press Release, Verizon Wireless, June 5, 2008.

²⁰⁷ *Id.*

²⁰⁸ *Id.*

²⁰⁹ *Id.*

²¹⁰ *Id.*

Wireless and Alltel filed a series of applications to seek Commission approval of their transaction.²¹¹

83. The Commission approved the Verizon Wireless/Alltel transaction on November 4, 2008.²¹² The Commission conditioned its approval of the transaction on the companies divesting the licenses and related operational and network assets in five markets where the Commission found potential for competitive harm.²¹³ The Commission also conditioned the transaction on the companies' voluntary commitment to divest the licenses and related operational and network assets in 100 markets and on Verizon Wireless's voluntary commitments with respect to providing roaming services to other providers.²¹⁴ The companies closed their transaction on January 9, 2009.²¹⁵

84. *Divestitures.* The divestitures of the mobile wireless assets by Verizon Wireless and AT&T – as conditions of the *Verizon Wireless/Rural Cellular*, *Verizon Wireless/Alltel*, and *AT&T/Centennial* transactions, respectively – have not all received regulatory approval (by the Commission and the DOJ) as of the end of 2009.²¹⁶ Subject to regulatory approval, Verizon Wireless has agreed to divest to AT&T 79 of the 105 service areas covered under the DOJ/Commission rulings on the *Verizon/Alltel* and *Verizon/Rural Cellular* transactions;²¹⁷ and has agreed to divest to Atlantic Tele-Network Inc. (ATN) the remaining 26 service areas covered under the DOJ/Commission rulings on the *Verizon Wireless/Alltel* transactions.²¹⁸ Subject to regulatory approval, AT&T has agreed to divest to Verizon Wireless five of the eight Centennial service areas covered under the DOJ/Commission

²¹¹ “Verizon Wireless and Atlantis Holdings LLC Seek FCC Consent to Transfer Licenses, Spectrum Manager and *De Facto* Transfer Leasing Arrangements, and Authorizations, and Request a Declaratory Ruling on Foreign Ownership,” WT Docket No. 08-95, *Public Notice*, 23 FCC Rcd 10004 (WTB 2008).

²¹² Applications of Cellco Partnership d/b/a Verizon Wireless and Atlantis Holdings LLC For Consent to Transfer Control of Licenses, Authorizations, and Spectrum Manager and *De Facto* Transfer Leasing Arrangements and Petition for Declaratory Ruling that the Transaction is Consistent with Section 310(b)(4) of the Communications Act, WT Docket No. 08-95, *Memorandum Opinion and Order*, 23 FCC Rcd 17444, 17546-47 ¶ 233 (2008) (*Verizon Wireless-Alltel Order*).

²¹³ *Id.* at 17491-93, ¶¶ 100-106.

²¹⁴ *See id.* at 17515-16, 17524-25, 17546-47, ¶¶ 157, 178-181, 233. The Commission conditioned its approval of the transaction on Verizon Wireless's compliance with a voluntary commitment to phase out its requests for federal high-cost universal service support over a five-year transition period and with a voluntary commitment to use counties for measuring compliance with the Commission's wireless E911 location accuracy rules governing handset-based technologies. *Id.* at 17532-33, ¶¶ 197 & 201.

²¹⁵ *Verizon Wireless Completes Purchase of Alltel; Creates Nation's Largest Wireless Carrier*, Press Release, Verizon Wireless, Jan. 9, 2009.

²¹⁶ For a discussion of the divestiture requirements of these transactions, *see Verizon-RCC Order* 23 FCC Rcd at 12512-15, ¶¶ 110-122; *Verizon Wireless-Alltel Order*, 23 FCC Rcd 17491-93, 17515-18, ¶¶ 99-106, 157-162; *AT&T-Centennial Order*, 24 FCC Rcd 13960-63, ¶ 109-119.

²¹⁷ *AT&T Updates Anticipated Completion Date of Divestiture Properties From Verizon Wireless*, Press Release, AT&T, Dec. 11, 2009. *See* “AT&T Inc. and Cellco Partnership d/b/a Verizon Wireless Seek FCC Consent To Assign or Transfer Control of Licenses and Authorizations and Modify a Spectrum Leasing Arrangement,” WT Docket No. 09-104, *Public Notice*, 24 FCC Rcd 8171 (WTB 2009). These service areas include areas in Alabama, Arizona, California, Colorado, Iowa, Kansas, Michigan, Minnesota, Montana, Nebraska, Nevada, New Mexico, North Dakota, South Dakota, Tennessee, Utah, Virginia and Wyoming. *See AT&T to Acquire Divestiture Properties from Verizon Wireless, Enhance Network Coverage and Customer Service*, Press Release, AT&T, May 8, 2009.

²¹⁸ *See* “Atlantic Tele-Network, Inc. and Verizon Wireless Seek FCC Consent To Assign or Transfer Control of Licenses and Authorizations,” WT Docket No. 09-119, *Public Notice*, 24 FCC Rcd 9035 (WTB 2009); Verizon Communications, Inc., SEC Form 10-Q, filed Oct. 29, 2009, at 8.

rulings.²¹⁹ The Commission has stated that divestiture transactions are evaluated, upon receipt of the application(s) for transfers, by the same competitive and public interest criteria that the Commission regularly applies to transactions.²²⁰

²¹⁹ *AT&T Completes Acquisition of Centennial Communications*, Press Release, AT&T, Nov. 6, 2009. See “Cellco Partnership d/b/a Verizon Wireless and AT&T Inc. Seek FCC Consent To Assign or Transfer Control of Licenses and Authorizations and Request a Declaratory Ruling on Foreign Ownership,” WT Docket No. 09-121, *Public Notice*, 24 FCC Rcd 11314 (WTB 2009).

²²⁰ *Verizon Wireless-Alltel Order*, 23 FCC Rcd at 17518, ¶ 162.

IV. MOBILE WIRELESS SERVICES: PROVIDER CONDUCT

85. In addition to industry structure, a second key element of our analysis of competition in the mobile wireless services sector is an examination of the conduct of mobile wireless services providers—in particular, whether they engage in price and non-price rivalry.

86. During 2008 and 2009, mobile wireless service providers continued to compete on the basis of pricing plans as well as on various non-price factors, such as network upgrades; product information and perception, which include advertising and marketing; and downstream product differentiation, which includes handset/device and application offerings.²²¹ Indicators of non-price rivalry, which are discussed in detail below, include technology deployment and upgrades, advertising and marketing strategies and expenditures, and handsets/devices and application offerings.

A. Price Rivalry: Developments in Mobile Service Pricing Plans

87. One way that mobile wireless providers compete is through differentiated pricing plans. In the mobile wireless sector, we observe varying pricing levels and structures, for varying service packages, with various handsets and policies on handset pricing. Today, all of the nationwide service providers, and many smaller operators, offer some version of a national flat-rate pricing plan in which customers can purchase a “bucket” of minutes to use on a nationwide or nearly nationwide network without incurring roaming or long-distance charges. All the nationwide service providers also offer some version of a family plan.²²²

88. Operators have experimented with various types of “unlimited” calling options.²²³ For example, some providers offer “calling circle” plans that allow subscribers unlimited free calling to and from a small number of designated numbers, regardless whether they are for wireline or wireless phone,²²⁴ while other providers offer plans that provide for free calls only to customers who use the same mobile wireless provider (“on-net” mobile-to-mobile options).²²⁵ In 2008, unlimited national flat-rate calling plans were launched by all the nationwide operators,²²⁶ and then spread from postpaid service to the prepaid and reseller segment of the market.²²⁷ Both postpaid and prepaid versions of these unlimited flat-rate plans include bundled options that combine unlimited nationwide calling with either unlimited text messaging or unlimited use of other data services as well as text messaging.²²⁸ Finally, a number of smaller, regional, and multi-metro providers, like Leap and MetroPCS, also have been offering unlimited local calling plans.²²⁹ As detailed below, the pricing conduct of mobile wireless providers in 2009 and early 2010 included changes in the monthly price of service plans, the attachment of additional features to existing plans, the introduction of new pricing options for customers who choose to forego discounted handsets, and the launch of new unlimited prepaid service offerings.

²²¹ See CTIA NOI Comments, at 63-64.

²²² See *Tenth Report*, 20 FCC Rcd at 15946, ¶ 98.

²²³ See *Twelfth Report*, 23 FCC Rcd at 2292, ¶ 113; CTIA PN Comments at 24-28.

²²⁴ *Eleventh Report*, 21 FCC Rcd at 10984, ¶ 91. See also Allie Winter, *Verizon Wireless Apes Alltel's My Circle With New Small Businesses Calling Plan*, RCR WIRELESS NEWS, June 11, 2008 (reporting that, in June 2008, Verizon Wireless also introduced a new plan for businesses, allowing unlimited calling between a Verizon Wireless number and up to five wireline numbers for \$5 per line).

²²⁵ *Eleventh Report*, 21 FCC Rcd at 10984, ¶ 91.

²²⁶ *Thirteenth Report*, 24 FCC Rcd at 6244, ¶ 112.

²²⁷ *Id.* at 6246, ¶ 118.

²²⁸ *Id.* at 6247, ¶ 120.

²²⁹ See *id.* at 6295, ¶ 231; RTG PN Comments at 10.

1. Postpaid Service

89. In the period since the release of the *Thirteenth Report*, pricing competition among the nationwide service providers in the postpaid market initially centered on changes in the composition of pricing plans, rather than outright price cuts.²³⁰ In general, there were three types of postpaid price changes: new features added to existing price plans, new unlimited calling plans, and ancillary terms and conditions. Each is described in turn below.

90. *New Pricing Features.* Some of the nationwide operators further differentiated their service plans by attaching additional features to existing plans, without changing core components such as the monthly recurring charge and the number of “anytime” minutes offered in each tier.²³¹ While the monthly bill remains unchanged, the additional features are designed to create a perception that consumers are getting more value for their money. For example, in September 2009, AT&T introduced its “A-List” calling feature, which allows unlimited mobile calling to and from any five “VIP” domestic phone numbers for individual plans, and any ten numbers for family plans.²³² The A-List feature, which was included at no additional charge with individual and family plans offering a minimum number of anytime minutes, was designed to compete with earlier unlimited “calling circle” options, such as T-Mobile’s myFaves and Verizon Wireless’s Friends and Family options.²³³ Also in September 2009, Sprint Nextel launched its “Any Mobile, Anytime” feature, which allows unlimited mobile-to-mobile calling to any domestic wireless number, rather than just a limited selection of designated wireless and wireline numbers.²³⁴ The Any Mobile, Anytime feature was offered at no additional charge with Sprint Nextel’s existing “Everything Data” plan, and was included with individual and family plans offering buckets of anytime minutes for calls to and from wireline numbers.²³⁵

91. *Unlimited Calling Plans.* The focus of price competition now appears to be shifting to unlimited service offerings. In an effort to reduce churn, T-Mobile introduced a lower-priced version of its unlimited national voice calling plan in the first quarter of 2009, but limited its availability to select existing customers.²³⁶ With the subsequent launch of its new “Even More” plans in October 2009, T-Mobile reset prices on tiered offerings at significant discounts to its legacy plans, and brought its pricing structure more closely into line with that of Sprint Nextel, the least expensive nationwide service provider.²³⁷ The biggest pricing changes were made on T-Mobile’s unlimited service offerings, which include bundled voice, text and data offerings as well as an unlimited voice-only calling plan.²³⁸ At the same time, T-Mobile discontinued its myFaves unlimited calling circle offer.²³⁹

²³⁰ David W. Barden, *et al.*, *Wireless Service and Handset Pricing – Pressure Building*, Bank of America, Equity Research, Oct. 5, 2009, at 6 (*Wireless Service and Handset Pricing – Pressure Building*).

²³¹ *Id.* at 1, 5.

²³² *Id.* at 6.

²³³ *Id.*

²³⁴ *Id.*

²³⁵ *Id.*; John C. Hodulik, *et al.*, *Waiting for T-Mobile to Pull the Price Lever*, UBS, Global Equity Research, Oct. 12, 2009, at 3 (*T-Mobile Price Lever*).

²³⁶ *T-Mobile Price Lever*, at 3; Craig Moffet, *et al.*, *U.S. Wireless '09: A Recipe for Disaster?*, Bernstein Research, Mar. 5, 2009, at 15 (*Recipe for Disaster*).

²³⁷ David W. Barden, *et al.*, *Wireless Service and Handset Pricing – Tick Tock*, Bank of America, Equity Research, Jan. 10, 2010, at 1-2, 5-6 (*Wireless Service and Handset Pricing – Tick Tock*); *Wireless Service and Handset Pricing – Pressure Building*, at 1, 3.

²³⁸ *Wireless Service and Handset Pricing – Tick Tock*, at 1-2, 5.

²³⁹ *Id.* at 5.

92. Even before T-Mobile launched its new pricing plans, Verizon Wireless and AT&T priced their postpaid service offerings at a premium relative to those of T-Mobile and Sprint Nextel.²⁴⁰ According to analysts, this premium reflected the willingness of consumers to pay higher prices for access to preferred handsets and data offerings,²⁴¹ and in Verizon Wireless's case, positive perceptions of its network.²⁴² T-Mobile's price changes appear to have prompted Verizon Wireless and AT&T to narrow the price premium on unlimited service offerings.²⁴³ In January 2010, Verizon Wireless reduced the prices of its unlimited voice plans for both individual and shared family offerings.²⁴⁴ Later the same day, AT&T responded to Verizon Wireless's changes with matching price reductions on its unlimited voice plans.²⁴⁵ While Verizon Wireless's and AT&T's unlimited plan price cuts were significant, their postpaid service offerings remained the most expensive in the industry, even following these price changes, as the prices of Sprint Nextel's and T-Mobile's equivalent or comparable unlimited plans had already declined sharply.²⁴⁶

Table 10
Comparison of Unlimited Pricing Plans²⁴⁷

	Verizon Wireless	AT&T	T-Mobile	Sprint Nextel
Voice	\$69.99	\$69.99	\$59.99	Not offered
Voice + Text	\$89.99	\$89.99	\$69.99	Not offered
Voice + Text + Basic Data	\$99.99	\$99.99	\$79.99	Not offered
Voice + Text + Smartphone Data	\$119.99	\$119.99	\$99.99	\$99.99

93. *Ancillary Terms and Conditions.* While Verizon Wireless and AT&T shared a virtually identical tiered pricing structure before and after these pricing changes, in the past year Verizon Wireless has differentiated its pricing from that of AT&T and the other two national operators in three interrelated areas: early termination fees (ETFs), data plan requirements for advanced devices, and handset pricing and subsidies.

94. Under the postpaid handset subsidy model, customers are required to sign a one- to two-year service contract in exchange for purchasing a handset at a discount, and are subject to paying an ETF if they cancel their wireless service before the term of their service contract expires. In November 2009, Verizon Wireless introduced a new two-tiered structure for ETFs. The ETF starts at one amount for

²⁴⁰ *Id.* at 6; *Recipe for Disaster*, at 26.

²⁴¹ *Recipe for Disaster*, at 26.

²⁴² Roger Cheng, *Wal-Mart Wireless Expands*, *Wall Street Journal*, Oct. 15, 2009. *See also*, Roger Entner, *When Choosing a Carrier, Does the iPhone Really Matter?*, NIELSENWIRE, Aug. 10, 2009, at 2 (noting that “the number of consumers who perceive Verizon Wireless as having the best mobile network has shot up over the last two years and it leads its closest competitor now by an almost 2:1 margin”).

²⁴³ *T-Mobile Price Lever*, at 2.

²⁴⁴ *Verizon Wireless Offers Simple, Affordable Convenience With New Unlimited Voice Plans*, Press Release, Verizon Wireless, Jan. 15, 2010; Simon Flannery *et al.*, *Quick Comment: Verizon's Price Plan Changes Should Not Rattle Postpaid Market*, Morgan Stanley, Equity Research, Jan. 15, 2010, at 1-2 (*Verizon's Price Plan Changes*).

²⁴⁵ *AT&T Announces New Unlimited Plans*, Press Release, AT&T, Jan. 15, 2010.

²⁴⁶ Jonathan Chaplin, *et al.*, *Breaking View: VZ Pricing Changes Not Deflationary*, Credit Suisse, Equity Research, Jan. 15, 2010, at 1, 6.

²⁴⁷ Tony Adam, *The Ultimate Cell Phone Plans Comparison*, BillShrink.com, Jan. 18, 2010, available at <http://androidandme.com/2010/01/news/billshrink-compares-smartphone-data-plans-t-mobile-comes-out-on-top/>.

regular handsets, and double that amount for designated “advanced devices.”²⁴⁸ In either case, the ETF declines over time by a fixed amount for each full month of service completed by the customer, consistent with the policy of pro-rating ETFs instituted by Verizon Wireless in November 2006.²⁴⁹ Customers can also opt out of ETFs altogether by paying the full retail price upfront for advanced devices or regular handsets and choosing Verizon Wireless’s month-to-month contract option.²⁵⁰

95. Purchase of a monthly data plan is typically a requirement for smartphones such as the iPhone and its closest competitors. In January 2010, along with the pricing changes on its unlimited voice plans, Verizon Wireless introduced a three-tiered structure of data plan requirements for handsets.²⁵¹ Verizon Wireless extended a requirement to purchase a 25 MB monthly data package from two devices to its entire line of 3G “multimedia” handsets. For more advanced 3G smartphones, including the Motorola Droid, Blackberry Storm, and Palm Pre, a more expensive 5 GB monthly data plan is still required. Customers using traditional handsets (labeled “simple feature” phones) have the option of purchasing the 25 MB data package, the unlimited monthly data package, or they can also continue to access mobile broadband and data services using a pay-as-you-go or pay-per-use pricing option by paying a fixed per-MB fee.²⁵²

96. The doubling of the ETF for advanced devices and the expansion of data plan requirements for multimedia phones followed a move by Verizon Wireless to discount handsets in the second half of 2009.²⁵³ One analyst estimates that, in the third quarter of 2009, Verizon Wireless lowered its average smartphone selling price 39 percent through discounts and promotions.²⁵⁴ According to the analyst, Verizon Wireless offered the least expensive average smartphone price after discount beginning in the third quarter of 2009 and continuing through the fourth of quarter of 2009.²⁵⁵ The same analyst argues that Verizon Wireless’s move to discount the prices of smartphones aggressively is a response to the launch of the iPhone 3GS and the lower price of the legacy 3G iPhone.²⁵⁶ The mandating of data plans for all new enhanced devices, with the resulting addition of a minimum monthly service charge for active data users, is interpreted by the analyst as a way of “cushioning the cost of additional handset

²⁴⁸ Letter from Ruth Milkman, Chief, Wireless Telecommunications Bureau, FCC, and Mark Stone, Acting Chief, Consumer and Governmental Affairs Bureau, FCC, to Steven E. Zipperstein, Vice President – Legal and External Government Affairs, General Counsel and Secretary, Verizon Wireless, WT Docket No. 05-194, CG Docket No. 09-158, (Dec. 18, 2009) (*WTB ETF Letter to Verizon Wireless*).

²⁴⁹ *Twelfth Report*, 23 FCC Rcd at 2293, ¶ 115; *Verizon Wireless Expands the ‘Worry-Free Wireless Guarantee’ It Pioneered*, Press Release, Verizon Wireless, Nov. 16, 2006. Verizon Wireless reduces its \$175 ETF for regular handsets by \$5 per month for each full month the customer retained Verizon Wireless’s service, while it reduces its \$350 ETF for designated advanced devices by \$10 per month for each full month of service completed by the customer.

²⁵⁰ *Thirteenth Report*, 24 FCC Rcd at 6245, ¶ 115; *Verizon Wireless Statement on Wireless Service Pricing Options*, Press Release, Verizon, Nov. 9, 2009.

²⁵¹ *Verizon Wireless Offers Simple, Affordable Convenience With New Unlimited Voice Plans*, Press Release, Verizon Wireless, Jan. 15, 2010; Jonathan Chaplin, et al., *Breaking View: VZ Pricing Changes Not Deflationary*, Credit Suisse, Equity Research, Jan. 15, 2010, at 1, 6; *Verizon’s Price Plan Changes*, at 1.

²⁵² *Verizon Wireless Offers Simple, Affordable Convenience With New Unlimited Voice Plans*, Press Release, Verizon Wireless, Jan. 15, 2010. See also, *Thirteenth Report*, 24 FCC Rcd at 6246-48, ¶¶ 119-122, for a detailed discussion of the variety of pricing options for mobile broadband and data services.

²⁵³ *Wireless Service and Handset Pricing – Tick Tock*, at 9-10; *Wireless Service and Handset Pricing – Pressure Building*, at 1-2.

²⁵⁴ *Wireless Service and Handset Pricing – Pressure Building*, at 1-2, 16.

²⁵⁵ *Id.* at 16; *Wireless Service and Handset Pricing – Tick Tock*, at 9.

²⁵⁶ *Wireless Service and Handset Pricing – Pressure Building*, at 1-2.

discounts.”²⁵⁷

97. As noted in the *Thirteenth Report*, Verizon Wireless also offers a month-to-month pricing option that allows customers to purchase the company’s nationwide postpaid pricing plans without signing a one- to two-year service contract, provided the customers either purchase new devices at the full retail price or use their own technologically compatible devices.²⁵⁸ Customers who choose the month-to-month option pay the same recurring monthly charge as customers who purchase handsets at a discount, but unlike the latter they can terminate their service at the end of any month without paying an ETF. T-Mobile introduced a differentiated version of this pricing option, called “Even More Plus,” in the fall of 2009. The different tiers of Even More Plus correspond to those of T-Mobile’s Even More pricing plans, but handset prices are not discounted, no annual contract is required and the recurring monthly charges are lower.²⁵⁹ Thus, in contrast to Verizon Wireless’s month-to-month option, T-Mobile’s Even More Plus plan gives customers the option of paying a lower monthly price than the equivalent Even More plan if they purchase their handsets at the full retail price.²⁶⁰

2. Prepaid Service

98. In the United States, most mobile wireless subscribers pay their phone bills after they have incurred charges, which requires service providers to extend credit to their customers. This approach is known as postpaid service.²⁶¹ Prepaid service, in contrast, requires customers to pay for service prior to making calls. Prepaid plans typically produce lower ARPU’s and higher churn rates in comparison to postpaid service.²⁶² For these reasons, the industry generally had not heavily promoted prepaid offerings in the past.²⁶³ More recently, however, the pool of unsubscribed customers qualified for postpaid plans declined to the point where prepaid offerings, which do not require credit checks, have become more attractive to service providers.²⁶⁴ In response, some service providers have introduced new prepaid plans, or entire “flanker brands,” for prepaid service.²⁶⁵ In some cases, providers have tailored prepaid offerings to suit segments of the market that do not want or cannot get a traditional service plan, particularly the youth market segment. As one 2009 analyst report put it, “As penetration of cellular phones has increased among more attractive demographics, providers have increasingly offered and promoted prepaid plans as they dig deeper and deeper into younger and poorer demographics to sustain growth.”²⁶⁶ In addition to facilities-based providers, many MVNOs offer prepaid plans rather than standard monthly billing.

99. The prepaid service segment has evolved in recent years due in part to the introduction and growth of unlimited prepaid service offerings.²⁶⁷ As one analyst explained, “The prepaid market used

²⁵⁷ *Id.* at 2.

²⁵⁸ *Thirteenth Report*, 24 FCC Rcd at 6245, ¶ 115.

²⁵⁹ T-Mobile, *Plans*, http://www.t-mobile.com/shop/plans/Cell-Phone-Plans-Overview.aspx?WT.z_HP=shop_plans_DL (visited Feb. 22, 1010).

²⁶⁰ Saul Hansell, *Is There is Method in Cellphone Madness?*, NEW YORK TIMES, Nov. 15, 2009.

²⁶¹ See Section V.A.2, Mobile Wireless Subscribers by Pricing Plan, *infra*, for information on mobile wireless subscribers by pricing plan.

²⁶² *Twelfth Report*, 23 FCC Rcd at 2293-94, ¶ 116.

²⁶³ *Id.*

²⁶⁴ *Id.*

²⁶⁵ *Id.*

²⁶⁶ *Recipe for Disaster*, at 20.

²⁶⁷ Phil Cusick *et al.*, *Slumdog Millionaires*, Macquarie Capital, Equity Research, May 1, 2009, at 3 (*Slumdog Millionaires*).

to be fairly homogenous, with customers buying minutes ahead of time on a card, or ‘European Style,’ and in general far overpaying for handsets and minutes relative to postpaid customers.”²⁶⁸ This kept prepaid usage and ARPU low. However, with the growth of unlimited prepaid offerings, among other developments, there is a trend to lower per-minute rates and increased usage and ARPU in prepaid services. As a result, analysts stress that the market segment for prepaid service appears to be “bifurcating” into a low-end segment and a high-end segment.²⁶⁹ The low-end segment comprises traditional pay-as-you-go prepaid service, while the high-end segment encompasses unlimited (“all you can eat”) prepaid offerings.

100. Tracfone Wireless is generally regarded as the leader in the low-end prepaid niche.²⁷⁰ Although Tracfone’s rates are slightly higher on a per minute basis than those of alternative prepaid offerings, the company targets low-usage and safety-oriented customers whom other prepaid service providers are reluctant to go after because the average monthly revenue per user (ARPU) they generate, at around \$10-12, is so low.²⁷¹ Tracfone purchases minutes predominantly from AT&T and resells them through a national distribution network under various brands, including Tracfone, Net10, and Safelink.²⁷² The company’s phones and prepaid calling cards are sold at Wal-Mart Stores, Target, and RadioShack, in addition to drug stores and other local retail outlets.²⁷³ Analysts attribute much of Tracfone’s recent subscriber growth to its Safelink offer, a program supported by the Universal Service Fund (USF) that provides a free cell phone and credit for a limited amount of free monthly wireless service to eligible low-income families.²⁷⁴

101. The unlimited prepaid segment includes the earliest unlimited prepaid providers, Leap and MetroPCS, and more recent unlimited prepaid players such as Sprint Nextel’s Virgin Mobile and Boost Mobile prepaid brands.²⁷⁵ The latest entrant to the unlimited prepaid segment is Tracfone’s “Straight Talk” service, which became nationally available in October 2009 after a limited trial service that began the previous summer.²⁷⁶ As with other Tracfone prepaid brands, the Wal-Mart store chain distributes Straight Talk handsets and service.²⁷⁷ Unlike Tracfone’s other prepaid brands, however, Straight Talk runs on Verizon Wireless’s network and was initially marketed with Verizon Wireless’s name and logo on the box.²⁷⁸ In addition, whereas other Tracfone brands are targeted at low-usage customers in the traditional pay-as-you-go prepaid segment, Straight Talk’s unlimited prepaid offerings

²⁶⁸ *Slumdog Millionaires*, at 3.

²⁶⁹ Craig Moffett *et al.*, *U.S. Wireless Industry Scorecard: The Haves and the Have-Nots Diverge*, Bernstein Research, Nov. 6, 2009, at 1, 9 (*The Haves and the Have-Nots Diverge*); *Slumdog Millionaires*, at 4.

²⁷⁰ *The Haves and the Have-Nots Diverge*, at 9; *Slumdog Millionaires*, at 1; Roger Cheng, *TracFone’s Prepaid Niche*, WALL STREET JOURNAL, Mar. 4, 2009 (*TracFone’s Prepaid Niche*).

²⁷¹ *TracFone’s Prepaid Niche*; *Slumdog Millionaires*, at 4, 24.

²⁷² *Slumdog Millionaires*, at 24; CTIA PN Comments at 26.

²⁷³ *TracFone’s Prepaid Niche*.

²⁷⁴ *The Haves and the Have-Nots Diverge*, at 10; *Slumdog Millionaires*, at 25; *TracFone’s Prepaid Niche*.

²⁷⁵ See Verizon Wireless PN Comments at 6 (“Prepaid and no-contract options for consumers are growing, and though they’ve been pioneered by smaller companies, the national providers are starting to respond to this competition by expanding their own prepaid and no-contract options”); CTIA PN Comments at 24-26.

²⁷⁶ Roger Cheng, *Wal-Mart Wireless Expands*, WALL STREET JOURNAL, Oct. 15, 2009 (*Wal-Mart Wireless Expands*).

²⁷⁷ *Wal-Mart Wireless Expands*.

²⁷⁸ *Wal-Mart Wireless Expands*; Craig Moffett *et al.*, *Weekend Media Blast: Tilt*, Bernstein Research, Jul. 10, 2009, at 1 (*Weekend Media Blast: Tilt*).

are targeted at customers with higher usage and ARPU.

102. Prepaid service providers have been the most aggressive in cutting the price of unlimited service offerings.²⁷⁹ In January 2009, Sprint Nextel reduced the monthly charge on its Boost Unlimited voice and data plan to roughly half the price of the cheapest postpaid version of an unlimited voice and data offering then available.²⁸⁰ One analyst argues that stranded capacity on Sprint Nextel's iDEN network was the incentive for Sprint Nextel to offer the Boost Unlimited plan at a substantial discount to existing unlimited offerings.²⁸¹ The unlimited voice, text and data offering launched by Tracfone under the Straight Talk brand later that same year was initially priced at a slight discount to Boost's unlimited voice and data plan.²⁸² In light of these unlimited prepaid offerings, one analyst estimated that all-you-can-eat plans have dropped by as much as 55 percent since the first unlimited national flat-rate calling plan was launched by Verizon Wireless in February 2008.²⁸³

103. Analysts see both the Straight Talk unlimited offering and the Boost Unlimited plan as competitive threats to unlimited players Leap and MetroPCS.²⁸⁴ Following the launch of Tracfone's low-priced service offering, MetroPCS enhanced its unlimited local calling plan in August 2009 by reducing the monthly charges for add-on features such as text messaging and various other data services.²⁸⁵ Leap responded with similar changes to the pricing of add-on features for its Cricket service plans shortly thereafter.²⁸⁶ MetroPCS made another round of similar price cuts to add-on features in the fourth quarter of 2009, and Leap again followed suit.²⁸⁷ With each round of changes, MetroPCS and Leap lowered the monthly recurring charge for applicable features by five to ten dollars.²⁸⁸

B. Non-Price Rivalry

104. In addition to price, mobile wireless service providers compete on many other dimensions. This section identifies three broad categories of non-price rivalry among mobile wireless service providers: 1) network upgrades; 2) product information and perception, which include advertising and marketing; and 3) downstream product differentiation, which includes handset/device and application offerings.²⁸⁹ Indicators of non-price rivalry, which are discussed in detail below, include technology deployment and upgrades, advertising and marketing expenditures, and handsets/devices and application offerings.

1. Network Coverage and Technology Upgrades

105. Network investment remains a centerpiece of providers' efforts to improve their customers' mobile wireless service experience. During 2008 and 2009, mobile wireless service providers continued to improve the coverage, capacity, and capabilities of their networks, focusing largely on the

²⁷⁹ *Recipe for Disaster*, at 16.

²⁸⁰ *Id.* at 14; *Slumdog Millionaires*, at 5, 16.

²⁸¹ *Slumdog Millionaires*, at 5.

²⁸² *Wal-Mart Wireless Expands; Weekend Media Blast: Tilt*, at 1.

²⁸³ *Weekend Media Blast: Tilt*, at 1.

²⁸⁴ *Wal-Mart Wireless Expands; Recipe for Disaster*, at 14.

²⁸⁵ *Wireless Service and Handset Pricing – Pressure Building*, at 6-7.

²⁸⁶ *Id.* at 7.

²⁸⁷ *Wireless Service and Handset Pricing – Tick Tock*, at 2-3.

²⁸⁸ *Wireless Service and Handset Pricing – Pressure Building*, at 6-7; *Wireless Service and Handset Pricing – Tick Tock*, at 2-3.

²⁸⁹ See CTIA NOI Comments, at 63-64.

upgrade and expansion of mobile broadband networks to enable high-speed Internet access and other data services for their customers.²⁹⁰

106. Industry analysts and commenters have highlighted the key role that mobile broadband networks – and the products, services, and applications that rely on them – play in mobile wireless competition. As mobile voice service has become commoditized and mobile voice penetration is reaching saturation, one way that mobile wireless service providers are differentiating themselves is with the speeds, reliability, capabilities, and coverage of their mobile broadband networks and with the handsets/devices, applications, and other products and services that run on those networks. According to one analyst, “[C]arriers with the most attractive, feature rich smartphones and robust networks have been performing strongly. ... [S]uccess for the carriers who compete in the high end will largely hinge on retailing and upselling more data services.”²⁹¹

107. As a component of investing in their networks, service providers can improve capacity, coverage, and service quality through their spectrum positions. As mentioned elsewhere in the *Report*, service providers have added to their spectrum holdings in recent years through the Commission’s spectrum auctions, the purchase of licenses in the secondary market, and mergers and acquisitions.²⁹² These spectrum acquisitions have enabled certain operators – including Leap, MetroPCS, and T-Mobile – to expand networks into new markets, and to improve and enhance networks in existing markets.²⁹³

108. The Commission has largely adopted flexible licensing policies that do not mandate any particular technology or network standard for commercial mobile wireless licensees. Mobile wireless service providers have the flexibility to deploy the network technologies and services they choose as long as they abide by certain technical parameters designed to avoid radiofrequency interference with adjacent licensees.²⁹⁴ As a result of this approach, different U.S. service providers have deployed, over the past 15 years, different digital network technologies with divergent technology migration paths. The two main migration paths for 2G, 2.5G, and 3G technologies have been the CDMA and GSM technology paths, as shown in Figure 2 below.²⁹⁵ The major CDMA and GSM service providers are now planning to deploy

²⁹⁰ See AT&T PN Comments at 16; AT&T NOI Comments at 36. As discussed in the *Thirteenth Report*, network upgrades in previous years have focused on improving voice quality and call-completion rates, minimizing dead zones and dropped calls, and adding calling features. Providers have addressed many of these issues by increasing the number of cell sites in their networks, and adding micro-cell sites, repeaters, and in-building wireless systems. See *Thirteenth Report*, 24 FCC Rcd at 6262, ¶ 159.

²⁹¹ Simon Flannery, *et al.*, *Telecom Services – 3Q09 Preview: Expecting Solid Earnings Despite Competition Concerns*, Morgan Stanley, Oct. 20, 2009, at 20.

²⁹² See Section III.D, Entry and Exit Conditions, *supra*, and Section VII.A.1, Spectrum, *infra*. Section VII.A.1 also highlights the key importance of spectrum holdings in influencing service providers’ network deployment costs and network capacity.

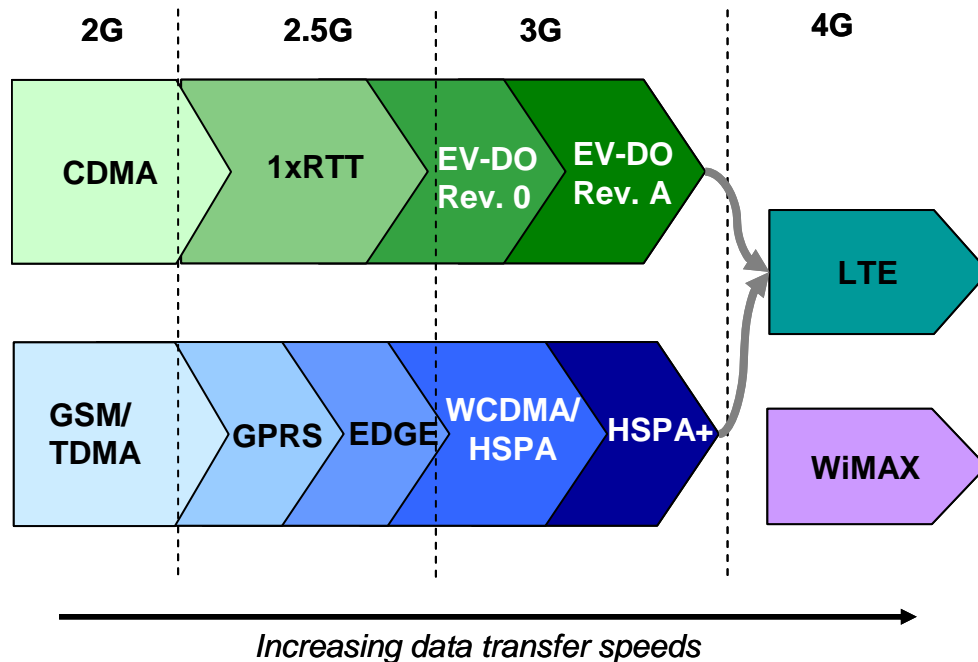
²⁹³ See Section III.E, Recent Entry and Exit, *supra*, and Section VII.A.1, Spectrum, *infra*. According to T-Mobile, “the launch of the 3G network also enables T-Mobile to accommodate and serve more customers more efficiently through the use of its AWS spectrum, effectively doubling T-Mobile USA’s spectrum position.” *T-Mobile USA Begins Commercial 3G Network Rollout*, Press Release, T-Mobile, May 5, 2008.

²⁹⁴ In contrast, the European Community mandated a single harmonized standard for second-generation mobile telecommunications services (GSM), and also has adopted a single standard for third-generation services (WCDMA). Neil Gandal, *et al.*, *Standards in Wireless Telephone Networks*, TELECOMMUNICATIONS POLICY, Vol. 27, No. 5-6, June-July 2003, at 325 (*Standards in Wireless Telephone Networks*). The authors note that, although the European Community backed away from mandating a single standard for third-generation services, the absence of a mandate has had little practical effect as all European mobile operators have opted for the same standard and migration path. *Id.* at 330.

²⁹⁵ Additional information on mobile wireless network technologies, including definitions, background, and average and peak download speeds for the various technologies, can be found in Appendix B, Mobile Wireless Network Technologies, *infra*.

LTE as a 4G technology.²⁹⁶ However, at least one other service provider is deploying an alternate 4G technology, WiMAX.

Figure 2
Mobile Wireless Network Technology Evolution



109. One advantage of compatibility between competing wireless networks is that greater economies of scale in the production of both terminals and network infrastructure equipment tend to lower the unit cost of handsets, chipsets, and other network equipment.²⁹⁷ Lower equipment costs, in turn, may promote more rapid adoption of mobile wireless services.²⁹⁸ In addition, standardization tends to produce greater variety of handsets.²⁹⁹ However, it has been argued that the Commission's market-based approach to wireless network standards helped to encourage the development of the CDMA wireless network technology.³⁰⁰ Competition among mobile wireless providers using incompatible wireless network technologies has other advantages that can benefit consumers, including greater product variety and differentiation of services,³⁰¹ more technological competition,³⁰² and greater price

²⁹⁶ See Table 11. See also, Verizon Wireless PN Comments at 8 (Verizon Wireless, AT&T, Cox, and MetroPCS have all announced plans to deploy LTE); CTIA PN Comments, Attach. A, at 14.

²⁹⁷ *Id.* at 329.

²⁹⁸ See Carl Shapiro and Hal R. Varian, *Information Rules*, Harvard Business School Press, 1999, at 264 (*Information Rules*) (noting that "the Europeans managed to adopt new digital wireless telephone technology more rapidly than in the United States"); Stephen C. Littlechild, *Mobile Termination Charges: Calling Party Pays Versus Receiving Party Pays*, TELECOMMUNICATIONS POLICY, Vol. 30, No. 5-6, June-July 2006, at 242-77 (finding that "technical concentration," measured as the percent of subscribers on GSM networks, increases mobile penetration).

²⁹⁹ *Standards in Wireless Telephone Networks*, at 329.

³⁰⁰ *Id.* at 328-30; *Information Rules*, at 264.

³⁰¹ *Standards in Wireless Telephone Networks*, at 329-330 (noting, for example, that CDMA networks "have offered more and better data services than were available on GSM networks").

competition.³⁰³

110. In addition to upgrading their networks for mobile broadband systems, as described below, mobile wireless operators are also taking steps to improve indoor coverage through the use of new technologies such as distributed antenna systems (DAS) and femtocells.³⁰⁴ DAS provides enhanced coverage in highly trafficked areas such as shopping malls and office buildings. Femtocells are personal cell sites that can be installed in a consumer's home; they receive cell phone signals within the home and nearby area and use an in-home broadband connection for the last-mile transport of calls and data transmissions.³⁰⁵ Several mobile wireless operators have made femtocells available to their customers to improve coverage in areas that might not otherwise have it.³⁰⁶

a. Service Provider Technology Deployments

111. During 2008 and 2009, the four nationwide mobile wireless service providers, as well as other mobile operators, continued to expand service into new markets and to upgrade their networks with mobile broadband technologies. Of the top four nationwide mobile wireless providers, AT&T and T-Mobile use GSM as their 2G digital technology and WCDMA as their 3G digital technology, while Verizon Wireless and Sprint Nextel followed a different technology path by upgrading their 2G CDMA technology to 3G EV-DO Rev. A technology.³⁰⁷ In addition, several providers have either begun to deploy 4G wireless technologies or announced plans to deploy 4G networks over the next few years, as shown in Table 11 below. For purposes of the report, we include the CDMA EV-DO and WCDMA/UMTS/HSPA technologies within the 3G category, and LTE and WiMAX in the 4G category. Additionally, we include all 3G and 4G network technologies in our discussion of mobile broadband. For additional information on mobile wireless network technologies, including the average and peak download speeds of the various technologies, can be found in Appendix B, Mobile Wireless Network Technologies, *infra*.

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³⁰² *Id.* at 330. See also *Eleventh Report*, 21 FCC Rcd at 10993, ¶ 113 (noting that the former Cingular was pressured to upgrade its network to WCDMA/HSDPA, rather than the slower, interim WCDMA technology, in an effort to compete with Verizon Wireless's EV-DO network, which offers speeds similar to WCDMA/HSDPA and faster than WCDMA) and at 11025-26 (arguing that this technological competition helped give the United States an edge over Europe with regard to the deployment of high-speed wireless data networks).

³⁰³ *Standards in Wireless Telephone Networks*, at 330. Technological competition may pressure providers to cut rates and provide larger handset subsidies to attract a sufficiently large customer base to ensure their chosen technology survives as a standard. See Simon Flannery *et al.*, *3G Economics a Cause for Concern*, Morgan Stanley, Equity Research, Feb. 1, 2005, at 11. In addition, use of multiple incompatible wireless network standards may act as a constraint on providers' ability to engage in explicit or tacit coordination that would impair price competition. See *Horizontal Merger Guidelines*, at § 2.11 (noting that standardization of pricing and product variables on which firms could compete may facilitate reaching terms of coordination that would harm consumers).

³⁰⁴ CTIA NOI Comments, at 16-17.

³⁰⁵ *Id.*

³⁰⁶ *Id.*

³⁰⁷ Sprint Nextel also uses iDEN on the former Nextel network. In addition, through February 18, 2008, all operators using cellular spectrum were required to deploy AMPS, an analog technology, throughout the part of their networks using cellular spectrum. 47 C.F.R. § 22.901(b). In 2002, the Commission decided to eliminate the requirement after a five-year transition period, which ended February 18, 2008. Year 2000 Biennial Regulatory Review – Amendment of Part 22 of The Commission's Rules to Modify or Eliminate Outdated Rules Affecting The Cellular Radiotelephone Service and Other Commercial Mobile Radio Services, *Report and Order*, 17 FCC Rcd 18401, 18414 ¶ 22 (2002).

Table 11
3G/4G Deployment by Selected Mobile Wireless Service Providers

Service Provider	3G Deployment	4G Deployment
AT&T Wireless	As of October 2009, HSPA network covered 230 million POPs in more than 350 metropolitan areas. ³⁰⁸	Plans LTE trials in 2010 and deployment in 2011. ³⁰⁹
Verizon Wireless	As of mid-2009, EV-DO network covered 284 million POPs. ³¹⁰	Expects to launch LTE in 25-30 markets in 2010 and to cover 285 million POPs by 2013. ³¹¹
Clearwire	NA	As of September 2009, WiMAX network covered over 10 million POPs, expected to cover 120 million POPs by end of 2010. ³¹²
Sprint Nextel	As of August 2009, EV-DO network covered 271 million POPs. ³¹³	Ownership interest in Clearwire and reselling Clearwire WiMAX service.
T-Mobile	As of August 2009, HSPA network covered 121 million POPs, expected to cover 200 million POPs by year-end 2009. ³¹⁴	No U.S.-specific plans.

112. The two nationwide CDMA operators, Verizon Wireless and Sprint Nextel, have deployed EV-DO and EV-DO Rev. A network technologies across significant portions of their networks. As noted in the *Thirteenth Report*, Verizon Wireless has upgraded its entire EV-DO network to EV-DO

³⁰⁸ *AT&T Brings 3G Mobile Broadband Network to Champaign-Urbana Area*, Press Release, AT&T, Oct. 8, 2009.

³⁰⁹ *AT&T to Deliver 3G Mobile Broadband Speed Boost*, Press Release, AT&T, May 27, 2009; *AT&T Doubling 3G Capacity*, TELEPHONY ONLINE, Apr. 20, 2009, available at <http://telephonyonline.com/wireless/news/att-3g-network-capacity-increase-0420/> (referring to statement by AT&T executive on use of 700 MHz and AWS spectrum).

³¹⁰ Verizon Wireless, *Network Facts*, http://aboutus.vzw.com/bestnetwork/network_facts.html (visited Oct. 7, 2009); *Verizon Reports Revenue Growth and Continued Improvement in Cash Flow in 2Q*, Press Release, Verizon, July 27, 2009.

³¹¹ See Presentation by Tom Sawanobori, Vice President of Network Technology and Strategy, Verizon Wireless, at FCC Workshop: Deployment Wireless – General, Aug. 12, 2009; *Verizon Uses New Network for First Time*, AP, Aug. 14, 2009.

³¹² See *Clearwire Introduces CLEAR(TM) 4G WiMAX Internet Service in 10 New Markets*, Press Release, Clearwire, Sept. 1, 2009; *Clearwire to Bring WiMAX to 10 More Markets*, Wireless – CNET News, Aug. 3, 2009; *Sprint 4G Blazes into Milledgeville*, Press Release, Sprint Nextel, Oct. 5, 2009; Clearwire, SEC Form 10-K, filed Mar. 26, 2009, at 2-3.

³¹³ *HTC Touch Pro2 from Sprint Pairs a Dynamic Must-Have Business Device with the Best Value in Wireless*, Press Release, Sprint Nextel, Aug. 31, 2009.

³¹⁴ Caroline Gabriel, *T-Mobile USA to Upgrade Network and Move to HSPA+ Next Year*, RETHINK WIRELESS, Sept. 16, 2009, at http://www.rethink-wireless.com/article.asp?article_id=1901&keywords=t-mobile (citing Cole Brodman, T-Mobile Chief Technology Officer).

Rev. A technology,³¹⁵ increasing download speeds for customers with Rev. A-capable devices from 400-700 kilobits per second (kbps) to 600 kbps-1.4 megabits per second (Mbps) and increasing upload speeds from 60-80 kbps to 500-800 kbps.³¹⁶ At the end of 2007, the EV-DO Rev. A network footprint covered approximately 240 million people.³¹⁷ Since that time, Verizon Wireless has added over 44 million POPs to its EV-DO Rev. A network footprint by expanding this network technology into new markets and acquiring Alltel's EV-DO network, which covered approximately 61 million POPs at the end of 2008.³¹⁸ As of mid-2009, Verizon Wireless's EV-DO Rev. A network covered 284 million people.³¹⁹ Verizon Wireless has also announced that it plans to deploy LTE as its 4G network technology beginning in 2010.³²⁰ LTE will further increase data rates; the company expects to deliver average download speeds of 5-12 Mbps.³²¹ LTE will also provide lower latency and enable global roaming in countries where Vodafone, a major investor in Verizon Wireless, operates.³²² Verizon Wireless expects to launch LTE in 25-30 U.S. markets in 2010 using its 700 MHz Band spectrum, and to expand LTE coverage to 210 markets covering 285 million people by 2013.³²³ The company is currently testing LTE in Boston and Seattle.³²⁴

113. Sprint Nextel continued to upgrade its network with EV-DO Rev. A technology during 2008 and 2009;³²⁵ however, the company's mobile broadband deployment efforts during the period

³¹⁵ *Thirteenth Report*, 24 FCC Rcd at 6254, ¶ 136; see also Verizon Wireless, *Network Facts*, http://aboutus.vzw.com/bestnetwork/network_facts.html (visited Oct. 7, 2009). When EV-DO subscribers travel to other parts of the country where EV-DO networks have not been deployed, they can seamlessly roam on and access Verizon Wireless's 1xRTT network because the more advanced technologies on the CDMA migration path are backwards compatible. See *Ninth Report*, 19 FCC Rcd at 20652.

³¹⁶ Verizon Wireless, *Mobile Broadband*, <http://www.verizonwireless.com/b2c/mobilebroadband/?page=coverage> (visited Jan. 14, 2010).

³¹⁷ *Thirteenth Report*, 24 FCC Rcd at 6254, ¶ 136.

³¹⁸ Verizon Communications, Inc., SEC Form 10-K, filed Feb. 24, 2009, at 8. Verizon Wireless stated in September 2009 that it planned to complete the upgrade of all of Alltel's EV-DO Rev. 0 markets to EV-DO Rev. A by the end of 2009. Verizon Wireless NOI Comments, at 82.

³¹⁹ Verizon Wireless, *Network Facts*, http://aboutus.vzw.com/bestnetwork/network_facts.html (visited Oct. 7, 2009); *Verizon Reports Revenue Growth and Continued Improvement in Cash Flow in 2Q*, Press Release, July 27, 2009, at <http://newscenter.verizon.com/press-releases/verizon/2009/verizon-reports-revenue.html>; Presentation by Tom Sawanobori, VP of Network Technology and Strategy, Verizon Wireless, FCC Workshop: Deployment Wireless – General, Aug. 12, 2009.

³²⁰ Presentation by Tom Sawanobori, VP of Network Technology and Strategy, Verizon Wireless, FCC Workshop: Deployment Wireless – General, Aug. 12, 2009; *Verizon Uses New Network for First Time*, AP, Aug. 14, 2009; *Thirteenth Report*, 24 FCC Rcd at 6254, ¶ 136.

³²¹ Presentation by Tom Sawanobori, VP of Network Technology and Strategy, Verizon Wireless, FCC Workshop: Deployment Wireless – General, Aug. 12, 2009; *Verizon Uses New Network for First Time*, AP, Aug. 14, 2009; *Thirteenth Report*, 24 FCC Rcd at 6254, ¶ 136.

³²² *Thirteenth Report*, 24 FCC Rcd at 6254, ¶ 136.

³²³ Presentation by Tom Sawanobori, VP of Network Technology and Strategy, Verizon Wireless, FCC Workshop: Deployment Wireless – General, Aug. 12, 2009; *Verizon Uses New Network for First Time*, AP, Aug. 14, 2009; CTIA NOI Comments at 33.

³²⁴ Presentation by Tom Sawanobori, VP of Network Technology and Strategy, Verizon Wireless, FCC Workshop: Deployment Wireless – General, Aug. 12, 2009; *Verizon Uses New Network for First Time*, AP, Aug. 14, 2009.

³²⁵ At the end of 2007, Sprint Nextel's EV-DO network covered nearly 234 million people and its EV-DO Rev. A network covered 222 million people. *Thirteenth Report*, 24 FCC Rcd at 6255, ¶ 137. As of August 2009, Sprint's EV-DO network covered 271 million POPs, including roaming, and had been deployed in census blocks covering 232 million POPs, excluding roaming. *HTC Touch Pro2 from Sprint Pairs a Dynamic Must-Have Business Device* (continued....)

focused on launching the resale of 4G WiMAX service in several markets in conjunction with its relationship with Clearwire. As discussed above, Sprint Nextel transferred its WiMAX network assets and 2.5 GHz spectrum holdings to Clearwire in 2008, and currently holds a majority ownership interest in the company.³²⁶ During 2009, Sprint Nextel began reselling Clearwire's WiMAX service in several markets across the country where Sprint Nextel also offers mobile wireless voice and data services over its own CDMA network.³²⁷ As of December 2009, Sprint Nextel was offering "Sprint 4G powered by WiMAX" in 27 markets.³²⁸ The company expects to launch 4G service in several additional markets – including Boston, Houston, New York, San Francisco, and Washington, D.C. – in 2010 and to offer service in 80 markets covering 120 million POPs by the end of 2010.³²⁹ As of January 2010, Sprint Nextel was offering a dual-mode USB (Universal Serial Bus) laptop card and mobile Wi-Fi hotspot device, which are compatible with both 4G WiMAX and 3G EV-DO networks.³³⁰

114. Apart from Sprint Nextel and Verizon Wireless, 22 other smaller, regional, and multi-metro CDMA operators also have deployed EV-DO technology within their networks.³³¹ For example, Leap had deployed EV-DO across nearly all of its network footprint, which covered approximately 91 million POPs as of September 2009.³³² Leap's covered POPs increased 36 percent from 67 million at the end of 2008, and 72 percent from 53 million at the end of 2007.³³³ In addition, US Cellular's EV-DO network has grown from covering one city at the end of 2006, to five markets at the end of 2008, to 75 percent of its customer base as of September 30, 2009.³³⁴ The EV-DO networks of the non-nationwide CDMA providers combined had been deployed in census blocks covering 113 million people, 40 percent of the U.S. population, as of November 2009.³³⁵ One additional CDMA operator, MetroPCS, has not upgraded its network with EV-DO but has announced that it plans to begin deploying LTE beginning in the second half of 2010 using its AWS spectrum licenses.³³⁶

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with the *Best Value in Wireless*, Press Release, Sprint Nextel, Aug. 31, 2009; American Roamer database, Aug. 2009.

³²⁶ See Section III.E, Recent Entry and Exit, *supra*. See also, Sprint Nextel, SEC Form 10-Q, filed Nov. 6, 2009, at 7.

³²⁷ Sprint Nextel, SEC Form 10-Q, filed Nov. 6, 2009, at 7.

³²⁸ *Sprint 4G Rollout Blazes on with Maui Launch*, Press Release, Sprint Nextel, Dec. 1, 2009; Sprint Nextel, SEC Form 10-Q, filed Nov. 6, 2009, at 20.

³²⁹ *Id.*

³³⁰ *Overdrive 3G/4G Mobile Hotspot by Sierra Wireless Can Bring Sprint's 4G Speeds to More Than 400 Million W-Fi-Enabled Devices*, Press Release, Sprint Nextel, Jan. 10, 2010; Sprint Nextel, *Turbocharge your Now Connection. Get 4G Speeds up to 10x Faster Than 3G*, <http://mobilebusiness.sprint.com/broadband/index.html?pid=5> (visited Jan. 19, 2010). Sprint is also offering a 4G-only desktop modem device. *Sprint 4G Desktop Modem CPEi25150 by Motorola Fact Sheet*, Press Release, Sprint Nextel, Dec. 14, 2009.

³³¹ American Roamer database, Nov. 2009. See also, CDMA Development Group Comments at 6.

³³² Leap Wireless International, Inc., SEC Form 10-Q, filed Nov. 9, 2009, at 39, 41. American Roamer database, Nov. 2009.

³³³ Leap Wireless International, Inc., SEC Form 10-Q, filed Nov. 9, 2009, at 41.

³³⁴ United States Cellular Corp., SEC Form 10-Q, filed Nov. 5, 2009, at 26; United States Cellular Corp., SEC Form 10-K, filed Feb. 26, 2009, at 11 (US Cellular launched EV-DO in Milwaukee, WI in Nov. 2006, then in Chicago, Des Moines, Tulsa, and southern Wisconsin during 2008).

³³⁵ American Roamer database, Nov. 2009.

³³⁶ *Unlimited Wireless Carrier MetroPCS Announces Vendors for 2010 4G LTE Launch*, Press Release, MetroPCS, Sept. 15, 2009. At that time, MetroPCS announced deals with LTE equipment vendors Ericsson and Samsung. *Id.*

115. In addition to the 3G deployments and 4G announcements by CDMA operators, AT&T and T-Mobile continued to expand and upgrade their HSPA networks during 2008 and 2009.³³⁷ As of August 2009, AT&T had deployed HSPA to more than 350 major metropolitan areas,³³⁸ up from 275 in May 2008.³³⁹ In early 2010, the company revealed that its 3G network covered 230 million Americans.³⁴⁰ In addition, AT&T has upgraded its entire HSPA network with an HSPA 7.2 software upgrade³⁴¹ and is in the process of increasing the number of high-speed backhaul connections to its cell sites, primarily with fiber connections, to accommodate increased data speeds and traffic.³⁴² According to analysts and the company, AT&T's network upgrades are being done to improve consistency in accessing data sessions, increase efficiency, meet the rising demands on the network from bandwidth-heavy data applications, and address service quality problems – such as dropped calls, delayed text and voice messages, and slow download speeds – which typically occur during periods of peak use in dense urban areas with higher concentrations of iPhone users.³⁴³ AT&T claims that the backhaul upgrades will also be used to support its LTE deployment.³⁴⁴ The company plans to begin LTE trials in 2010 and LTE deployment in 2011 using its 700 MHz band and AWS spectrum.³⁴⁵

116. T-Mobile is also deploying an HSPA 3G network in cities across the United States. As mentioned in the *Thirteenth Report*, the company had launched HSPA service, using its AWS spectrum, in 13 major U.S. markets as of September 2008. Since that time, T-Mobile has expanded its HSPA coverage into new markets. As of August 2009, T-Mobile's HSPA network covered 121 million people in 176 cities, and the company planned to cover 200 million people in an additional 100 cities by the end

³³⁷ See CTIA PN Comments, Attach. A, at 14.

³³⁸ *AT&T Brings 3G Mobile Broadband Network to Champaign-Urbana Area*, Press Release, AT&T, Oct. 8, 2009. In August 2009, AT&T stated that it planned to deploy HSPA to 20 additional markets, including 2,000 cell sites, by the end of 2009. Presentation by Kris Rinne, Senior VP, AT&T, FCC National Broadband Plan Workshop: Technology-Wireless, Aug. 13, 2009.

³³⁹ *Thirteenth Report*, 24 FCC Rcd at 6256, ¶ 139.

³⁴⁰ See AT&T, *The Truth About 3G* (television advertisements), <http://www.att.com/truthabout3g/?WT.srch=1> (visited Feb. 1, 2010). In May 2009, AT&T announced that it was migrating its 850 MHz Cellular band network to HSPA technology in order to improve coverage and increase capacity. *AT&T to Deliver 3G Mobile Broadband Speed Boost*, Press Release, AT&T, May 27, 2009.

³⁴¹ When combined with the backhaul upgrade, HSPA 7.2 will support theoretical peak maximum download speeds of 7.2 Mbps, with actual speeds being lower and varying due to a number of factors. *AT&T Upgrades 3G Technology at Cell Sites Across Nation*, Press Release, AT&T, Jan. 5, 2010. See also, CTIA NOI Comments at 33. As of January 2010, AT&T offered 10 HSPA 7.2-compatible devices and planned to introduce additional HSPA 7.2-compatible devices in 2010. *Id.*

³⁴² In December 2009, AT&T began the backhaul upgrades at cell sites in six cities – Charlotte, Chicago, Dallas, Houston, Los Angeles, and Miami – and plans to continue upgrading cell sites across its network during 2010 and 2011. *AT&T Upgrades 3G Technology at Cell Sites Across Nation*, Press Release, AT&T, Jan. 5, 2010. For additional information on backhaul, see Section VII.A.3, Backhaul Facilities, *infra*.

³⁴³ *AT&T Upgrades 3G Technology at Cell Sites Across Nation*, Press Release, AT&T, Jan. 5, 2010. *Wireless Service and Handset Pricing – Pressure Building*, at 2; Jenna Wortham, *Customers Angered as iPhones Overload AT&T*, NEW YORK TIMES, Sept. 3, 2009. See Section V.I, Network Quality, *infra*.

³⁴⁴ *AT&T Upgrades 3G Technology at Cell Sites Across Nation*, Press Release, AT&T, Jan. 5, 2010.

³⁴⁵ *AT&T to Deliver 3G Mobile Broadband Speed Boost*, Press Release, AT&T, May 27, 2009; *AT&T Doubling 3G Capacity*, TELEPHONY ONLINE, Apr. 20, 2009, available at <http://telephonyonline.com/wireless/news/att-3g-network-capacity-increase-0420/> (referring to statement by AT&T executive on use of 700 MHz and AWS spectrum).

of 2009.³⁴⁶ T-Mobile also announced that it planned to upgrade its network with HSPA 7.2 technology by the end of 2009³⁴⁷ and that it is was running a trial of HSPA+, which has a theoretical peak maximum speed of 21 Mbps, in Philadelphia.³⁴⁸ The company expects to launch HSPA+ in select, high demand markets in 2010.³⁴⁹

117. In addition to the 3G networks deployed by the major mobile wireless service providers, Clearwire is the only service provider now offering 4G service, using mobile WiMAX technology in the 2.5 GHz BRS/EBS spectrum band.³⁵⁰ Clearwire launched commercial 4G mobile WiMAX service in Portland, OR in January 2009.³⁵¹ As of September 2009, Clearwire's WiMAX service was available in 14 markets covering 10.1 million POPs.³⁵² Since that time, Clearwire has expanded the WiMAX network to an additional 16 markets and expects to reach 120 million POPs by the end of 2010.³⁵³ Clearwire's WiMAX network provides average speeds of 3-6 Mbps with burst rates up to 10 Mbps.³⁵⁴ In all of the markets except Baltimore, WiMAX service is available under both Sprint Nextel's 4G brand as well as Clearwire's CLEAR brand.³⁵⁵ CLEAR service includes both mobile and fixed service plan and device options. In addition, since July 2009, Comcast has been reselling Clearwire's WiMAX service under the brand name Comcast High-Speed 2go in five cities - Atlanta, Chicago, Philadelphia, Portland, and Seattle.³⁵⁶ The service is sold bundled with one of Comcast's other Internet access, phone, or multichannel video products.³⁵⁷ Customers have the option of purchasing a 4G WiMAX-only data card,

³⁴⁶ Caroline Gabriel, *T-Mobile USA to Upgrade Network and Move to HSPA+ Next Year*, RETHINK WIRELESS, Sept. 16, 2009, available at http://www.rethink-wireless.com/article.asp?article_id=1901&keywords=t-mobile (citing Cole Brodman, T-Mobile CTO).

³⁴⁷ Taylor Wimberly, *T-Mobile 3G to Reach 21Mbps in 2010*, ANDROID & ME, Sept. 14, 2009, available at <http://androidandme.com/2009/09/carriers/t-mobile-news/t-mobile-3g-to-reach-21mbps-in-2010/> (citing T-Mobile CTO, Cole Brodman, in an interview with Om Malik, available at <http://www.livestream.com/gigaomtv>).

³⁴⁸ Sascha Segan, *Hands-On with T-Mobile's Super 3G HSPA+ Network*, PC MAG, Sept. 25, 2009, available at <http://www.pcmag.com/article2/0,2817,2353300,00.asp>; CTIA NOI Comments at 33.

³⁴⁹ Caroline Gabriel, *T-Mobile USA to Upgrade Network and Move to HSPA+ Next Year*, RETHINK WIRELESS, Sept. 16, 2009, available at http://www.rethink-wireless.com/article.asp?article_id=1901&keywords=t-mobile (citing Cole Brodman, T-Mobile CTO).

³⁵⁰ NCTA NOI Comments at 3.

³⁵¹ Clearwire Corp., SEC Form 10-K, filed Mar. 26, 2009, at 2. Prior to the close of the transaction, Sprint had launched WiMAX service in Baltimore, MD. *Sprint 4G Rollout Blazes on with Maui Launch*, Press Release, Sprint Nextel, Dec. 1, 2009.

³⁵² Clearwire Corp., SEC Form 10-Q, filed Nov. 11, 2009, at 29.

³⁵³ Clearwire, *Where is CLEAR?*, <http://www.clear.com/coverage> (visited Jan. 19, 2010); Clearwire Corp., SEC Form 10-K, filed Mar. 26, 2009, at 2-3.

³⁵⁴ Clearwire, *How Fast is "Super Fast"?*, <http://www.clear.com/discover/network> (visited Jan. 19, 2010).

³⁵⁵ *Sprint 4G Rollout Blazes on with Maui Launch*, Press Release, Sprint Nextel, Dec. 1, 2009; Clearwire, *Where is CLEAR?*, <http://www.clear.com/coverage> (visited Jan. 19, 2010). Only Sprint offers WiMAX service in Baltimore. Sprint states that it offers 4G service in 27 markets; however, the company's press release does not list Tacoma, Everett-Snohomish, and Kitsap, WA as separate markets from Seattle, whereas Clearwire's website coverage map does. *Id.* The 4G coverage map on Sprint's website shows coverage in these areas. See, e.g., Sprint Nextel, *Sprint Coverage Tool*, <http://coverage.sprintpcs.com/IMPACT.jsp?covType=wimaxdual&serviceType=data&mapcity=Snohomish&mapstate=WA> (visited Jan. 20, 2010).

³⁵⁶ *Comcast Begins National Rollout of High-Speed Wireless Data Service*, Press Release, Comcast, Jun. 29, 2009; Comcast, *4G Coverage Map*, <http://www.comcast.com/highspeed2go/#/coverage> (visited Apr. 9, 2010).

³⁵⁷ *Comcast Begins National Rollout of High-Speed Wireless Data Service*, Press Release, Comcast, Jun. 29, 2009.

or a 3G/4G data card that will also work on Sprint Nextel's 3G network.³⁵⁸

b. Coverage by Technology Type

118. Using a census block level analysis of American Roamer data,³⁵⁹ we are able to estimate coverage by air interface type in the approximately 8 million census blocks.³⁶⁰ As of November 2009, virtually the entire population of the United States lived in census blocks where operators offer digital mobile wireless service, using CDMA, GSM/TDMA, or iDEN (including their respective next generation technologies), or some combination of the three.

Table 12
Mobile Wireless Coverage by Technology³⁶¹

Technology	POPs in Covered Blocks ³⁶²	% of Total POPs	Square Miles Contained in Those Blocks	% of Total Square Miles
CDMA	282,911,183	99.2%	2,603,946	68.5%
GSM/TDMA	279,560,517	98.0%	2,170,954	57.1%
iDEN	251,976,136	88.3%	936,119	24.6%
Total Digital	284,108,955	99.6%	2,779,247	73.1%

119. As shown in Table 12, CDMA and GSM/TDMA have been deployed in census blocks containing 283 million and 280 million people, respectively. iDEN coverage is more limited, available in census blocks covering 252 million people, or 88 percent of the U.S. population. These figures are essentially unchanged from the *Thirteenth Report*, which was based on an analysis of May 2008 American Roamer data.³⁶³

120. Based on data supplied by American Roamer from November 2009, we also have estimated the extent of mobile data and mobile broadband network coverage. Table 13 below 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 3G and 4G mobile broadband network technologies, HSPA, EV-DO, and WiMAX.

³⁵⁸ *Comcast Begins National Rollout of High-Speed Wireless Data Service*, Press Release, Comcast, Jun. 29, 2009.

³⁵⁹ See Section III.C.1, Number of Competitors, *supra*, for a discussion of the limitations of American Roamer data.

³⁶⁰ By utilizing such a small geographic area to analyze technological availability, we are able to minimize the concerns regarding the over-counting of population and geographic area covered that were inherent in previous reports' county-based analyses (there are approximately 3,200 in the United States). See Section III.C.1, Number of Competitors, *supra*.

³⁶¹ Commission estimates based on American Roamer database, Oct. 2009. POPs are from the 2000 Census, and the square miles include the United States and Puerto Rico.

³⁶² A covered block has at least one provider.

³⁶³ See *Thirteenth Report*, 24 FCC Rcd at 6257, ¶ 143, Table 8.

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

Technology	POPs in Covered Blocks	% of Total POPs	Square Miles Contained in Those Blocks	% of Total Square Miles
CDMA Path (1xRTT/EV-DO/EV-DO Rev. A)	282,751,321	99.1%	2,574,498	67.8%
GSM Path (GPRS/EDGE/WCDMA/HSPA)	279,587,859	98.0%	2,188,317	57.6%
Total Mobile Data Coverage	284,014,858	99.6%	2,763,446	72.7%
WCDMA/HSPA (3G)	217,440,872	76.2%	423,738	11.2%
EV-DO/EV-DO Rev. A (3G)	279,153,300	97.9%	2,125,354	55.9%
Mobile WiMAX (4G)	28,074,849	9.8%	13,895	0.4%
Total Mobile Broadband Coverage (3G/4G)	279,756,907	98.1%	2,150,160	56.6%

Source: Federal Communications Commission estimates based on data supplied by American Roamer, Nov. 2009.

Notes: POPs are from the 2000 Census, and the square miles include the United States and Puerto Rico.

121. Table 13 shows that mobile data networks, which include 2.5G technologies such as 1xRTT, GPRS, and EDGE, were widely deployed as of November 2009, covering 99.6 percent of the total U.S. population. While coverage by all mobile data network technologies increased slightly from May 2008 – CDMA path coverage grew from 98.8 percent to 99.1 percent, and GSM path coverage grew from 97.4 percent to 98.0 percent – the overall figure remained essentially unchanged.³⁶⁴

122. When looking at mobile broadband coverage, 98.1 percent of the U.S. population was covered by at least one mobile broadband network technology as of November 2009, up from 92.3 percent in May 2008, according to the analysis of American Roamer data.³⁶⁵ EV-DO coverage increased six percent from 263 million people, or 92.2 percent of the U.S. population, to 279 million people, or 97.9 percent of the U.S. population.³⁶⁶ The increase in HSPA coverage was more substantial, growing 42 percent from 153 million POPs (54 percent of the U.S. population) to 217 million POPs (76 percent of the U.S. population).³⁶⁷ In addition, mobile WiMAX networks, which were effectively non-existent in the *Thirteenth Report*, now cover approximately 28 million people. Mobile broadband coverage across different states and areas of the country is shown in Map D-28 in Appendix D.

123. Chart 5 below depicts the pace of 3G and 4G deployment over the past four years. In 2006, EV-DO networks covered 62.6 percent of the U.S. population. Today, they cover nearly all Americans, as measured by census blocks, with 98 percent covered as of November 2009.³⁶⁸ This is reflected in the network deployment activities of the two major EV-DO providers, Verizon Wireless and Sprint Nextel, which are beginning to focus on 4G offerings rather than 3G deployment – Verizon Wireless with LTE and Sprint Nextel with its investment in Clearwire. HSPA network coverage is not as extensive as EV-DO coverage. However, HSPA deployment has been increasing in recent years, rising from 20 percent of the U.S. population in 2006 to 76 percent in 2009.³⁶⁹ The largest HSPA network operators, AT&T and T-Mobile, are still in the process of actively expanding and upgrading their HSPA networks.

³⁶⁴ See *Thirteenth Report*, 24 FCC Rcd at 6257, ¶ 145, Table 9.

³⁶⁵ *Id.*

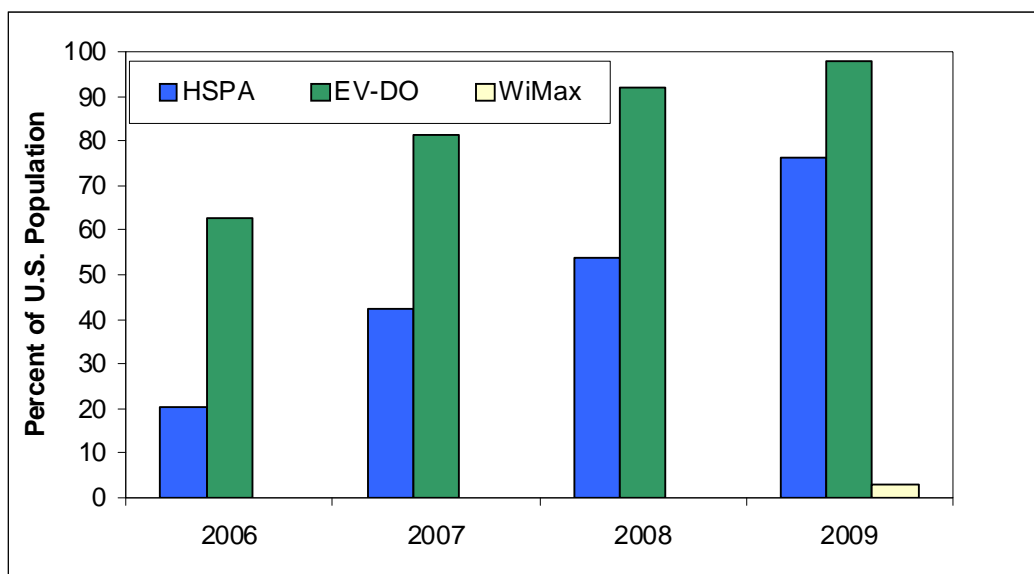
³⁶⁶ *Id.*

³⁶⁷ *Id.*

³⁶⁸ See *Eleventh Report*, 21 FCC Rcd at 10985, ¶ 95, Table 8.

³⁶⁹ See *id.*

Chart 5
The Pace of 3G and 4G Network Deployment³⁷⁰



c. Roaming

124. 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 attain roaming agreements with other providers than to build out its own facilities.³⁷¹ 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.³⁷² As shown in Table 21, below, total annual intercarrier roaming revenues and minutes have declined as a percentage of total service revenues and total minutes, respectively, over the past ten years.³⁷³ From a customer perspective, many service plans now include nationwide roaming at no additional cost to subscribers. In addition, changes in the wireless industry over the last decade have resulted in larger geographic coverage areas, which may have affected roaming arrangements in some instances.

125. Despite the declining contribution of roaming relative to wireless industry revenues and minutes of use on the whole, roaming remains an important means for mobile wireless providers in areas where they do not have network coverage. As commenters have noted, no mobile wireless provider – including the four nationwide providers – has built out its entire licensed service area, and consequently

³⁷⁰ Commission estimates based on American Roamer database, Nov. 2009 (for 2009 data). See *Thirteenth Report*, 24 FCC Rcd at 6257, ¶ 145; *Twelfth Report*, 23 FCC Rcd at 2304, ¶ 143; *Eleventh Report*, 21 FCC Rcd at 10995, ¶ 117.

³⁷¹ See AT&T NOI Comments, at 74 (stating that “the economics of providing any type of product or service – including wireless – are more challenging in rural areas, because the lower population density of these areas typically entails higher average delivery costs”); NTCA PN Comments, at 3 (acknowledging the “difficulties inherent to providing wireless service to rural areas, such as challenging topography and low customer density”).

³⁷² 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 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.

³⁷³ See Section V.E.3, Intercarrier Roaming Rates and Revenue, *infra*.

all providers employ roaming to some extent to fill gaps in their coverage.³⁷⁴ In addition, as discussed above, there are various non-nationwide providers whose business plans are not focused on building out their networks nationally.³⁷⁵ Nonetheless, through roaming agreements with other mobile wireless providers, many of the non-nationwide providers are able to offer coverage and service plans that are national in scope.³⁷⁶ 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.³⁷⁷ Similarly, roaming may be important to new entrants who wish to begin offering service before they have fully built out their networks.³⁷⁸

126. The Commission has recognized the importance of roaming and in 2007 clarified that automatic roaming is a common carrier obligation for CMRS providers.³⁷⁹ In the *2007 Roaming Order and FNPRM*, the Commission held that CMRS providers must provide automatic 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.³⁸⁰ Recently, the Commission adopted a *Roaming Order on Reconsideration*, which eliminates the

³⁷⁴ See Cricket PN Comments, at 6 (stating that “[a]utomatic roaming agreements play a critical role in the wireless industry, plugging coverage holes that exist in every carrier’s network so that subscribers can obtain seamless coverage wherever they travel.”); T-Mobile Petition, Oct. 1, 2007, WT Docket No. 05-265, at 2 (stating that “on a geographic basis, no wireless carrier operating in the United States has close to a nationwide footprint using solely its own facilities”). One potential measure of the significance of roaming in the wireless industry is roaming revenues, which are discussed in detail below. See Section V.E.3, Intercarrier Roaming Rates and Revenue, *infra*.

³⁷⁵ See Section III.B.1, Facilities-Based Providers, *supra*. For example, Leap and MetroPCS focus mainly on offering service to customers in metropolitan areas, while US Cellular offers regional coverage in 185 operating markets throughout 26 states.

³⁷⁶ See, e.g., Cricket, Coverage, <http://www.mycricket.com/coverage/cell-phone-coverage> (visited Jan. 20, 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 Jan. 20, 2010) (providing an interactive U.S. map showing Cricket’s roaming coverage); MetroPCS, Compare Plans, <http://www.metropcs.com/plans/> (visited Jan. 20, 2010) (showing MetroPCS plans that include nationwide coverage); MetroPCS, Coverage Map, <http://www.metropcs.com/coverage/> (visited Jan. 20, 2010) (providing an interactive U.S. map showing the various types of coverage provided by MetroPCS in different geographic areas); US Cellular, Plans, http://www.uscc.com/uscellular/SilverStream/Pages/r_zip.html?call=2&tabPlan=2 (visited Jan. 20, 2010) (after entering a valid zip code, shows US Cellular national plans); US Cellular, Voice and Data Maps, http://www.uscc.com/uscellular/SilverStream/Pages/x_page.html?p=map_home (visited Jan. 20, 2010) (providing an interactive U.S. map depicting US Cellular “National Voice Coverage”).

³⁷⁷ See RCA NOI Comments, at 11-12 (stating that smaller rural and regional carriers “must be in a position to meet their customers’ expectations,” which “increasingly include the provision of a nationwide footprint”); SouthernLINC NOI Reply, at 4 (stating that “[c]onsumers expect to be able to use their wireless handsets when they travel outside their local areas”).

³⁷⁸ See RTG PN Reply, at 17 (stating that “[f]or each and every new market entrant to become fully deployed across their license area overnight, or at least prior to a commercial launch, is completely impractical”).

³⁷⁹ 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.”)

³⁸⁰ *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.

home roaming exclusion and establishes the same general obligation to provide automatic roaming, regardless of whether the carrier requesting roaming holds spectrum in an area.³⁸¹ In that Order, the Commission found that making automatic 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.³⁸² At the same time, the Commission also adopted a Second Further Notice of Proposed Rulemaking seeking comment on whether to extend roaming obligations to data services such as mobile broadband and Internet access services and expanding the scope of the proceeding by seeking comment on obligations governing the provision of roaming for data services by providers that are not CMRS carriers, as well as by providers that also offer CMRS services.³⁸³

2. Advertising, Marketing, Sales Expenditures, and Retailing

127. 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. Mobile wireless service is an “experience good,”³⁸⁴ and in general, advertising for an experience good tends to be persuasive rather than informational in nature. CTIA, in its comments, cites economists who claim that advertising leads to lower prices, improved product quality, strong brands, and innovation.³⁸⁵

a. Advertising Expenditures

128. Advertising spending by wireless service providers in 2008 and 2009 fell slightly from its 2007 levels, and there is evidence that providers’ marketing efforts are becoming more segmented and less aimed at the mass market. According to Nielsen, advertising expenditures for mobile wireless service dropped eight percent from \$3.7 billion in 2007 to \$3.4 billion in 2008.³⁸⁶ For the first three quarters of 2009, wireless advertising spending totaled \$2.55 billion, down 5.4 percent from \$2.69 billion during the first three quarters of 2008.³⁸⁷

129. 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 7th place in 2007 to 6th place in 2008 to fourth place in the first quarter through the third quarter of 2009.³⁸⁸ Nielsen also found that

³⁸¹ Reexamination of Roaming Obligations of Commercial Mobile Radio Service Providers, *Order on Reconsideration and Second Further Notice of Proposed Rulemaking*, FCC 10-59 (rel. Apr. 21, 2010) (*Roaming Order on Reconsideration*).

³⁸² *Id.*

³⁸³ *Id.*

³⁸⁴ 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.

³⁸⁵ CTIA NOI Comments, at 53.

³⁸⁶ *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/>.

³⁸⁷ *Ad Spending in U.S. Down 11.5 Percent in First Three Quarters of 2009*, NIELSEN WIRE, Dec. 10, 2009, available at <http://blog.nielsen.com/nielsenwire/consumer/ad-spending-in-u-s-down-11-5-percent-in-first-three-quarters-of-2009/>.

³⁸⁸ *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/>; *Ad Spending in U.S. Down 11.5 Percent in First Three Quarters of 2009*, NIELSEN WIRE, Dec. 10, 2009, available at (continued....)

wireless service has the second-highest amount of advertising spending, after the automobile industry, on Spanish-language advertising during the first three months of 2009. Wireless service providers increased their Spanish-language advertising nearly five percent during this period from \$319 million to \$335 million.³⁸⁹

130. When looking at the advertising expenditures of individual firms, we see a similar picture: wireless and telecom advertising spending is significant, particularly in relationship to other industries,³⁹⁰ but has been declining in recent years. According to data from TNS, Verizon and AT&T were the second and fourth largest U.S. advertisers during 2008, spending \$2.39 billion and \$1.98 billion respectively.³⁹¹ However, this was a 2.9 percent drop from the total advertising spending of these two companies in 2007.³⁹² Advertising spending by Verizon and AT&T declined further in 2009. During the first three quarters of that year, Verizon's advertising spending fell 5.8 percent while AT&T's fell 6.1 percent, versus the same period in 2008.³⁹³ On the other hand, during that period, Sprint Nextel rose to become the seventh largest U.S. advertiser, increasing its advertising spending 51 percent over the first three quarters of 2009.³⁹⁴

131. According to Forrester, one reason for the slight decline in advertising spending could be that wireless service providers are focusing their advertising efforts less on the mass market and more on niche segments, with the two key segments being: 1) consumers purchasing unlimited, prepaid service, and 2) higher-ARPU consumers purchasing smartphones.³⁹⁵ Verizon targets its marketing efforts at various customer segments, including young adults, seniors, families, and small and large businesses.³⁹⁶ Leap also reports that its customer base is segmented; in Leap's case, it is diversified geographically, ethnically, and demographically.³⁹⁷ Leap reports that it has decentralized its marketing efforts to customize them for local markets.³⁹⁸

b. Marketing Campaigns

132. In addition to investing in network infrastructure and acquiring spectrum, mobile wireless (Continued from previous page) —————
<http://blog.nielsen.com/nielsenwire/consumer/ad-spending-in-u-s-down-11-5-percent-in-first-three-quarters-of-2009/>.

³⁸⁹ *Nielsen Ad Intelligence Spotlight on Multi-Cultural Advertising*, Nielsen, Oct. 2009, available at <http://blog.nielsen.com/nielsenwire/wp-content/uploads/2009/10/MultiCulturalSpotlight10.23.09.pdf>, at 3.

³⁹⁰ See AT&T PN Comments at 49.

³⁹¹ *TNS Media Intelligence Reports U.S. Advertising Expenditures Declined 4.1 Percent in 2008*, Press Release, TNS Media Intelligence, May 4, 2009, available at <http://www.tns-mi.com/news/05042009.htm>. The advertising expenditures of Verizon and AT&T include those companies' wireline businesses as well.

³⁹² *Id.*

³⁹³ *TNS Media Intelligence Reports U.S. Advertising Expenditures Declined 14.7 Percent in First Nine Months of 2009*, Press Release, TNS Media Intelligence, Dec. 9, 2009, available at <http://www.tns-mi.com/news/2009-Ad-Spending-Q3.htm>.

³⁹⁴ *Id.*

³⁹⁵ Mike Shields, *Calling on Niche Markets*, BRANDWEEK, June 8, 2009 (citing Charles Golvin, principal analyst at Forrester Research, who stated, "There has been a lot of competition around the low end. Companies have been spending to get that message out, that they offer predictability. No hidden fees, no charges sneaking up," and "At the high end, carriers are willing to spend on advertising. ... It's worth it to get those highly profitable users. These are people who are better insulated against tough times and can handle expensive plans.")

³⁹⁶ Verizon Communications, Inc., SEC Form 10-K, filed Feb. 24, 2009, at 7.

³⁹⁷ Leap Wireless International, Inc., SEC Form 10-K, filed Feb. 27, 2009, at 4.

³⁹⁸ *Id.*

service providers have pursued marketing strategies designed to highlight their network quality and to differentiate it from rival offerings. 2008 and 2009 saw a shift in the focus of several providers' marketing campaigns from voice quality and reliability to mobile broadband 3G network quality, coverage, speed, and reliability.

133. As discussed in the *Thirteenth Report*, many mobile wireless service providers have highlighted the quality of their networks in various advertising campaigns in recent years, including Verizon Wireless's "Can You Hear Me Now?" advertisements and "America's most reliable wireless network" slogan, AT&T's "fewest dropped calls of any wireless carrier" claim. While certain service providers continue to emphasize network quality in their marketing and branding efforts, in 2009, the focus of these efforts shifted from voice to 3G mobile broadband services. For example, in July 2008, with the launch of the Apple iPhone 3G, AT&T began claiming in its advertisements that it has the nation's fastest 3G network.³⁹⁹ Verizon Wireless countered this campaign by launching a series of advertisements, beginning in October 2009, comparing its 3G coverage to that of AT&T, parodying the Apple slogan, "There's an app for that," with its own version, "There's a map for that."⁴⁰⁰ In addition, Sprint Nextel claims to have "the most reliable 3G network."⁴⁰¹

c. Retailing

134. 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.⁴⁰² 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.⁴⁰³ Service providers report that those customers obtained through direct channels tend to be more loyal and generate higher revenue than those obtained through indirect channels. For instance, Verizon Wireless had approximately 2,500 company-owned and operated stores and kiosks as of December 31, 2008,⁴⁰⁴ and reports that the customers obtained through these channels are less likely to cancel their service than

³⁹⁹ *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>.

⁴⁰⁰ 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.

⁴⁰¹ *Sprint Named Denver's Most Reliable Network in PC World's 3G Comparison Test*, Press Release, Sprint Nextel, July 15, 2009. Similar press releases were issued for seven other cities and can be found at http://newsreleases.sprint.com/phoenix.zhtml?c=127149&p=irol-news_newsroom&nyo=1. See also, Mark Sullivan, *A Day in the Life of 3G*, PC WORLD, June 28, 2009, available at http://www.pcworld.com/article/167391/a_day_in_the_life_of_3g.html.

⁴⁰² Verizon Communications, Inc., SEC Form 10-K, filed Feb. 24, 2009, at 7; Leap Wireless International, Inc., SEC Form 10-K, filed Feb. 27, 2009, at 6.

⁴⁰³ Verizon Communications, Inc., SEC Form 10-K, filed Feb. 24, 2009, at 7; Sprint Nextel Corp., SEC Form 10-K, filed Feb. 27, at 3; CTIA PN Comments at 33-34. In addition, service providers use direct sales representatives to sell services to business and government customers. *Id.*

⁴⁰⁴ Verizon Communications, Inc., SEC Form 10-K, filed Feb. 24, 2009, at 7. This included Verizon Wireless's "store-within-a-store" kiosks within Circuit City and BJ's Wholesale Club stores. On February 19, 2009, Verizon Wireless closed all of its Circuit City kiosks following Circuit City's bankruptcy and liquidation of assets. *Id.*

those obtained through mass-market channels.⁴⁰⁵ In addition, as of December 31, 1008, Leap had 263 company-owned stores and kiosks, which generated 23 percent of the company's net adds in 2008, as well as 2,826 indirect distributor locations.⁴⁰⁶ These indirect distributor locations included 1,036 "premier" dealer stores, which are independently owned but usually sell Cricket products exclusively and look and function similar to company-owned stores.⁴⁰⁷ Leap reports that the premier stores tend to generate more sales than the other indirect retail outlets.⁴⁰⁸ The company also reports that its Internet and telephone sales are growing.⁴⁰⁹

3. Differentiation in Mobile Wireless Handsets/Devices

135. 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. 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.⁴¹⁰ The role of smartphone devices – such as the iPhone, Blackberry, Palm, and Android devices – in competition among mobile wireless service providers is discussed in detail below. The emergence of a handful of smartphone operating systems – Apple, Android, BlackBerry, Palm, and Windows Mobile – represents a shift in the mobile wireless ecosystem and one that is affecting the ability of mobile wireless service providers to differentiate themselves based on handsets and devices.

136. *Smartphones.* As discussed in previous reports, the 2007 launch of the iPhone and 2008 launch of the iPhone 3G catalyzed the development of a new type of device in the mobile wireless ecosystem, the smartphone.⁴¹¹ Over the past two years, wireless service providers, handset manufacturers, and platform developers have introduced an array of smartphones to respond to consumer demand for devices with advanced data capabilities and to compete with and mimic the features of the iPhone.⁴¹² 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 handset.⁴¹³ Many smartphones also have touch screens and/or a QWERTY keypad, and, as discussed below, run an operating system that

⁴⁰⁵ Verizon Communications, Inc., SEC Form 10-K, filed Feb. 24, 2009, at 7.

⁴⁰⁶ Leap Wireless International, Inc., SEC Form 10-K, filed Feb. 27, 2009, at 6.

⁴⁰⁷ *Id.*

⁴⁰⁸ *Id.*

⁴⁰⁹ *Id.* at 4.

⁴¹⁰ See Verizon Wireless PN Comments at 15; AT&T PN Comments at 34, AT&T NOI Comments at 47; TIA NOI Comments at 8.

⁴¹¹ See *Thirteenth Report*, 24 FCC Rcd at 6264-65, ¶ 165; *Twelfth Report* 23 FCC Rcd at 2315-16, ¶ 177.

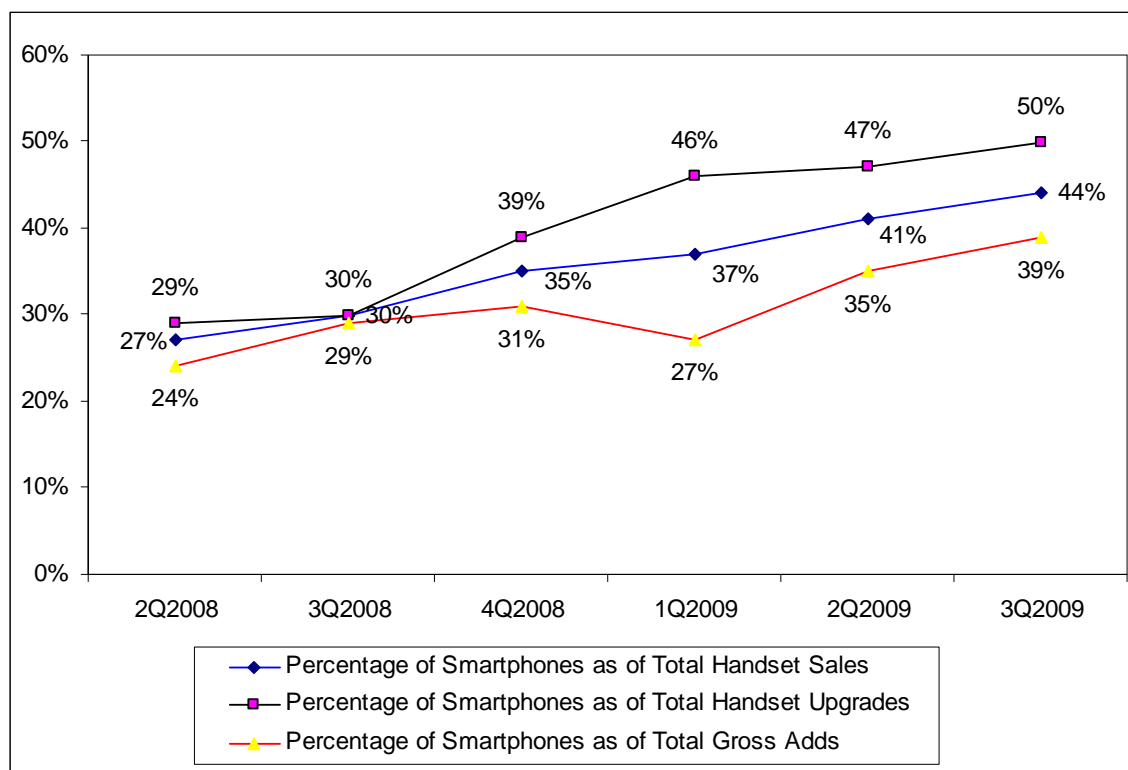
⁴¹² See CBW NOI Comments at 3; Bright House Networks NOI Comments at 10.

⁴¹³ 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.

offers a standard platform for application developers to create and sell device software through an application store.

137. Over the past two years, the industry has experienced an increase in smartphone adoption. As shown in Chart 6, smartphones accounted for 44 percent of total handset sales in the third quarter of 2009, up from 27 percent in the second quarter of 2008.⁴¹⁴ CTIA also reports that smartphones represented 23 percent of all U.S. handset sales in the fourth quarter of 2008, up from 12 percent in 2007.⁴¹⁵

Chart 6
Smartphone Adoption Rates (2Q08-3Q09)⁴¹⁶



138. AT&T began offering, on an exclusive basis, Apple's iPhone 3G in July 2008. Unlike the first generation iPhone, the iPhone 3G runs on AT&T's faster HSPA network and includes direct access to the Apple App Store, launched at the same time.⁴¹⁷ In June 2009, AT&T began selling the latest iPhone model, the iPhone 3GS.⁴¹⁸ 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

⁴¹⁴ See Section VII.B.1, Mobile Wireless Handsets/Devices and Operating Systems, *infra*.

⁴¹⁵ CTIA PN Comments at 33. The market shares of the smartphone operating systems in use in the United States in December 2009 are shown in Table 33, *infra*.

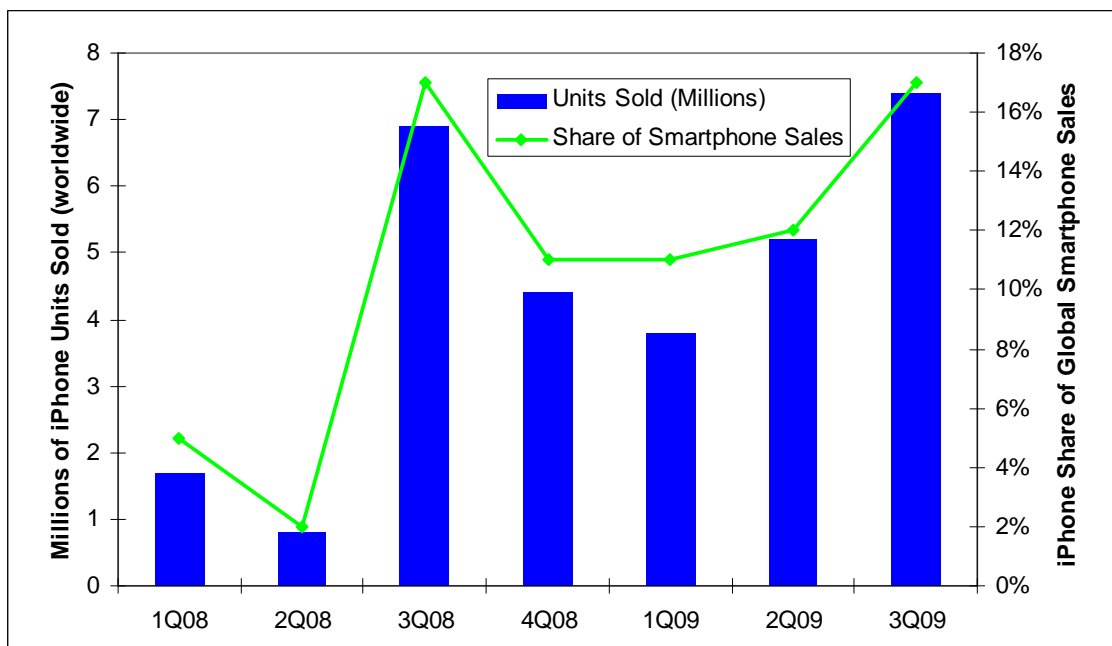
⁴¹⁶ Simon Flannery and Daniel Gaviria, *Survey: Smartphone Adoption Steadily Rising*, Morgan Stanley, Nov. 13, 2009, at 3 (*Smartphone Adoption Steadily Rising*).

⁴¹⁷ *Thirteenth Report*, 24 FCC Rcd at 6265-66, ¶¶ 165-166.

⁴¹⁸ *iPhone 3GS Available at AT&T Tomorrow*, Press Release, AT&T, June 18, 2009.

3.0.⁴¹⁹ The 3GS is also able to connect to AT&T's HSPA 7.2 Mbps network.⁴²⁰ As a sign that certain mobile consumers have switched to AT&T primarily to access an iPhone, AT&T reports that 40 percent of its iPhone customers switched to AT&T from another service provider.⁴²¹ iPhone's share of smartphone business has grown as well from 5 percent in the first quarter of 2008 to 17 percent in the third quarter of 2009 (see Chart 7).

Chart 7
Apple iPhone Sales (1Q08-3Q09)⁴²²



139. To capitalize on the growing consumer demand for smartphones and to compete with the functionalities offered by the iPhone, several wireless service providers, equipment manufacturers, and mobile platform developers introduced new smartphone devices in 2008 and 2009. Table C-5 in Appendix C shows selected smartphones launched over the past two years, and Chart 8 below shows the number of smartphone launches by the four largest service providers, based on the information in Table C-5. These launches represent not only an attempt by service providers to prevent their subscribers from switching to the iPhone, and hence to AT&T, but also an effort to migrate their traditional handset customers to smartphones. Smartphone users typically have lower churn rates and generate higher data ARPU, which can, from the service provider's perspective, offset the slowing growth in subscriber penetration and declining voice ARPU.⁴²³ On the other hand, smartphone users also typically have higher

⁴¹⁹ *Apple Announces the New iPhone 3GS – The Fastest, Most Powerful iPhone Yet*, Press Release, Apple, June 8, 2009.

⁴²⁰ *Id.* The iPhone 3.0 OS on the 3GS also includes automatic authentication at AT&T's Wi-Fi hotspots, allowing customers to move seamlessly from AT&T's 3G network to its Wi-Fi network without a call or data connection being dropped. *iPhone 3GS Available at AT&T Tomorrow*, Press Release, AT&T, June 18, 2009.

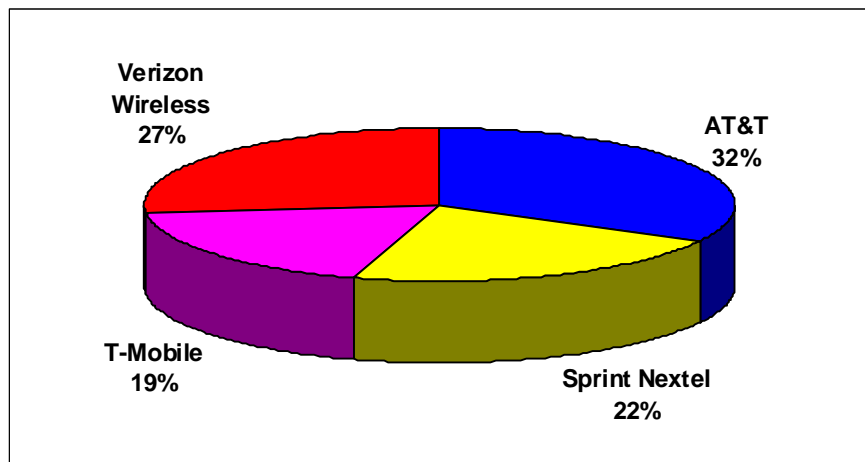
⁴²¹ Roger Entner, *Is Handset Exclusivity Really the Issue of the Day?*, NIELSEN WIRE, Aug. 27, 2009, available at http://blog.nielsen.com/nielsenwire/online_mobile/handset-exclusivity/.

⁴²² See Tal Liani, et al., *Finding Value in Smartphones*, Bank of America/Merrill Lynch, Dec. 14, 2009, at 15 (*Finding Value in Smartphones*).

⁴²³ See *Finding Value in Smartphones*, at 7, 26; *Smartphone Adoption Steadily Rising*, at 1, 2.

bandwidth consumption levels, which can strain wireless network capacity.⁴²⁴

Chart 8
Share of Smartphone Launches by Four Nationwide Service Providers in 2008-2009⁴²⁵



140. Many of the features and capabilities of the smartphones introduced in the past two years – such as touch screens, automatic rotation of images, easy-to-use web browsers, and application stores – can be viewed as an attempt to compete with those features originally introduced on the iPhone. For example, the Motorola DROID automatically rotates images from portrait to landscape and allows users to zoom in on web pages by tapping on the screen. However, several service providers have introduced smartphones that attempt to differentiate themselves based on other functionalities. For example, RIM’s BlackBerry devices continue to offer integration with corporate e-mail servers, Palm’s devices allow users to multitask among applications and save documents,⁴²⁶ and Windows Mobile devices have sought to replicate a Windows PC desktop experience on a mobile device.⁴²⁷ As with the iPhone, a number of these other smartphones were launched subject to exclusive handset arrangements.⁴²⁸

141. A notable development in smartphone differentiation in 2008-2009 was the introduction of devices that use Google’s Android operating system. As discussed in the *Thirteenth Report*, the first Android device to be made available in the United States was T-Mobile’s G1, manufactured by HTC, in October 2008.⁴²⁹ In 2009, T-Mobile unveiled the Android-based myTouch 3G, myTouch 3G Fender

⁴²⁴ *Smartphone Adoption Steadily Rising*, at 1, 2.

⁴²⁵ Based on Table C-5, Appendix C, *infra*.

⁴²⁶ Steven Levy, *Palm Pre*, WIRED, June 4, 2009, at <http://www.wired.com/reviews/product/palmpre>; Tom Krazit, *Can a Palm Pre Multitask Better Than an iPhone?*, CNET NEWS, May 6, 2009, at http://news.cnet.com/8301-1035_3-10234043-94.html.

⁴²⁷ See *Finding Value in Smartphones*, at 25. However, Windows Mobile 7, scheduled to be released later in 2010, will likely include additional features and functionalities, such as a touchscreen system with highly simplified menus, music syncing, and application support. David Liu, *Can Windows 7 Mobile Compete in an iPhone World?*, INFORMATIONWEEK SMB, Mar. 31, 2010, available at <http://bmighty.informationweek.com/mobile/showArticle.jhtml?articleID=224200868>.

⁴²⁸ See *infra* Appendix C, Table C-5.

⁴²⁹ See *Thirteenth Report*, 24 FCC Rcd at 6269, ¶ 174.

Limited Edition, Samsung Behold II, and Motorola CLIQ with MOTOBLUR,⁴³⁰ while Sprint Nextel launched the HTC Hero and Samsung Moment.⁴³¹ In late 2009, Verizon Wireless began offering two Android devices: the HTC DROID Eris and Motorola DROID.⁴³² And in January 2010, Google began selling its own version of an Android-based smartphone, the Nexus One, directly to end users as a reseller of wireless network services.

142. Like Apple, Google has been aiming to create an entire ecosystem of applications and services around its Android operating system.⁴³³ As of December 2009, the Android Market had 15,000 applications and 40 million downloads in 14 months, versus Apple App Store's 100,000 applications and over 2 billion downloads in 17 months.⁴³⁴ Android is made available free of charge to handset manufacturers and wireless service providers, and is available on multiple devices and multiple service providers.⁴³⁵ Android is also an open source platform; 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 service provider.⁴³⁶ In addition, Android combines and supports Google's web-based applications, including its search engine, Gmail e-mail product, web browser, and mapping application, all of which come pre-loaded on Android devices.⁴³⁷ According to analysts, the Android operating system – because of the characteristics described above – is likely to compete more effectively with the Apple iPhone than handset manufacturers and mobile wireless service providers acting alone.⁴³⁸

143. As mobile operating systems and the functionalities they enable play a more prominent role in a consumer's mobile wireless experience, consumers are showing an increasing loyalty to particular operating systems or device platforms. In cases where a particular mobile operating system is developed by a device manufacturer or vendor and available only on the devices produced by (or under contract for) that manufacturer or vendor, as with the Apple iPhone, a service provider can respond to demand for this consumer experience by making an arrangement with the manufacturer to be the exclusive network provider for those devices. AT&T's arrangement to be the exclusive service provider

⁴³⁰ *T-Mobile myTouch 3G with Google Now Available for Pre-Sale for Current T-Mobile Customers*, Press Release, T-Mobile, July 8, 2009; *T-Mobile Unveils Holiday Handsets Including Broadest Selection of Android-Powered Devices*, Press Release, T-Mobile, Oct. 7, 2009.

⁴³¹ *Samsung's First Android-Powered Phone, Samsung Moment with Google, Coming to America's Most Dependable 3G Network*, Press Release, Sprint Nextel, Oct. 7, 2009; *The Innovation and Openness of a True Mobile Internet Experience Coming Soon to America's Most Dependable 3G Network from Sprint on HTC Hero with Google*, Press Release, Sprint Nextel, Sept. 3, 2009; Sprint Nextel NOI Comments at 14..

⁴³² *Bring an Android Device Home for the Holidays with DROID ERIS by HTC, Exclusively from Verizon Wireless*, Press Release, Verizon Wireless, Nov. 5, 2009; *Hello Humans: Droid by Motorola Arrives Next Week*, Press Release, Verizon Wireless, Oct. 28, 2009. AT&T has announced plans to begin selling five Android devices during the first half of 2010. *AT&T Announces Major Initiative to Bring 'Apps to All' Company Also Plans to Launch Five Android-Based Devices in First Half of 2010*, Press Release, AT&T, Jan. 6, 2010.

⁴³³ See *Finding Value in Smartphones*, at 9.

⁴³⁴ *Morgan Stanley Mobile Internet Report*, at 157.

⁴³⁵ 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.

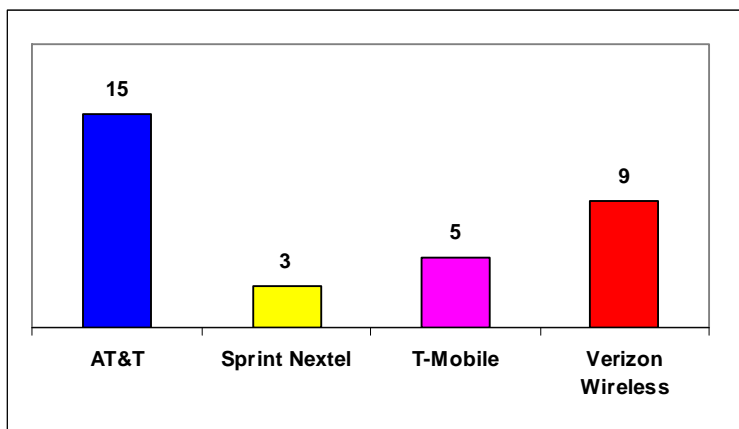
⁴³⁶ *Morgan Stanley Mobile Internet Report*, at 156. Customers are still subject to the terms and conditions of their contracts with wireless service providers.

⁴³⁷ *Thirteenth Report*, 24 FCC Rcd at 6269, ¶ 172; *Morgan Stanley Mobile Internet Report*, at 155; *Finding Value in Smartphones*, at 9-10.

⁴³⁸ See *Finding Value in Smartphones*, at 9-10; *Morgan Stanley Mobile Internet Report*, at 159.

for the Apple iPhone is the most notable example of such conduct. Of the 67 selected smartphone launches in 2008-2009, shown in Table C-5 in Appendix C, 32, including some of the most popular (*e.g.*, Apple iPhone, Motorola DROID, Palm Pre), were launched on an exclusive basis from one of the four largest service providers, nearly half of which were by AT&T (see Chart 9).

Chart 9
Exclusive Smartphone Launches by Four Nationwide Service Providers in 2008-2009⁴³⁹



144. In some cases, service providers offer a device exclusively, yet the operating system on that device is available on other devices available from other operators. For example, the Android-based Motorola DROID is offered exclusively from Verizon Wireless, yet several other Android devices are available from T-Mobile and Sprint Nextel. In addition, with the RIM Blackberry devices, the operating system and device are bundled and made by the same company, yet several different BlackBerry device models are available from a range of service providers. In cases where a popular platform is not offered exclusively but is available from multiple providers, operators may focus on differentiating the features of a particular device, which the provider does offer exclusively, from the other devices with the same OS.⁴⁴⁰

145. *Data-Only Devices.* In addition to launching new smartphone devices during 2008 and 2009, several service providers began offering a range of new devices to facilitate mobile broadband access on computers, including netbook computers with embedded modems, wireless data cards, and mobile Wi-Fi hotspots.⁴⁴¹ AT&T, Verizon Wireless, and Sprint Nextel began offering netbook computers with embedded mobile broadband modems during 2009.⁴⁴² The netbooks have typically been offered at a slightly lower upfront price than when purchased through an electronics retailer, but with the requirement that the customer purchase a \$39.99-per-month or \$59.99-per-month mobile broadband access plan with a two-year contract.⁴⁴³ In addition to netbooks, certain service providers began offering mobile Wi-Fi, or

⁴³⁹ Based on Table C-5, Appendix C, *infra*.

⁴⁴⁰ Service providers may also focus on competing based on other factors, as described above: price, coverage, and network quality. See Sections IV.A, Price Rivalry: Developments in Mobile Service Pricing Plans and IV.B.1, Network Coverage and Technology Upgrades, *supra*. See also Niraj Sheth, *AT&T Prepares Network for Battle*, WALL STREET JOURNAL, Mar. 31, 2010, at B1.

⁴⁴¹ See Section V.A, Subscribership Levels, *infra*, for data on the number of mobile wireless subscribers by device type.

⁴⁴² *AT&T to Offer New Suite of Mobile Broadband Netbooks Online and in Stores Nationwide*, Press Release, AT&T, July 20, 2009; *Stay Connected in More Places with Wireless Access on PC Cards, Mifi, Netbooks and More from Verizon Wireless*, Press Release, Verizon Wireless, May 14, 2009.

“Mi-Fi,” devices during 2009, which are credit card-sized, mobile Wi-Fi routers with mobile broadband wide-area connections that allow up to five Wi-Fi-enabled devices in short range to connect to the Internet via a Wi-Fi connection. Finally, most of the major mobile wireless service providers offer wireless data cards that can be attached to a desktop, laptop, or netbook computer through a USB port and provide mobile broadband connectivity for the computer.

146. In addition, certain mobile wireless service operators provide data connections for electronic reading devices.⁴⁴⁴ These devices, including the Amazon Kindle, are some of the most popular third-party, data-only devices used by U.S. consumers. Estimates of the number of Kindles sold as of January 2010 range from 2.5 million to 3 million.⁴⁴⁵ Data access for the Kindle was originally provided by Sprint Nextel. However, in October 2009, Amazon switched to AT&T as the data connection provider for the Kindle 2.⁴⁴⁶

147. *Machine-to-Machine (M2M) Devices.* Related to service providers’ launch of data-only devices are their efforts to differentiate themselves by opening their networks to outside devices that they do not brand or sell directly. In 2008 and 2009, several mobile wireless service providers launched initiatives that create a streamlined process for data-only mobile computing and M2M devices to be certified for use on their networks. For instance, in July 2009, Sprint Nextel announced that it had certified 300 third-party mobile computing and machine-to-machine devices for use on its network through its Open Device Initiative.⁴⁴⁷ In addition, as noted in the *Thirteenth Report*, Verizon Wireless began its Open Development Initiative in 2008 following its 2007 announcement to open its network to a wider array of devices and applications.⁴⁴⁸ The first third-party device was certified in July 2008, and several other devices have since been certified for use on the network and made commercially available, including data-only, M2M, and telemetry devices, as well as traditional handsets.⁴⁴⁹ In April 2009, (Continued from previous page) —————

⁴⁴³ 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.*

⁴⁴⁴ See CTIA NOI Comments at 21-22.

⁴⁴⁵ 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.

⁴⁴⁶ 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).

⁴⁴⁷ *Sprint Certifies 300th Embedded Device on the Now Network*, Press Release, Sprint Nextel, July 23, 2009; Sprint Nextel NOI Comments at 13-14.

⁴⁴⁸ See *Thirteenth Report*, 24 FCC Rcd at 6267, ¶ 168.

⁴⁴⁹ *Verizon Open Network Gets First, Unsexy Device*, Press Release, Verizon Wireless, July 16, 2008. The device was a modem that connects to a sensor that dips into large storage containers, such as diesel tanks at construction sites. See Verizon Wireless, *Open Development – Latest News Headlines*, https://www22.verizon.com/opendev/media_room.aspx (visited Feb. 19, 2010). Verizon Wireless also has certified three labs for the testing of third party devices. *Id.*; *A Look Back at 2008: Open Development at Verizon Wireless*, Press Release, Verizon Wireless, Jan. 5, 2009; Rajani Baburajan, *Verizon Wireless Approves Intertek as the Testing Lab for Open Development Initiative*, TMCNET.COM, Oct. 22, 2008, available at <http://www.astricon.net/topics/broadband-mobile/articles/43611-verizon-wireless-approves-intertek-as-testing-lab-open.htm>. Some of the devices certified include tablet PCs, routers, SmartGrid equipment, Mobile Clinical Assistants, and the Jitterbug phone. See Verizon Wireless, *Open Development – Latest News Headlines*, https://www22.verizon.com/opendev/media_room.aspx (visited Feb. 19, 2010).

Verizon Wireless released the initial set of technical specifications for devices seeking certification on the company's LTE network to be deployed using 700 MHz Band spectrum,⁴⁵⁰ and in October 2009, the company opened its LTE Innovation Center lab for the design and testing of products – such as consumer electronics, appliances, healthcare devices, and telematics – that would rely on the LTE network for data connections.⁴⁵¹ While service providers have undertaken programs to allow third-party devices to be used on their networks,⁴⁵² M2M devices still account for a relatively small percentage of all mobile wireless devices. According to one analyst, 4.3 percent of all mobile network connections in the United States were used for M2M communications at the end of 2009.⁴⁵³

4. Differentiation in Mobile Data Applications

148. As mentioned above, one way mobile wireless service providers compete is by differentiating from their rivals the applications that they provide and allow on their networks.⁴⁵⁴ Service providers offer applications both directly and indirectly to mobile customers: directly by having applications pre-loaded on the devices they sell or through provider-branded, “walled garden” mobile platforms, and indirectly by allowing applications to be downloaded via web browsers or application stores.⁴⁵⁵ In recent years, there has been a shift from the former to the latter within the mobile wireless ecosystem.⁴⁵⁶ The ability to access a wider variety of applications and content and to browse the web more openly has become increasingly popular with consumers. Recognizing and capitalizing on this trend, service providers have made their networks more open to third-party applications and have begun selling devices, smartphones in particular, that allow easier web browsing and the downloading of applications through web browsers and applications stores.⁴⁵⁷

149. Many of the open network initiatives launched by service providers, described above,⁴⁵⁸ extend to applications as well as devices, and several mobile service providers have launched websites, testing labs, developer conferences, and other initiatives or efforts designed to assist application developers in creating products for the devices and platforms that run on their networks.⁴⁵⁹ In addition to Verizon Wireless's LTE Innovation Center described above,⁴⁶⁰ AT&T has created a Developer Program

⁴⁵⁰ *Verizon Wireless Drives 4G LTE Innovation with Open Device Development Specifications*, Press Release, Verizon Wireless, Apr. 17, 2009.

⁴⁵¹ *Developers: The Verizon Wireless LTE Innovation Center Lab Opens*, Press Release, Verizon Wireless, Oct. 5, 2009.

⁴⁵² See CTIA NOI Comments at 55-56.

⁴⁵³ *Berg Insight Says Machines Account for 1.4 Percent of Mobile Network Connections Worldwide*, Press Release, Berg Insight, Dec. 14, 2009.

⁴⁵⁴ 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.

⁴⁵⁵ CTIA NOI Comments at 28.

⁴⁵⁶ *Morgan Stanley Mobile Internet Report*, at 5, 185, 214-215.

⁴⁵⁷ See Mercatus NOI Comments at 17. 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.

⁴⁵⁸ See Section IV.B.3, *Differentiation in Mobile Wireless Handsets/Devices*, *infra*.

⁴⁵⁹ Sprint Nextel NOI Comments at 13; CTIA NOI Comments at 56.

⁴⁶⁰ The LTE Innovation Center lab and online portal are designed to facilitate the creation of non-traditional devices, as well as applications for those devices. Verizon Wireless, *LTE Innovation Center – Frequently Asked Questions*, <https://www.lte.vzw.com/NewsResources/FrequentlyAskedQuestions/tabid/5780/Default.aspx#LTETIT1> (visited Feb. 21, 2010); *Developers: the Verizon Wireless LTE Innovation Center Lab Opens*, Press Release, Verizon (continued....)

to assist application developers in getting their products to market.⁴⁶¹ In addition, in December 2008, Sprint Nextel launched an open software platform designed to extend desktop computing and “Web 2.0” capabilities to mobile devices operating on its mobile broadband network, and has been hosting annual developer conferences.⁴⁶²

150. The emergence of web-friendly smartphones and a handful of smartphone operating systems with application stores have influenced the ability of mobile wireless service providers to differentiate themselves based on mobile applications. Competing less on the basis of exclusive content or applications available from a provider-branded platform or walled garden, operators instead are competing 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 via the web or application stores.⁴⁶³ According to CTIA, application stores allow consumers to have a direct role in the functionality of their handsets and devices.⁴⁶⁴

151. Many service providers have imposed 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.⁴⁶⁵ 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. However, in recent months, providers have announced that certain high-bandwidth, and in some cases previously-prohibited, applications could be used on their networks. For example, AT&T reported in August 2009 that Apple had agreed not to allow the iPhone to use AT&T’s 3G network for VoIP calling without first obtaining AT&T’s consent.⁴⁶⁶ However, in October 2009, AT&T reversed this decision and announced that it would allow iPhone customers to make VoIP calls on its 3G network.⁴⁶⁷ AT&T also announced, in February 2010, that its mobile broadband network would support the video streaming application, SlingPlayer Mobile.⁴⁶⁸ 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

(Continued from previous page) —————

Wireless, Oct. 5, 2009. As stated in the *Thirteenth Report*, Verizon Wireless is the licensee for the 700 MHz Upper C Block license and is therefore required to allow third-party application developers to develop applications of their choosing for networks in that band. *Thirteenth Report*, 24 FCC Rcd at 6267, ¶ 169

⁴⁶¹ AT&T, *Why AT&T Developer Program?*, <http://developer.att.com/developer/index.jsp?page=why> (visited Feb. 21, 2010).

⁴⁶² *Sprint Launches Open Software Platform at Eighth Annual Application Developer Conference to Help Millions More Developers Create Products for Sprint Customers*, Press Release, Sprint Nextel, Dec. 9, 2008. In October 2009, Sprint outlined the tenets of its open approach: let consumers determine application winners, be easy to do business with, create a developer’s “garage,” use the proven open Internet model as a guide, and open networks still require management. *Sprint Outlines “Open” Approach at Ninth Annual Developer Conference*, Press Release, Sprint Nextel, Oct. 27, 2009.

⁴⁶³ See T-Mobile NOI Comments at 15; Verizon Wireless NOI Comments at 127-132; Mercatus NOI Comments at 17.

⁴⁶⁴ CTIA NOI Comments at 57.

⁴⁶⁵ AT&T, *Wireless Data Service Terms and Conditions*, <http://www.wireless.att.com/cell-phone-service/legal/plan-terms.jsp> (visited Apr. 9, 2010).

⁴⁶⁶ Letter from James W. Cicconi, Senior Executive Vice President – External and Legal Affairs, AT&T, to Ruth Milkman, Chief, Wireless Telecommunications Bureau, FCC, R-11361, RM-11497 (filed Aug. 21, 2009), at 6.

⁴⁶⁷ *AT&T Extends VoIP to 3G Network for iPhone*, Press Release, AT&T, Oct. 6, 2009.

⁴⁶⁸ *AT&T and Sling Media Collaborate on SlingPlayer Mobile App for 3G Mobile Broadband Network*, Press Release, AT&T, Feb. 4, 2010.

VoIP calling.⁴⁶⁹

152. Even in cases where service providers have taken steps to open their networks to a wider array of third-party applications, mobile operating system/platform developers may control consumer access to applications, particularly those available through their application stores. We note that the issues of consumer access to applications and content via mobile wireless Internet access and the application of nondiscrimination principles to mobile wireless broadband providers are the subject of another Commission proceeding.⁴⁷⁰

⁴⁶⁹ *Verizon Wireless and Skype Join Forces to Create a Global Mobile Calling Community*, Press Release, Verizon Wireless, Feb. 16, 2010.

⁴⁷⁰ *Preserving the Open Internet, Broadband Industry Practices*, GN Docket No. 09-191, WC Docket No. 07-52, *Notice of Proposed Rulemaking*, 24 FCC Rcd 13064 (2009).

V. MOBILE WIRELESS SERVICES: PERFORMANCE

153. 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 pricing levels and trends, subscriber growth and penetration, MOUs, innovation and diffusion of services, and quality of service.

154. 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.

A. Subscribership Levels

155. Mobile wireless subscribership can be measured and segmented 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 of subscribers using any type of mobile wireless device, we find that mobile wireless subscribership increased six percent in 2008 to 277.6 million subscribers, which translates into a nationwide penetration rates of 90 percent. Other sources indicate that there were 25 million subscribers to mobile high-speed services (Internet access at speeds over 200 kbps in at least one direction) and 86 million mobile high-speed devices in service in the United States at the end of 2008. Prepaid and wholesale subscribers as a percentage of all mobile wireless subscribers increased slightly in 2008 from 19.1 percent to 20.2 percent, and increased further in 2009 to 21.5 percent as of mid-2009. Mobile wireless penetration rates are high among nearly every age group in United States, but are highest among young adults (96 percent) and lowest among adults over 65 (89 percent). Finally, we have analyzed sub-national mobile wireless subscribership by estimating penetration rates by EAs. EA penetration rates range from a low of 68 percent in the La Crosse, WI-MN EA to a high of over 100 percent in six EAs.⁴⁷¹

1. Mobile Wireless Subscribers by Type of Service

156. Mobile wireless subscribership increased in 2008. According to the year-end 2008 NRUF data, we estimate that there were 277.6 million mobile wireless subscribers at the end of 2008,⁴⁷² which translates into a nationwide penetration rate of 90 percent.⁴⁷³ This addition of 14.6 million subscribers from 263 million at the end of 2007 represents a 5.6 percent growth in the number of subscribers during 2008. Between 2005 and 2008, mobile wireless service subscribership has increased over 30 percent. We estimate the number of mobile wireless subscribers using NRUF data. NRUF tracks the number of phone numbers that have been assigned to mobile wireless devices and therefore serves as

⁴⁷¹ See Section V.B, Penetration Rates Across Economic Areas (EAs), *infra*.

⁴⁷² Commission estimate, based on preliminary year-end 2008 NRUF filings, adjusted for porting.

⁴⁷³ The nationwide penetration rate is calculated by dividing total mobile wireless subscribers by the total U.S. population. According to the Bureau of the Census, the combined population of the 50 states, the District of Columbia, and Puerto Rico as of July 1, 2008 was estimated to be 308.3 million. See U.S. Census Bureau, *National and State Population Estimates: Annual Population Estimates 2000 to 2009*, <http://www.census.gov/popest/states/tables/NST-EST2009-01.xls> (visited Feb. 24, 2010).

a proxy for mobile wireless subscribers.⁴⁷⁴ With the increase in the use of mobile wireless devices – particularly the number of non-voice devices, such as access devices (e.g., wireless modem cards, mobile broadband-enabled laptops and netbooks, and mobile Wi-Fi hotspots), e-readers such as the Kindle, and telematics systems such as OnStar – many consumers have more than one mobile wireless device with a phone number assigned to it.⁴⁷⁵ Therefore, the mobile wireless 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.⁴⁷⁶ The value of the calculated wireless penetration rate as a measure of subscribership lies more in the change observed from year to year, rather than the absolute value.

Table 14
NRUF and CTIA - Estimated Mobile Wireless Subscribers⁴⁷⁷

	NRUF			CTIA
	<i>Subscribers (millions)</i>	<i>Increase from previous year (millions)</i>	<i>Penetration Rate</i>	<i>Subscribers (millions)</i>
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	277.6	14.6	90 %	270.3

157. CTIA reported similar growth in mobile wireless subscribership during 2008.⁴⁷⁸ CTIA's estimate for year-end 2008 was 270.3 million subscribers, a 5.8 percent increase over its estimate of 255.3

⁴⁷⁴ 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.

⁴⁷⁵ See Section III.A, Introduction, *supra*.

⁴⁷⁶ See Section V.B, Penetration Rates Across Economic Areas (EAs), *infra*.

⁴⁷⁷ Commission estimates based on NRUF data. Robert F. Roche and Lesley O'Neill, *CTIA's Wireless Industry Indices, Semi-Annual Data Survey Results: A Comprehensive Report from CTIA Analyzing the U.S. Wireless Industry, Year-End 2008 Results*, May 2009, at 26-27 (*CTIA Year-End 2008 Wireless Indices Report*). See also, CTIA PN Comments at 42.

⁴⁷⁸ While the Commission now uses NRUF data as the basis for its estimate of mobile wireless subscribership 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.

million subscribers as of year-end 2007.⁴⁷⁹ According to CTIA, since the end of 2005, mobile wireless subscribers increased by approximately 30 percent.⁴⁸⁰

158. The Commission's Form 477 data collection provides data on both the number of mobile wireless high-speed Internet access subscribers and the number of mobile high-speed-capable devices (those capable of sending or receiving information at speeds greater than 200 kbps in at least one direction) in service on a nationwide and state-by-state basis.⁴⁸¹ Under the Commission's revised Form 477 data collection adopted in 2008, terrestrial mobile wireless providers are required to report, on a state-by-state basis and by speed tier, their number of subscribers whose device and subscription permit them to access the lawful Internet content of their choice at data rates exceeding 200 kbps in at least one direction.⁴⁸² In addition, mobile broadband 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.⁴⁸³ As of the end of 2008, the Commission reported that there were about 25 million mobile wireless high-speed Internet access service subscribers and 86 million mobile high-speed capable devices in service in the United States (see Chart 10).⁴⁸⁴ Because reporting practices previously varied among providers to a largely unknown degree, neither of the December 2008 figures is directly comparable to mobile wireless high-speed connections reported for earlier dates.

⁴⁷⁹ See Appendix A, Table A-1, *infra*.

⁴⁸⁰ *Id.*

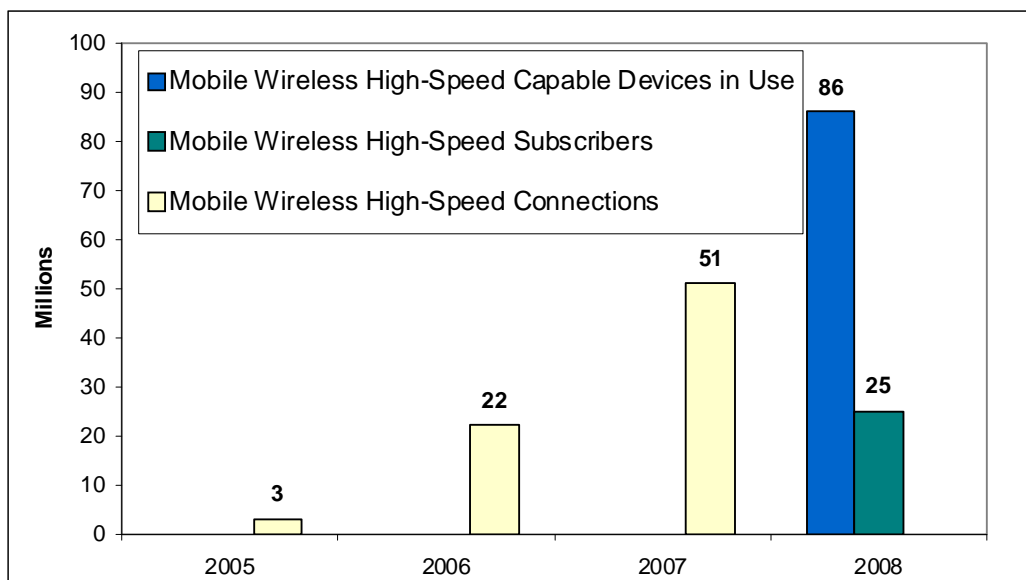
⁴⁸¹ See Table C-6, Appendix C, *infra*.

⁴⁸² 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*).

⁴⁸³ *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 mobile high-speed Internet access subscribers broken down on a Census Tract basis, as other broadband providers are required to do. *Broadband Data Order*, 23 FCC Rcd at 9698, ¶ 16. We note that the Form 477 mobile wireless broadband subscriber data do not capture those mobile data users who access the mobile Internet on a casual or *a la carte* basis but do not have a monthly or longer-term subscription to a mobile wireless Internet access service.

⁴⁸⁴ For the year-end 2007 and prior reporting periods, 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 broadband Internet access. *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 10
Mobile Wireless High-Speed Subscribers and Devices in Use⁴⁸⁵



159. In addition to the Form 477 data on mobile high-speed Internet access subscribership, CTIA estimates that, at the end of 2008, there were 228 million data-capable handsets in service, 227 million SMS-capable handsets, 203 million web-enabled handsets, and 7.2 million wireless laptops/aircards (see Chart 11).⁴⁸⁶ In 2009, CTIA began reporting data on the number of smartphones in use and reported that, as of June 30, 2009, there were 40.7 million smartphones in service.⁴⁸⁷ According to a survey from ChangeWave Research, an estimated 42 percent of U.S. consumers owned a smartphone in December 2009, up from 32 percent in December 2008 and 21 percent in October 2007 (see Chart 12).

⁴⁸⁵ Commission estimates based on Form 477 data.

⁴⁸⁶ *CTIA Year-End 2008 Wireless Indices Report*; CTIA PN Comments at 48.

⁴⁸⁷ *CTIA Mid-Year 2009 Wireless Indices Report*.

Chart 11
Mobile Wireless Subscriber Metrics by Source

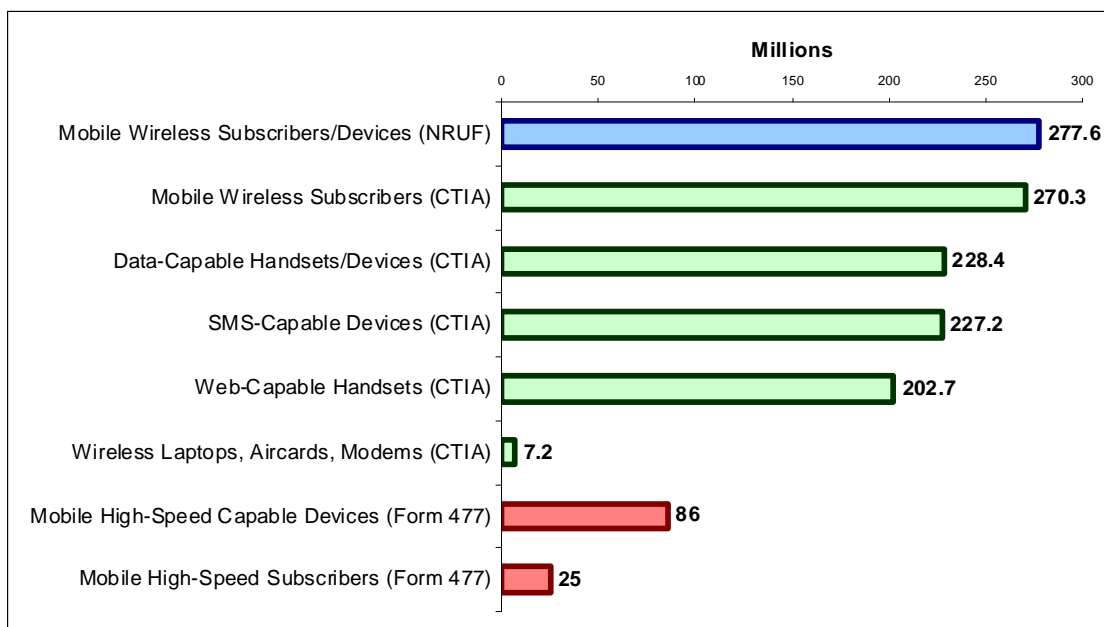
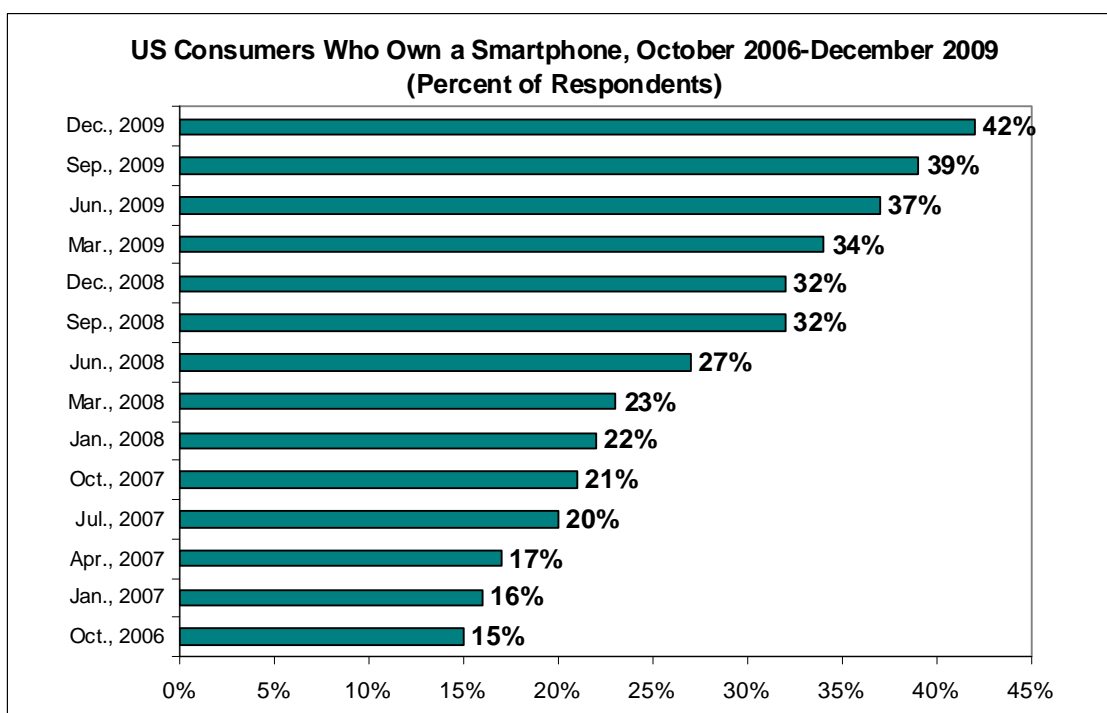


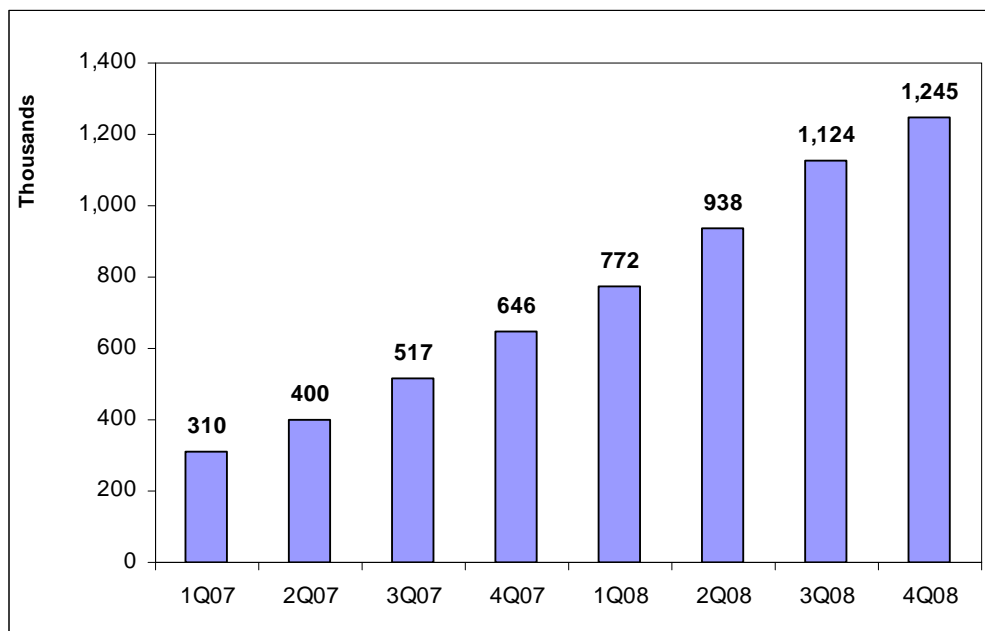
Chart 12
Smartphone Penetration Rates⁴⁸⁸



⁴⁸⁸ 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.

160. Certain individual service providers have reported data on the number of data-capable devices in use by their subscribers. For instance, 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.⁴⁸⁹ In addition, AT&T has reported its number of 3G laptop connect cards in service for several quarters, as shown in Chart 13. The number of laptop cards increased significantly during 2007 and 2008, nearly doubling from 646,000 at the end of 2007 to 1.2 million at the end of 2008.

Chart 13
AT&T 3G Laptop Connect Cards⁴⁹⁰



161. 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. 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 2007.⁴⁹¹ Among the mobile data services used, Pew estimates that 43 percent of subscribers used text messaging, 15 percent used e-mail, 14 percent accessed the Internet, 10 percent used instant messaging, 9 percent used games, 3 percent obtained maps or directions, and 3 percent watched a video. Texting remains one of the highest use activities, with 74 percent of 18- to 29-year-olds and 51 percent of 30-49 year olds using it on a typical day.⁴⁹²

162. Analysts at Credit Suisse have also estimated the number of mobile wireless data subscribers and the mobile wireless data penetration rates (see Chart 14). According to these estimates,

⁴⁸⁹ 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.*

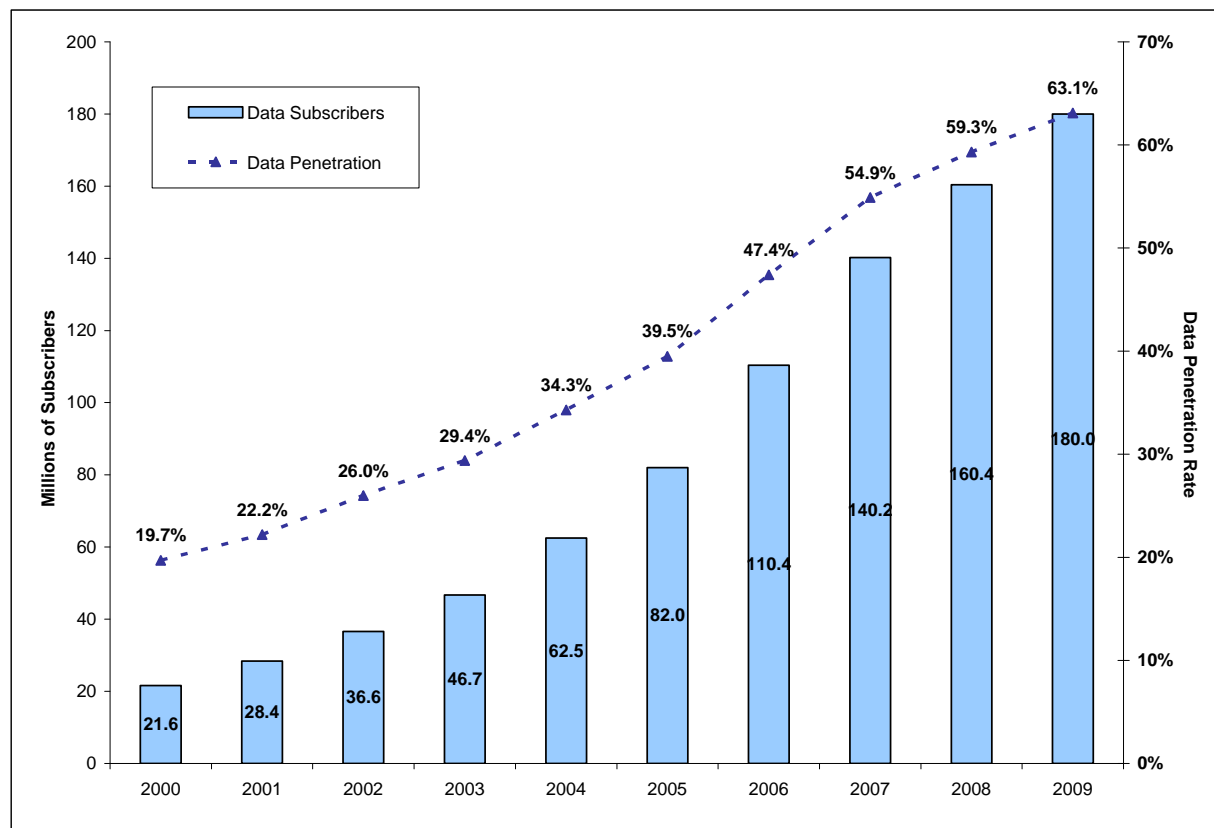
⁴⁹⁰ AT&T Fourth Quarter 2008 Earnings Release.

⁴⁹¹ 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.

⁴⁹² *Id.*

there were 180 million mobile data subscribers at the end of 2009, which translates into a penetration rate of 63 percent. The number of mobile data subscribers has increased 11 percent from 160 million at the end of 2008, and 22 percent from 140 million at the end of 2007.

Chart 14
Mobile Data Subscribers and Penetration Rates⁴⁹³



2. Mobile Wireless Subscribers by Pricing Plan

163. As previously noted, prepaid subscribers as a percentage of total subscribers has been increasing over the past few years.⁴⁹⁴ While the majority of subscribers in the United States today are in postpaid plans, the prepaid and resale/wholesale subscriber segments have been growing much faster than the postpaid segment. As shown in Chart 15, the postpaid subscribers as a percentage of total wireless subscribers decreased from 81.9 percent in the second quarter of 2007, to 78.5 percent in the second quarter of 2009. During this same period, the number of prepaid subscribers increased 37.6 percent, while the number of wholesale subscribers increased 32.5 percent.⁴⁹⁵ As discussed above, increased prepaid subscribership levels may be a reflection of the lower prices and an increasing number of prepaid service plans, as well as a response to the economic recession.⁴⁹⁶ One analyst has noted that consumers are purchasing prepaid plans “as a way to cut costs and avoid the lengthy contracts and occasional billing

⁴⁹³ Data provided by Credit Suisse First Boston.

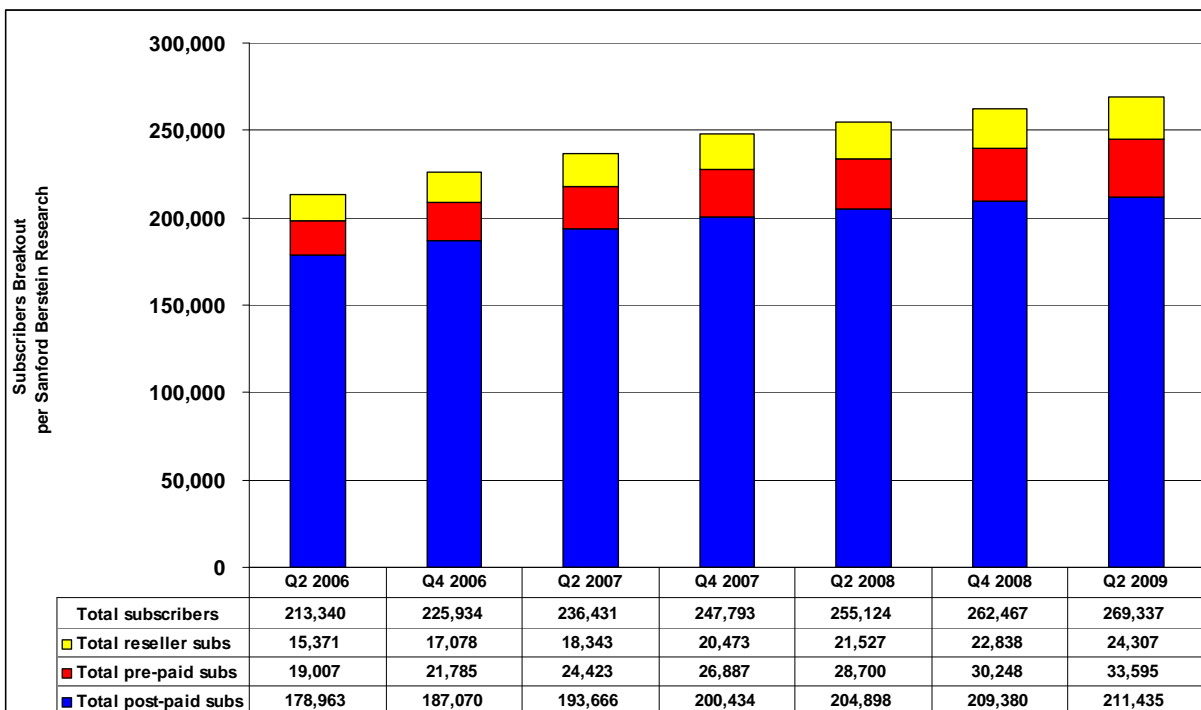
⁴⁹⁴ See Section V.A.2, Mobile Wireless Subscribers by Pricing Plan, *supra*.

⁴⁹⁵ *US Wireless 411 3Q09*, at 4.

⁴⁹⁶ See Section V.A.2, Mobile Wireless Subscribers by Pricing Plan, *supra*.

surprises that come with traditional cellphone plans.”⁴⁹⁷ The increase in wholesale/reseller subscribers may indicate that the use of devices that use mobile wireless data service on a wholesale basis, such as e-readers, is growing as well. While these devices as a percentage of all mobile wireless devices is growing, the overall ARPU for these subscribers is often substantially lower than for postpaid subscribers. For example, average revenue per Kindle device is estimated at \$2 per month.⁴⁹⁸

Chart 15
Mobile Wireless Subscribers by Type of Pricing Plan⁴⁹⁹



164. 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.⁵⁰⁰ 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.⁵⁰¹ As shown in Chart 16, Credit Suisse estimates that 67 percent of all mobile wireless subscribers were part of a family plan in 2009, up

⁴⁹⁷ Jenna Wortham, *More Customers Give Up the Cellphone Contract*, NEW YORK TIMES, Feb. 20, 2009, available at <http://www.nytimes.com/2009/02/21/technology/21prepaid.html>.

⁴⁹⁸ Lynnette Luna, *Kindle May Generate \$2 ARPU, But Is It Really That Bad?*, FIERCE BROADBAND WIRELESS, May 28, 2009, available at <http://www.fiercebroadbandwireless.com/story/arpu/2009-05-28>.

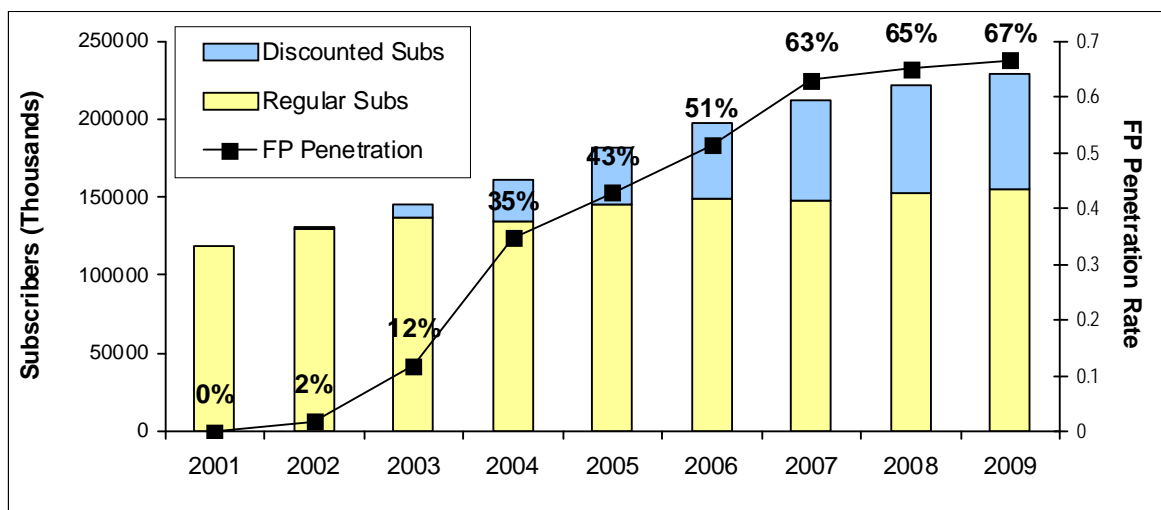
⁴⁹⁹ *US Wireless 411 3Q09*, at 4.

⁵⁰⁰ See Section IV.A, Price Rivalry: Developments in Mobile Service Pricing Plans, *supra*.

⁵⁰¹ John C. Hodulik, *et al.*, *MetroPCS - Growth Stays Strong, +CF on the Way*, UBS, UBS Investment Research, May 8, 2009, at 2.

from just 35 percent in 2004.⁵⁰² 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 2008.⁵⁰³ Family plan subscriber uptake is typical during non-promotional periods⁵⁰⁴ when, for example, couples or parents upgrade their handsets or children come of age. 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. According to one analyst, in the second quarter of 2008, Sprint Nextel and T-Mobile made an effort to restructure their family plan pricing options in order to align them with their unlimited plans and to allow family groups to realize some of the value of unlimited plans.⁵⁰⁵ Verizon Wireless and AT&T have not adopted this approach, requiring unlimited plan customers to take individual plans.⁵⁰⁶

Chart 16
Family Plan Subscribers and Penetration of Postpaid Base⁵⁰⁷



3. Mobile Wireless Subscribers by Age

165. Morgan Stanley provides data on mobile wireless subscribership by age (see Chart 17). While penetration rates are high at nearly every age group, they are highest among 18- to 24-year-olds, where penetration has reached 96 percent. The only age group with a penetration rate less than 90 percent is the 65 and over age range, where penetration is 89 percent.

⁵⁰² 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.

⁵⁰³ The Nielsen Company: Mobile Insights 2009.

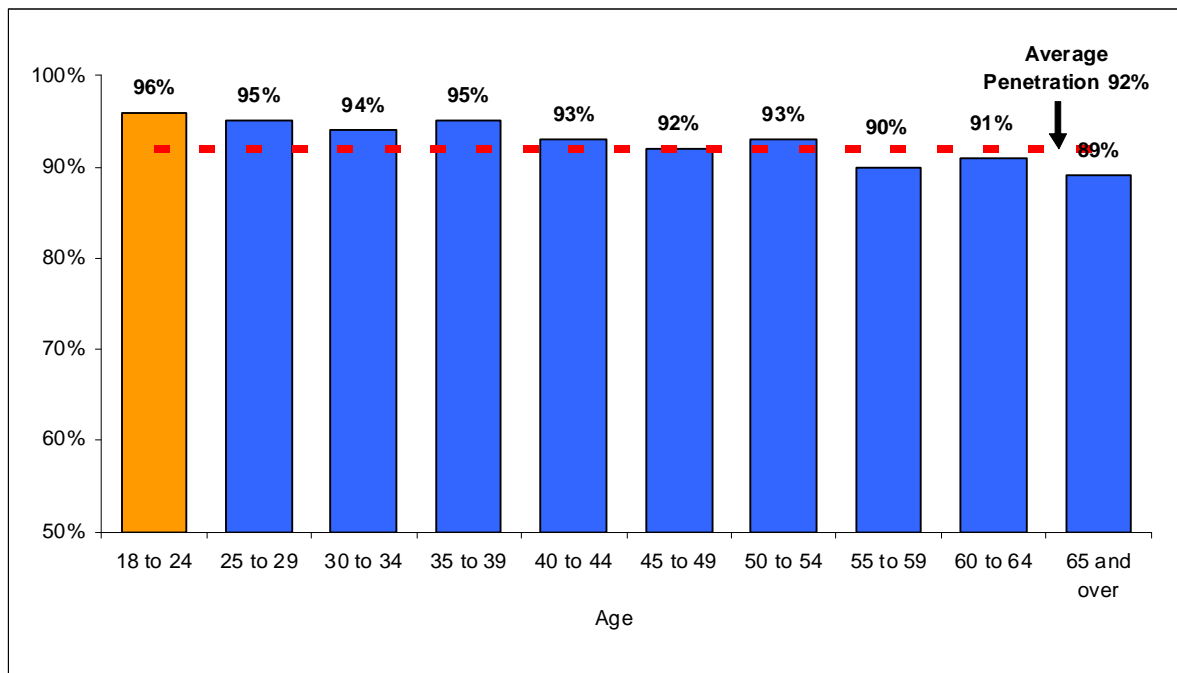
⁵⁰⁴ Non-promotional periods occur when service providers are not running promotions, such as during the holiday season.

⁵⁰⁵ Jonathan Epstein and Stephen Douglas, *Wireless Service and Handset Pricing Analysis – Sprint-T-Mobile Reset Family Plans, iPhone Subsidy Not Huge in Context*, Bank of America, June 19, 2008.

⁵⁰⁶ *Id.*

⁵⁰⁷ Data provided by Credit Suisse First Boston.

Chart 17
Mobile Wireless Penetration by Age⁵⁰⁸



166. In addition, a recent Pew study provides data on mobile wireless subscribership among teenagers (see Table 15). According to the Pew study, which reports data as of September 2009, age is an important factor in predicting mobile wireless subscribership. As the following table indicates, there is a substantial difference in mobile wireless penetration between 12-year-olds and 17-year-olds.⁵⁰⁹ Among the 12- to 17-year-old age group as a whole, mobile wireless subscribership has increased from 45 percent in 2004 to 75 percent in 2009.⁵¹⁰ Pew found that, beyond age, there were differences in mobile wireless subscribership among demographic groups of teens, such as gender and race/ethnicity.⁵¹¹ The one area where penetration rates varied was household income; 59 percent of teens in households earning less than \$30,000 per year had a cell phone, as compared to more than 75 percent of teens from families with higher incomes.⁵¹²

⁵⁰⁸ Data provided by Morgan Stanley Research, Morgan Stanley AlphaWise.

⁵⁰⁹ Amanda Lenhart, *et al.*, *Social Media & Mobile Internet Use Among Teens and Young Adults*, Pew Internet & American Life Project, Feb. 3, 2010, at 9.

⁵¹⁰ *Id.*

⁵¹¹ *Id.*

⁵¹² *Id.*

Table 15
Mobile Wireless Penetration Among Teenagers

Age	Penetration Rate
12 yrs	58%
13 yrs	73%
14 yrs	76%
15 yrs	79%
16 yrs	82%
17 yrs	83%

167. The Pew study also indicates that young adults are more likely than older adults to own a cell phone, with 93 percent of adults in the 18- to 29-year-old age group owning a cell phone compared to 83 percent of all adults over 18 years old owning a cell phone.⁵¹³ This compares to penetration figures in 2004 of 71 percent and 65 percent, respectively, for these age groups.⁵¹⁴

168. Also, one marketing analyst has reported that advanced mobile technology that enables web browsing, e-mail and use of applications is more frequently adopted by users in the 18 to 24 and 25 to 44 year old age groups than by older users.⁵¹⁵ The smartphone ownership rate of mobile users by age group is shown in Table 16 below. This marketing analyst also reports that adoption of SMS is highest among users in the 18 to 24 year old age group, but that this adoption is reaching a plateau (see Table 16 below). In addition, older age groups continue to show an increase in SMS adoption.⁵¹⁶

Table 16
Smartphone and SMS Adoption by Age Group⁵¹⁷

Age Range	Smartphone Ownership Rate	SMS Adoption Rate
18 to 24 year-olds	29%	83%
25 to 44 year-olds	29%	65%
45 to 54 year-olds	24%	52%
55 to 64 year-olds	13%	33%

B. Penetration Rates Across Economic Areas (EAs)

169. To analyze mobile wireless subscribership across geographic areas, we have estimated mobile wireless penetration rates in the EAs of the United States using NRUF data.⁵¹⁸ As discussed

⁵¹³ *Id.* at 17.

⁵¹⁴ *Id.*

⁵¹⁵ Marketing Sherpa, *Consumer Behavior in the Mobile Channel: 4 Trends Marketers Should Note*, Dec. 22, 2009, available at <https://www.marketingsherpa.com/sample.cfm?ident=31481>.

⁵¹⁶ *Id.*

⁵¹⁷ Marketing Sherpa, *Consumer Behavior in the Mobile Channel: 4 Trends Marketers Should Note*, Dec. 22, 2009, available at <https://www.marketingsherpa.com/sample.cfm?ident=31481>.

⁵¹⁸ NRUF data is collected on a small area basis and thus allows the Commission to compare the spread of mobile wireless subscribership across different areas within the United States. NRUF data is collected by the area code and prefix (NXX) level for each provider, which enables the Commission to approximate the number of subscribers that each provider has in each of the approximately 18,000 rate centers in the country. Rate center boundaries generally (continued....)

above, we use EAs as the geographic unit for measuring the level of concentration in the mobile wireless services industry in order to maintain continuity with past *Reports*⁵¹⁹ and ensure that we do not compromise the confidential information found in the NRUF data.⁵²⁰

170. Regional penetration rates for the 172 EAs covering all 50 states, as of December 2008, can be seen in Appendix C, Table C-3. In addition, a map showing regional penetration rates by EAs can be found in Appendix D.⁵²¹ Several EAs – including Detroit, MI; Birmingham, AL; Farmington, NM; Washington, DC; San Diego, CA; and Beaumont, TX – had penetration rates exceeding 100 percent, which is likely due to subscribers having more than one device.⁵²² In 53 of the 160 EAs, the penetration rates exceeded 90 percent, up from 24 EAs at the end of 2007. Only two EAs, with a combined population of just 415,000, had penetration rates under 70 percent. The EA with the lowest reported penetration rate was La Crosse, WI-MN (EA 105), with a penetration rate of 68 percent.⁵²³ The EA with the lowest population density, Anchorage, AK (EA 171), had a penetration rate of 86 percent, while the EA with the highest density, Tampa-St. Petersburg-Clearwater, FL (EA 34), had a penetration rate of 92

(Continued from previous page) —————

do not coincide with county boundaries. However, for purposes of geographical analysis, rate centers (including those that cross county boundaries) can be associated with the county that contains the (usually) centralized geographic point for that rate center. Counties, for which population and other data exist, can be aggregated together and associated with several larger geographic areas based on counties, such as EAs and Cellular Market Areas (CMAs). Aggregation to larger geographic areas reduces the level of inaccuracy inherent in combining non-coterminous areas such as rate center areas and counties.

⁵¹⁹ There are 172 EAs, each of which is an aggregation of counties. Each EA is made up of one or more economic nodes and the surrounding areas that are economically related to the node. The main factor used in determining the economic relationship between the two areas is commuting patterns, so that each EA includes, as far as possible, the place of work and the place of residence of its labor force. See Kenneth P. Johnson, *Redefinition of the EA Economic Areas*, SURVEY OF CURRENT BUSINESS, Feb. 1995, at 75 (*Redefinition of the EA*). For its spectrum auctions, the Commission has defined four additional EAs: Guam and the Northern Mariana Islands (173); Puerto Rico and the U.S. Virgin Islands (174); American Samoa (175); and Gulf of Mexico (176). See FCC, *FCC Auctions: Maps*, available at <http://wireless.fcc.gov/auctions/data/maps.html> (visited Dec. 15, 2008). In November 2004, the Bureau of Economic Analysis released updated definitions of EAs; however, for consistency, we use the previous release of definitions. See *New BEA Economic Areas For 2004*, Bureau of Economic Analysis, Nov. 17, 2004. As noted above, the Commission typically has used smaller geographic areas, such as CMAs, for analyzing mobile wireless transactions. See, e.g., *Sprint Nextel-Clearwire Order*, 23 FCC Rcd at 17591, ¶¶ 51-52; *Verizon Wireless-Alltel Order*, 23 FCC Rcd at 17472-73, ¶ 52.

⁵²⁰ Wireless providers have considerable discretion in how they assign telephone numbers across the rate centers in their operating areas and, according to one analyst, assign numbers so as to minimize the access charges paid to local wireline companies. See Linda Mutschler *et al.*, *Wireless Number Portability*, Merrill Lynch, Equity Research, Jan 9, 2003, at 8 (“For wireless operators, the standard practice is to aggregate phone numbers within the same area code onto the same or several rate centers, whose physical locations would result in the least amount of access charges paid to ILECs. Therefore, in each market, wireless operators are present in only a small number of rate centers. According to our industry sources, this percentage is probably below 20%, and could be meaningfully lower than 20%). Therefore, a mobile wireless subscriber can be assigned a phone number associated with a rate center that is a significant distance away from the subscriber’s place of residence or usage, but generally still in the same EA. See Linda Mutschler, *et al.*, *US Wireless Services: Wireless Number Portability – Breaking Rules*, Merrill Lynch, Equity Research, Feb. 28, 2003, at 3 (“Once the NPA-NXX (i.e., 212-449) is assigned to the wireless carrier, the carrier may select any one of its NPA-NXXs when allocating that number to a particular subscriber. Therefore, with regard to wireless, the subscriber’s physical location is not necessarily a requirement in determining the phone number assignment – which is very different from how wireline numbers are assigned”).

⁵²¹ See Map D-30, Appendix D, *infra*.

⁵²² We excluded New Orleans, LA-MS (EA 83) from this analysis due to what we believe to be an aberration with the statistics. See Appendix C, Table C-3: Economic Area Penetration Rates, note 1 *infra*.

⁵²³ In seven EAs, the penetration rate could not be reported for confidentiality reasons because the number of competing providers in the EA is less than four.

percent. As previously stated, based on an analysis of NRUF data, the national penetration rate at the end of 2008 was 90 percent.

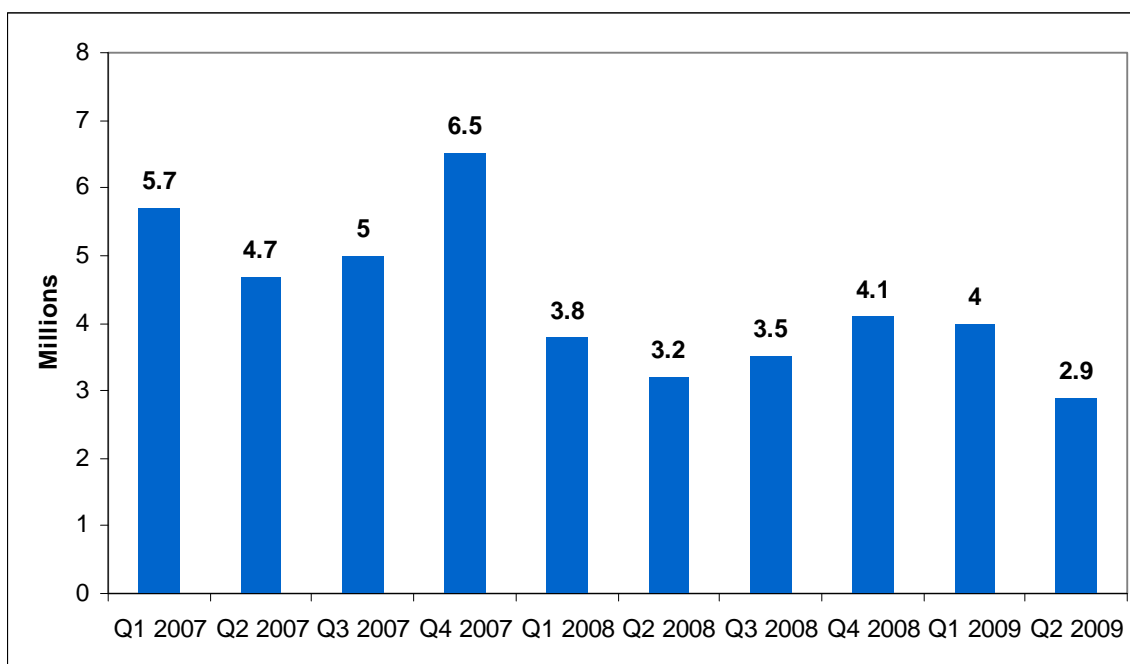
C. Net Adds/Subscriber Growth

1. Industry-Wide Subscriber Net Adds

171. As the wireless industry has reached penetration levels nearing 90 percent of the US population, the growth of net new subscribers has decelerated. Mobile wireless service providers are reporting that net adds have slowed on both a quarterly and an annual basis.

172. According to data from Bernstein Research, “2008 marked a new low in the wireless industry’s net additions and percentage growth.”⁵²⁴ Total mobile wireless subscriber growth in 2008 was 5.9 percent, down from 9.8 percent growth in 2007 and 12 percent growth in 2006.⁵²⁵ According to the Commission’s NRUF data, there were 14.6 million mobile wireless subscriber net adds in 2008, compared to 21.2 million in 2007, which represents a 31 percent decline.⁵²⁶ Quarterly net adds are shown in Chart 18 below.

Chart 18
Total Mobile Wireless Subscriber Quarterly Net Adds⁵²⁷



2. Mobile Wireless Net Adds by Pricing Plan

173. In recent years, net adds have varied by type of pricing plan, as shown in Chart 19 below. The number of unlimited prepaid plan net adds has grown in recent quarters, both in terms of absolute numbers and as a percentage of total net adds. During the fourth quarter of 2007, unlimited prepaid subscribers accounted for 10.5 percent of total net adds. This figure grew to 21.1 percent in the fourth

⁵²⁴ *A Recipe for Disaster*.

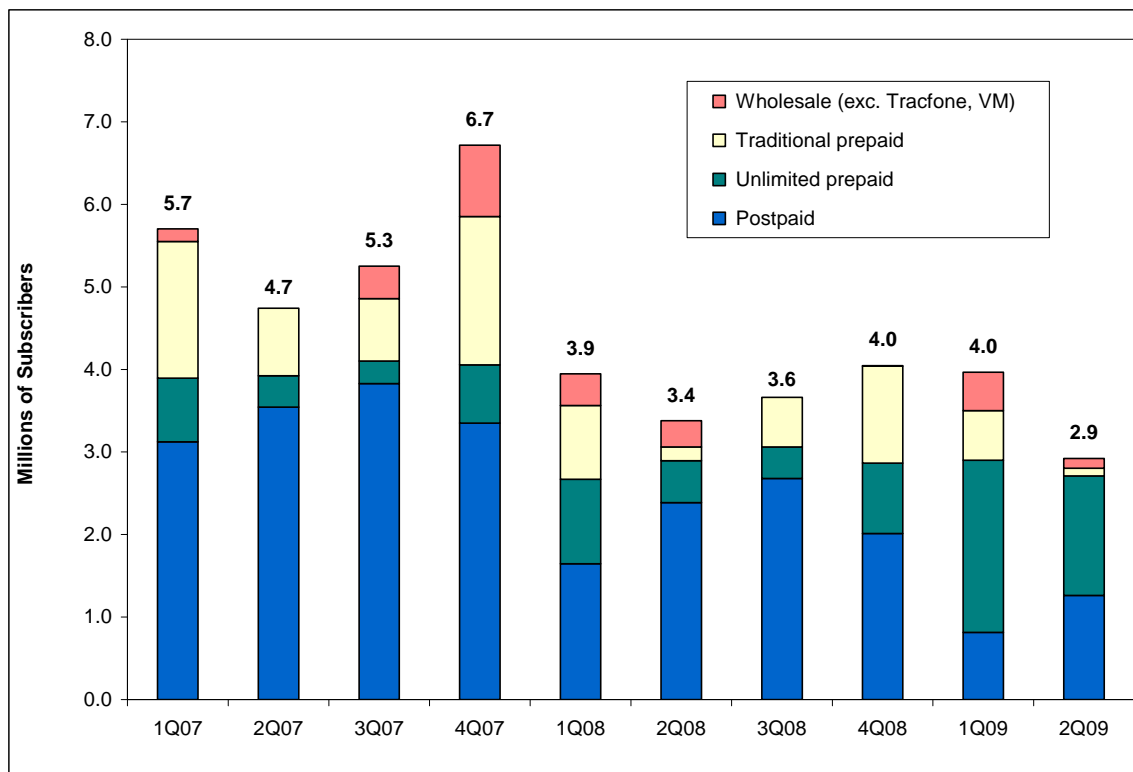
⁵²⁵ *Id.*

⁵²⁶ See Table 14, *supra*.

⁵²⁷ Data provided by Bernstein Research.

quarter of 2008 and to 50.1 percent in the second quarter of 2009. The number of unlimited prepaid net adds increased from 708,000 in the fourth quarter of 2007 to 854,000 in the fourth quarter of 2008, and to 1.5 million in the second quarter of 2009. This trend may be a reflection of the lower prices and increased number of offerings for prepaid plans, as discussed above, and of the economic recession, which may have moved consumers to seek lower-priced, higher-value mobile wireless service with no long term contracts.⁵²⁸

Chart 19
Mobile Wireless Net Adds by Pricing Plan⁵²⁹



174. The number of postpaid subscribers continued to grow during 2008 and the first half of 2009, but at a slower rate than in previous years. There were 3.3 million postpaid net adds in the fourth quarter of 2007 versus just 2 million in the fourth quarter of 2008, a 39 percent decrease. Postpaid net adds also dropped from 2.4 million in the second quarter of 2008 to 1.2 million in the second quarter of 2009. Postpaid net adds accounted for 70.6 percent of total net adds in the second quarter of 2008, versus just 43 percent in the second quarter of 2009, when unlimited prepaid dominated the net add mix.

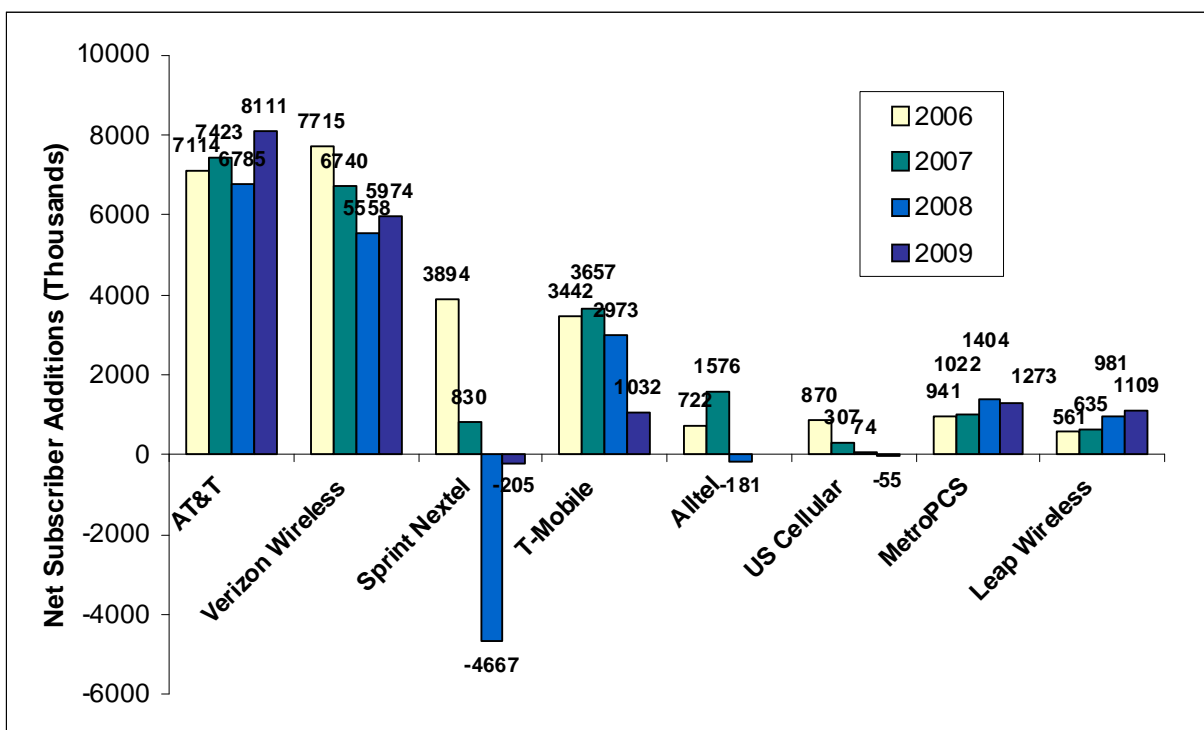
3. Mobile Wireless Net Adds by Service Provider

175. As shown in Chart 20 below, the net subscriber additions have not been evenly distributed across all service providers. During 2009, AT&T and Verizon Wireless gained 8.1 million and 6 million net adds, respectively, while T-Mobile had just over 1 million net adds and Sprint Nextel had a 205,000 net subscriber loss. MetroPCS and Leap, while smaller than the top four providers, increased their subscriber bases by about 24 and 29 percent, respectively during 2009.

⁵²⁸ See Section IV.A, Price Rivalry: Developments in Mobile Service Pricing Plans, *supra*.

⁵²⁹ *US Wireless 411 2Q09*, at 4.

Chart 20
Net Adds by Service Provider⁵³⁰



D. Output and Usage Levels

1. Mobile Voice

176. As a measure of mobile voice usage, CTIA reports the average MOUs for six-month periods.⁵³¹ As shown in Chart 21 below, MOUs declined eight percent during 2008, from 769 for the second half of 2007 to 708 during the second half of 2008. When comparing the first half of 2008 with the first half of 2009, MOUs declined two percent from 751 to 735. The trend of declining voice minutes may be due to substitution by mobile messaging services.⁵³²

177. Chart 22 below shows the MOUs for the four nationwide mobile wireless service providers, and it reveals that T-Mobile's MOU levels have been consistently higher than those of the other three providers but have been flat over the past several quarters. The average voice MOUs of

⁵³⁰ See Company 2009 SEC 10-K Filings (2009 subscriber data); Table C-4, Appendix C (2008-2007 subscriber data); *Thirteenth Report*, 24 FCC Rcd at 6320-21, Table A-4 (2006 subscriber data); *Twelfth Report*, 23 FCC Rcd at 2361-62, Table A-4 (2005 subscriber data). This research includes wholesale subscribers. *Pro-forma* calculations were made to account for mergers and show only "organic" net adds generated independent of mergers. Verizon Wireless's reported net additions for 2009, including the subscribers acquired from Alltel, totaled 19,193,000. Verizon Communications, Inc., SEC Form 10-K (Portions of Verizon Annual Report to Shareholders), filed Feb. 26, 2010, available at <http://www.sec.gov/Archives/edgar/data/732712/000119312510041685/dex13.htm>.

⁵³¹ CTIA aggregates all of the service providers' MOUs from January 1 through June 30, or from July 1 through December 31, then divides by the average number of subscribers for the period, and then divides by six. See *Thirteenth Report*, 24 FCC Rcd at 6284, note 582.

⁵³² Simon Flannery, *et al.*, *3Q Trend Tracker – Signs of Life for Telecom*, Morgan Stanley, Morgan Stanley Research – North America, Dec. 4, 2009, at 60 ("MOU and text messages per user combined is rising as a result of the explosion in texts per subscriber each month. We believe that some of what would be voice minutes are now being replaced by text messages"). Mobile messaging traffic is discussed in Section V.D.2, Mobile Messaging, *infra*.

AT&T and Sprint Nextel subscribers have been declining slightly, while those of Verizon Wireless have increased slightly.

Chart 21
Average MOUs Per Subscriber Per Month⁵³³

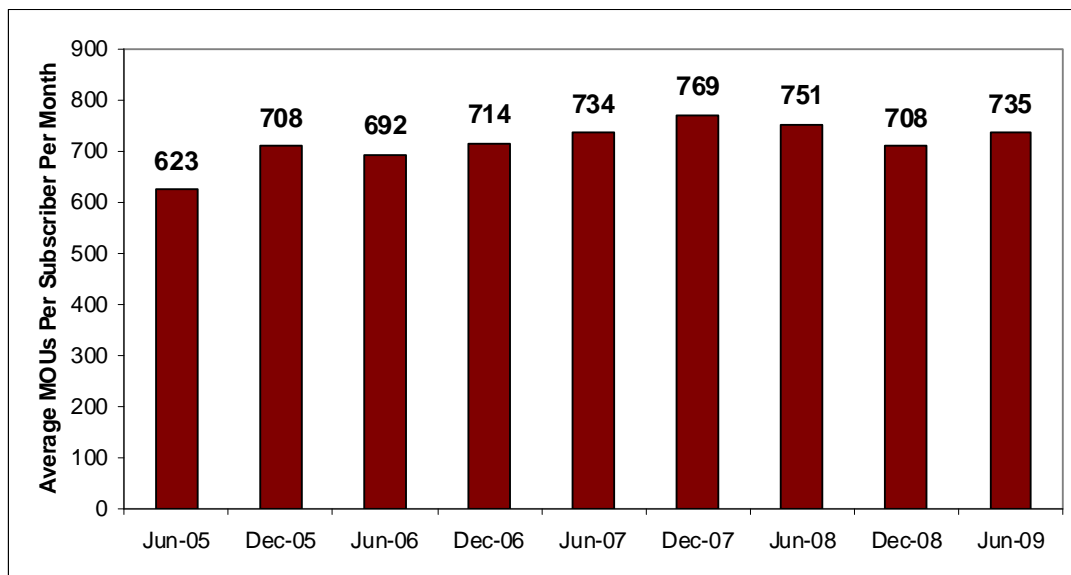
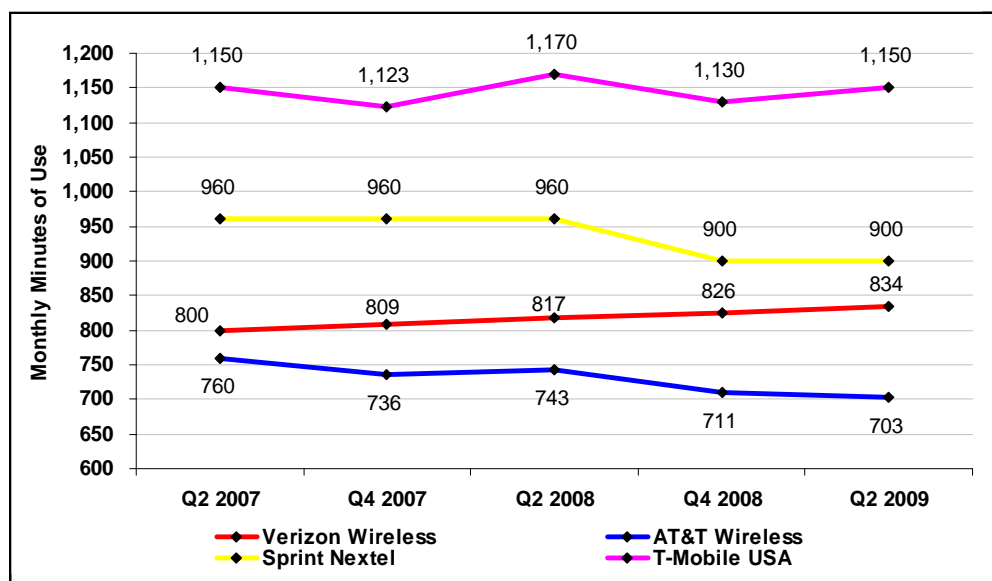


Chart 22
MOUs Per Subscriber: Four Nationwide Service Providers⁵³⁴



⁵³³ CTIA Mid-Year 2009 Wireless Indices Report.

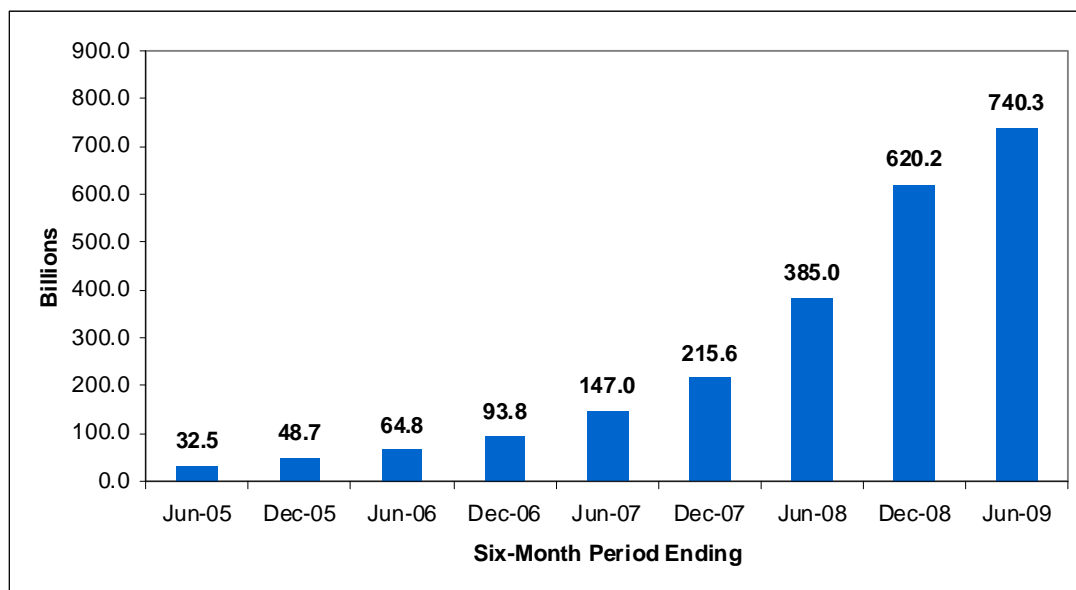
⁵³⁴ US Wireless 411 2Q09.

2. Mobile Messaging

178. Mobile text messaging traffic has grown significantly over the past two years. According to data reported by CTIA, which is presented in Chart 23, text messaging volumes grew 177 percent from a total of 363 billion in 2007 to just over 1 trillion in 2008.⁵³⁵ In 2009, monthly text messaging traffic increased 92 percent from 385 billion messages during the first half of 2008 to 740.3 billion messages in the first half of 2009.⁵³⁶ Mobile wireless subscribers are also sending more photo, video, and other multimedia messages (MMS) with their devices. As shown in Chart 24 below, CTIA reports that a total of 14.9 billion MMS messages were sent during 2008, a 144 percent increase from the 6.1 billion sent during 2007. MMS messages sent during the first half of 2009 rose 83 percent to 10.3 billion MMS messages from the 5.6 billion sent during the first half of 2008.⁵³⁷

179. We can estimate the number of text and MMS messages per subscriber per month by dividing the total number of messages by the average number of mobile wireless subscribers, while recognizing that not all mobile wireless subscriber use messaging services. As shown in Table 17, the average mobile wireless subscriber sent 388 text messages and 5.8 MMS messages per month during the second half of 2008. This represents a 169 percent increase in the average number of text messages per subscriber per month from the second half of 2007, and a 152 percent increase in the average number of MMS messages per subscriber per month during the same period.

Chart 23
Monthly Text Messaging Traffic Volumes⁵³⁸



⁵³⁵ CTIA Mid-Year 2009 Wireless Indices Report, at 201; CTIA PN Comments at 43.

⁵³⁶ CTIA Mid-Year 2009 Wireless Indices Report, at 201.

⁵³⁷ *Id.* at 203.

⁵³⁸ CTIA Mid-Year 2009 Wireless Indices Report.

Chart 24
Six-Month MMS Traffic Volumes⁵³⁹

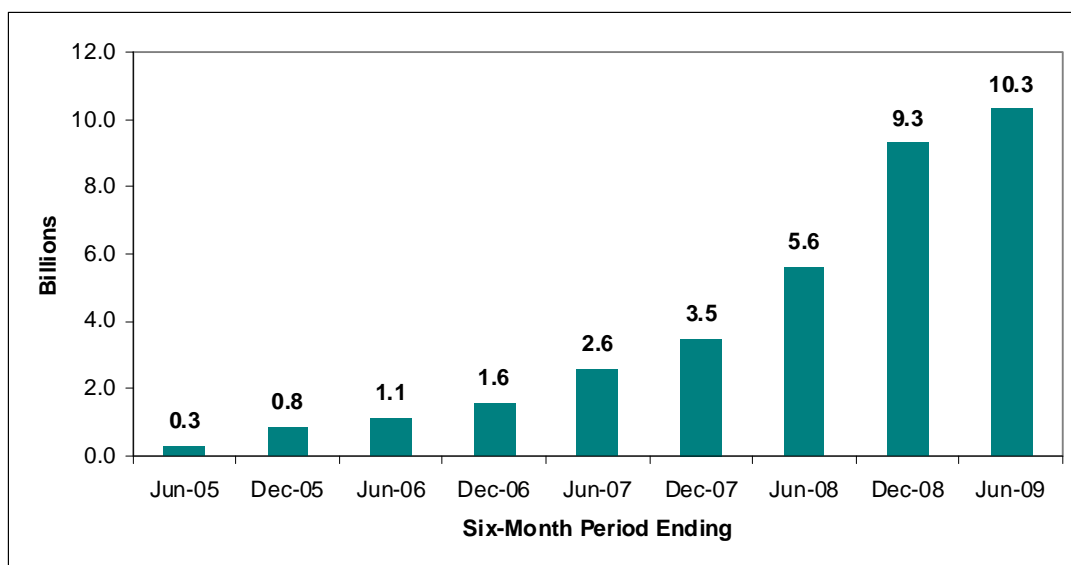


Table 17
Average Text and MMS Messages Per Subscriber Per Month⁵⁴⁰

Six-Month Period Ending	Average Text Messages Per User Per Month	Average MMS Messages Per User Per Month
Jun-05	29	0.3
Dec-05	40	0.7
Jun-06	51	0.9
Dec-06	69	1.2
Jun-07	103	1.8
Dec-07	144	2.3
Jun-08	248	3.6
Dec-08	388	5.8
Jun-09	451	6.3

180. A major driver of growth in mobile messaging is intensive use among the teen segment. The results of a study conducted by Nielsen Media, presented in Chart 25 below, reveal that consumption of text messaging services among teenagers in the United States is extraordinarily high.⁵⁴¹ This study indicates that teenagers send an average of 3,146 messages per month, which is the equivalent of more than ten messages every hour that they are not sleeping or in school. In the under-12 age group, Nielsen estimates that children are sending an average of 1,146 messages per month. As discussed above, the average price per text messages has been declining as more subscribers have shifted to unlimited or

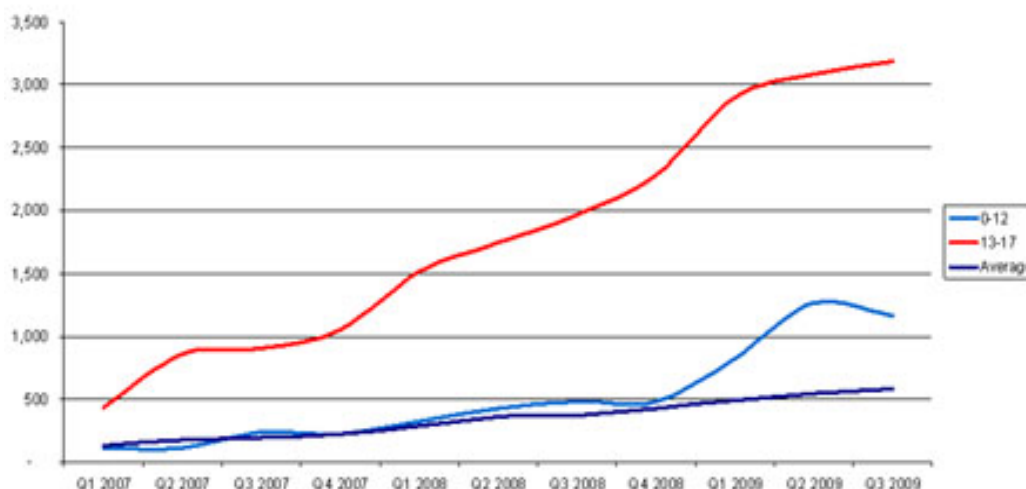
⁵³⁹ CTIA Mid-Year 2009 Wireless Indices Report; CTIA PN Comments at 43.

⁵⁴⁰ CTIA Mid-Year 2009 Wireless Indices Report; Commission estimates.

⁵⁴¹ Roger Entner, *Under-aged Texting: Usage and Actual Cost*, NIELSEN WIRE, Jan. 27, 2010, available at http://blog.nielsen.com/nielsenwire/online_mobile/under-aged-texting-usage-and-actual-cost/.

bucket messaging plans.⁵⁴²

Chart 25
Use of Texting by Children and Teenagers⁵⁴³



3. Mobile Data Traffic (Non-Messaging)

181. Unlike voice and text messaging services, CTIA does not currently provide usage data for non-messaging mobile data and mobile Internet traffic. Therefore, we base our discussion of mobile data usage on information from other sources. Estimates from other sources indicate that mobile data usage is growing significantly both in the United States and globally.⁵⁴⁴ For instance, Cisco estimates that global mobile data traffic grew 157 percent from 33 terabytes in 2008 to 85 terabytes in 2009.⁵⁴⁵ In addition, Nokia Siemens Networks estimates that mobile data traffic grew fourfold during 2008.⁵⁴⁶ Data traffic is

⁵⁴² According to Nielsen, only a small percentage of people who text message do so on a pay-as-you-go basis at the 20 cent per message rate. Nielsen estimates that the average price per text message dropped 47 percent between the first quarter 2008 and third quarter 2009 and is now around 1 cent. Nielsen also argues that text messaging is offered in a similar way to newspapers and magazines in the United States. Newspaper and magazine subscriptions are offered at a 40 to 80 percent discount off the newsstand price, while text messaging subscriptions offer messages at a 95 percent discount off the *a la carte* rate. Roger Entner, *Under-aged Texting: Usage and Actual Cost*, NIELSEN WIRE, Jan. 27, 2010, available at http://blog.nielsen.com/nielsenwire/online_mobile/under-aged-texting-usage-and-actual-cost/.

⁵⁴³ Reproduced from: Roger Entner, *Under-aged Texting: Usage and Actual Cost*, NIELSEN WIRE, Jan. 27, 2010, available at http://blog.nielsen.com/nielsenwire/online_mobile/under-aged-texting-usage-and-actual-cost/.

⁵⁴⁴ Cisco, *Cisco Virtual Networking Index: Global Mobile Data Traffic Forecast Update, 2009-2014*, http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-520862.html (visited Mar. 15, 2010); Informa Industry Outlook, available at <http://io2010.informatm.com/>; Mobile Opportunity, *The Mobile Data Apocalypse and What It Means to You*, <http://mobileopportunity.blogspot.com/2009/11/mobile-data-apocalypse-and-what-it.html> (visited Apr. 28, 2010).

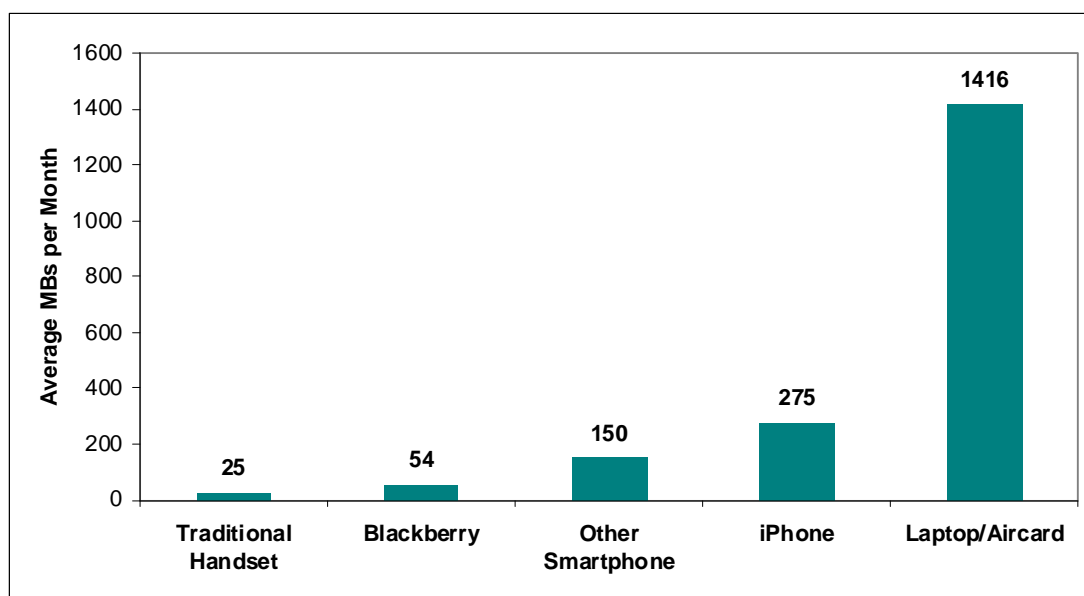
⁵⁴⁵ *Cisco Visual Networking Index: Global Mobile Traffic Forecast Update*, Cisco, Jan. 29, 2009, at 6.

⁵⁴⁶ Nick Wood, *Mobile Data Traffic Growth 10 Times Faster Than Fixed Over Next Five Years – Nokia Siemens*, TOTAL TELECOM, Sept. 7, 2009, available at <http://www.totaltele.com/view.aspx?ID=448681> (citing Mika Vehvilainen, CTO, Nokia Siemens Networks); Dan Warren, *Reality Check: All Roads Lead to LTE (Eventually)*, RCR WIRELESS, Sept. 29, 2009, available at <http://www.rcrwireless.com/ARTICLE/20090929/FRONTPAGE/909289993/reality-check-all-roads-lead-to-lte-eventually>.

increasing with the growth in smartphone subscribers, who use the Internet and send and receive content more than average mobile wireless users.⁵⁴⁷

182. Data on mobile data usage by type of device for the second half of 2009, based on estimates from Validas, is shown in Chart 26 below.⁵⁴⁸ Traditional handset users had the lowest levels of data usage, averaging 25 MB per month. Data traffic from smartphone users was significantly higher, ranging from 54 MB per month for Blackberry users to 275 MB per month for iPhone users. Mobile wireless subscribers using laptops and aircards/wireless modem cards had the highest data usage, averaging 1.4 GB per month. The Validas study also shows that the majority of Blackberry and other smartphone users had relatively low data levels of data usage, generating between 0 and 50 MB per month on average. Only 16 percent of iPhone users, on the other hand, generated between 0 and 50 MB per month; and 52 percent generated between 100 and 500 MB per month. Meanwhile, 59 percent of laptop/aircard users transferred over 500 MB of data traffic per month. As a point of comparison, Bank of America/Merrill Lynch estimated that, in leading mobile broadband markets around the world, per-capita mobile data usage was around 100 MB per month as of December 2009.⁵⁴⁹

Chart 26
Estimated Mobile Data Usage by Type of Device⁵⁵⁰



183. Individual mobile wireless service providers, such as AT&T and Verizon Wireless, confirm that their customers are migrating from voice-centric services to data-centric services. AT&T reported that its network experienced an 18-fold increase in mobile data traffic during the two-and-a-half

⁵⁴⁷ Simon Flannery, *et al.*, *3Q Trend Tracker – Signs of Life for Telecom*, Morgan Stanley, Morgan Stanley Research – North America, Dec. 4, 2009, at 59. See Section VII.B.2, Mobile Applications, *infra*.

⁵⁴⁸ Validas LLC, <http://www.myvalidas.com/industryanalytics.aspx>. Validas is a company that offers web-based wireless bill analysis and optimization services to consumers and businesses. See Jeff Blyskal, *iPhones Hog Much More Data Than Other Smartphones*, Consumer Reports Electronics Blog, Feb. 10, 2010, available at <http://blogs.consumerreports.org/electronics/2010/02/iphone-data-usage-smart-phones-smartphones-blackberry-mb-network-att-carrier-istress.html>.

⁵⁴⁹ See *Finding Value in Smartphones*, at 28.

⁵⁵⁰ Validas LLC, <http://www.myvalidas.com/industryanalytics.aspx>.

years after the iPhone was introduced, and that its mobile data traffic increased over four times between June 2008 and June 2009.⁵⁵¹ AT&T has also reported that its mobile data traffic increased 5000 percent from mid-2006 to mid-2009.⁵⁵² According to AT&T, three percent of its smartphone users are responsible for 40 percent of total data usage.⁵⁵³ According to one analyst, the average iPhone user consumes five to ten times more bandwidth on a monthly basis than the average smartphone customer,⁵⁵⁴ while another analyst estimates that the average iPhone user consumes twice the monthly bandwidth of the average smartphone user and five to seven times the monthly bandwidth of the average wireless voice subscriber.⁵⁵⁵ Verizon Wireless reported that the main drivers of data traffic growth on its network during the fourth quarter of 2008 were broadband access plans, e-mail, and messaging.⁵⁵⁶

184. According to a report by Allot Communications, mobile data traffic during the second quarter of 2009 was generated by the following applications: web browsing (35 percent), HTTP streaming (23 percent), messaging (21 percent), web downloads (16 percent) and other applications (5 percent).⁵⁵⁷

E. Pricing Levels, Changes, and Trends

1. Price Indicators

185. Wide variations in the non-price terms and features of wireless service plans make it difficult to characterize the price of mobile wireless service; consequently, it is difficult to identify sources of information that track mobile wireless service prices in a comprehensive manner.⁵⁵⁸ As documented in previous reports, there is ample evidence of a sharp decline in mobile wireless prices in the period since the launch of PCS service. However, after posting across-the-board declines in 2007,⁵⁵⁹ some indicators of mobile wireless service pricing showed price decreases in 2008, while others showed increases.⁵⁶⁰ The price of mobile wireless service, as measured by the CPI for mobile services, decreased. However, unit prices of voice and messaging services show different trends. Voice RPM increased slightly in 2008, while the average revenue per text message decreased. It is possible that these trends are interrelated, as consumers substitute messaging for voice on some occasions. We note that it is not possible to calculate unit prices for non-messaging mobile data services because the industry does not report comparable mobile data revenue and traffic figures.

186. *Cellular CPI.* One source of price information is the cellular telephone services'

⁵⁵¹ *MobileData: Traffic Jam Ahead?*, Bank of America/Merrill Lynch, Feb. 2, 2010. AT&T indicated that the Pandora and XM streaming music applications on the iPhone are two of the highest traffic drivers. *Id.*

⁵⁵² Presentation by Kris Rinne, Senior VP, AT&T, FCC National Broadband Plan Workshop: Technology-Wireless, Aug. 13, 2009; Michelle Megna, *AT&T Faces 5000 Percent Surge in Traffic*, INTERNETNEWS.COM, Oct. 8, 2009, at <http://www.internetnews.com/mobility/article.php/3843001> (citing AT&T CTO John Donovan).

⁵⁵³ Tom Kaneshige, *AT&T iPhone Users Irate at Idea of Usage-Based Pricing*, PCWORLD, Dec. 14, 2009.

⁵⁵⁴ *Id.* (citing Nielsen's Roger Entner, who told USA TODAY that the typical iPhone customer uses 400 MBs of wireless capacity per month, whereas the typical smartphone customer consumes about 40 to 80 MBs per month).

⁵⁵⁵ *Id.* (citing Bernstein Research analyst Toni Sacconaghi).

⁵⁵⁶ Verizon Q4 2008 Earnings Conference Call, Jan. 27, 2009 (citing Doreen Toben, Verizon Executive Vice President and CFO).

⁵⁵⁷ Allot Communications, *Global Mobile Broadband Traffic Report*, July 2009.

⁵⁵⁸ See *Fourth Report*, 14 FCC Rcd at 10164-10165.

⁵⁵⁹ See *Thirteenth Report*, 24 FCC Rcd at 6274-6276, ¶¶ 188-193.

⁵⁶⁰ Only indicators of the price of mobile wireless services are discussed in this section. See Section VII.B.1, Mobile Wireless Handsets/Devices and Operating Systems, *infra*, for information on handset and device pricing.

component of the CPI (Cellular CPI) produced by the United States Department of Labor's Bureau of Labor Statistics (BLS).⁵⁶¹ Cellular CPI data is published on a national basis only.⁵⁶² From 2007 to 2008, the annual Cellular CPI decreased by approximately 0.2 percent while the overall CPI increased by 3.8 percent. The Cellular CPI has declined 35.8 percent since December 1997, when BLS began tracking it.⁵⁶³

Table 18
Change in CPI⁵⁶⁴

	CPI		Cellular CPI		All Telephone CPI		Local Telephone CPI		Long Distance Telephone CPI	
	Index Value	Annual Change	Index Value	Annual Change	Index Value	Annual Change	Index Value	Annual Change	Index Value	Annual Change
Dec 1997	100		100		100		100		100	
1998	101.6		95.1		100.7		101.6		100.5	
1999	103.8	2.2%	84.9	-10.7%	100.1	-0.6%	103.4	1.8%	98.2	-2.3%
2000	107.3	3.4%	76.0	-10.5%	98.5	-1.6%	107.7	4.1%	91.8	-6.5%
2001	110.3	2.8%	68.1	-10.4%	99.3	0.8%	113.3	5.2%	88.8	-3.3%
2002	112.1	1.6%	67.4	-1.0%	99.7	0.4%	118.5	4.5%	84.9	-4.4%
2003	114.6	2.3%	66.8	-0.9%	98.3	-1.4%	123.3	4.1%	77.8	-8.4%
2004	117.7	2.7%	66.2	-0.9%	95.8	-2.5%	125.1	1.5%	70.9	-8.9%
2005	121.7	3.4%	65.0	-1.8%	94.9	-0.9%	128.5	2.7%	67.5	-4.8%
2006	125.6	3.2%	64.6	-0.6%	95.8	0.9%	131.1	2.1%	68.3	1.2%
2007	129.2	2.8%	64.4	-0.3%	98.247	2.6%	136.2	3.8%	71.453	4.6%
2008	134.1	3.8%	64.2	-0.2%	100.451	2.2%	141.0	3.6%	74.846	4.7%
Dec 1997 to 2008		34.1%		-35.8%		0.5%		41.0%		-25.2%

⁵⁶¹ See Table 18, *infra*. The CPI is a measure of the average change over time in the prices paid by urban consumers for a fixed market basket of consumer goods and services. The basket of goods includes over 200 categories including items such as food and beverages, housing, apparel, transportation, medical care, recreation, education, and communications. The CPI provides a way for consumers to compare what the market basket of goods and services costs this month with what the same market basket cost a month or a year ago. Starting in December of 1997, this basket of goods included a category for cellular/wireless telephone services. All CPI figures discussed in this paragraph were taken from BLS databases found on the BLS Internet site available at <http://www.bls.gov>. The index used in this analysis, the CPI for All Urban Consumers (CPI-U), represents about 87 percent of the total U.S. population. Bureau of Labor Statistics, *Consumer Price Index: Frequently Asked Questions*, available at <http://www.bls.gov/cpi/cpifaq.htm> (visited Aug. 26, 2008). While the CPI-U is urban-oriented, it does include expenditure patterns of some of the rural population. *Transcript*, at 59. Information submitted by companies for the CPI is provided on a voluntary basis. *Transcript*, at 53.

⁵⁶² *Transcript*, at 50. The Cellular CPI includes charges from all telephone companies that supply "cellular telephone services," which are defined as "domestic personal consumer phone services where the telephone instrument is portable and it sends/receives signals for calls by wireless transmission." This measure does not include business calls, telephone equipment rentals, portable radios, and pagers. Bureau of Labor Statistics, *How BLS Measures Price Change for Cellular Telephone Service in the Consumer Price Index*, available at <http://www.bls.gov/cpi/cpifactc.html> (visited Sept. 26, 2008).

⁵⁶³ From December 1997 compared to the annual index.

⁵⁶⁴ Bureau of Labor Statistics. All CPI figures were taken from BLS databases found on the BLS Internet site available at <http://www.bls.gov>.

187. *Blended Revenue per Minute.* Alternatively, some analysts believe RPM is a good proxy for mobile pricing.⁵⁶⁵ This metric is calculated by dividing an estimate of average monthly revenue per subscriber (often referred to as average revenue per unit, or “ARPU”) by average monthly minutes of use for the equivalent period.⁵⁶⁶

188. Using estimates of industry-wide ARPU⁵⁶⁷ and MOUs from CTIA, shown in Table 19 we estimate that RPM was \$0.07 in December of 2008, which is an increase of nine percent from the estimate of \$0.06 in December of 2007. Prior to 2008, RPM had fallen almost steadily from \$0.47 in December of 1994 to \$0.06 in December of 2007, which represented a decline of 87 percent.⁵⁶⁸ The estimate of \$0.07 in December 2008 represents a decline of 85 percent from the December 1994 peak and a decline of approximately 30 percent since December 2003.

189. *Revenue per Voice Minute.* As the contribution of data services to total revenues has increased, RPM has become an increasingly inaccurate measure of the pricing of mobile voice service. Until the last four years, revenues from wireless data services were a relatively insignificant portion of the average wireless subscriber’s bill. However, in recent years, data has become an ever increasing portion of that bill. Since the *Twelfth Report*, this *Report* has included a revised version of RPM, “Voice RPM,” which excludes that portion of ARPU generated by data services.⁵⁶⁹ While RPM and Voice RPM have been mostly identical over time, in absolute value and trend, in 2004 they began to diverge somewhat, with the decline in Voice RPM steeper, and its absolute value slightly lower, than RPM.

190. We estimate that Voice RPM was \$0.05 in December of 2008. As indicated in Table 11, although this estimate of Voice RPM is unchanged from the previous year due to rounding, the absolute value of Voice RPM in December of 2008 represents an increase of two percent from its absolute value in December of 2007. Thus, Voice RPM also registered a slight increase from 2007 to 2008, but the rise in Voice RPM was much less steep than the rise in RPM. As a result, the gap between RPM and Voice RPM widened still further in 2008.

⁵⁶⁵ See *US Wireless Matrix 1Q07*, at 52.

⁵⁶⁶ The average monthly minutes of use figure reflects voice minutes *used* and captured as network traffic, rather than minutes *paid for* as part of a monthly service package.

⁵⁶⁷ Note that this version of ARPU is CTIA’s “Average Local Monthly Bill” (“ALMB”), which does not include toll or roaming revenues where they are not priced into a calling plan. See *infra* note 585.

⁵⁶⁸ See Table 19, *infra*; *Thirteenth Report*, 24 FCC Rcd at 6275-76, ¶ 192.

⁵⁶⁹ To generate Voice RPM, we subtracted wireless data revenues, derived from CTIA’s survey, from ALMB (we assumed this was the same percentage of wireless data revenues in CTIA’s measure of total service revenues), then we divided that number by CTIA’s average MOUs per month. See also *Twelfth Report*, 23 FCC Rcd at 2323-24, ¶ 200.

Table 19
Average Revenue Per Minute⁵⁷⁰

	Average Local Monthly Bill	Minutes of Use Per Month	Average Revenue Per Minute	Annual Change in Overall RPM	Wireless Data Revenue as Percent of Total Service Revenues	Average Local Monthly Bill (excl. Data Revenues)	Average Revenue Per Voice Minute	Annual Change in Voice RPM
1993	\$61.49	140	\$0.44		n/a	\$61.49	\$0.44	
1994	\$56.21	119	\$0.47	8%	n/a	\$56.21	\$0.47	8%
1995	\$51.00	119	\$0.43	-9%	n/a	\$51.00	\$0.43	-9%
1996	\$47.70	125	\$0.38	-11%	n/a	\$47.70	\$0.38	-11%
1997	\$42.78	117	\$0.37	-4%	n/a	\$42.78	\$0.37	-4%
1998	\$39.43	136	\$0.29	-21%	n/a	\$39.43	\$0.29	-21%
1999	\$41.24	185	\$0.22	-23%	0.2%	\$41.16	\$0.22	-23%
2000	\$45.27	255	\$0.18	-20%	0.4%	\$45.09	\$0.18	-21%
2001	\$47.37	380	\$0.12	-30%	0.9%	\$46.94	\$0.12	-30%
2002	\$48.40	427	\$0.11	-9%	1.2%	\$47.82	\$0.11	-9%
2003	\$49.91	507	\$0.10	-13%	2.5%	\$48.66	\$0.10	-14%
2004	\$50.64	584	\$0.09	-12%	4.8%	\$48.21	\$0.08	-14%
2005	\$49.98	708	\$0.07	-19%	8.3%	\$45.83	\$0.06	-22%
2006	\$50.56	714	\$0.07	0%	13.5%	\$43.73	\$0.06	-5%
2007	\$49.79	769	\$0.06	-9%	17.9%	\$40.88	\$0.05	-13%
2008	\$50.07	708	\$0.07	9%	23.2%	\$38.45	\$0.05	2%

191. *Revenue per Text Message.* A proxy for the pricing of text messages can be derived by dividing an estimate of text messaging revenues by an estimate of the number of text messages sent during a specified period.

192. The average price for text messages continued to decline in 2008. Based on CTIA estimates of annual text messaging revenues and the annual volume of text messaging traffic, we estimate that the price per text message dropped to \$0.011 in 2008, down from \$0.025 in 2007 and \$0.036 in 2006.⁵⁷¹ This is likely the result of customers purchasing bucket or unlimited texting plans rather than paying for texting on a per-use basis. In such cases, the marginal price of sending an additional text message is nearly zero, and usage has increased dramatically. The average price of text messaging is decreasing, while text messaging ARPU is increasing, as discussed below.

⁵⁷⁰ Dec 2008 CTIA Survey, at 115 (Chart 28: Data ARPU as a Percentage of Total ARPU), and at 191-92 (Table 79: Approximate Billable MOUs per Subscriber). See Appendix C, Table C-1 (ARPU). Data covers the last six months of each year. For purposes of this presentation in this table, RPM is rounded to two decimal places, but RPM change is based on absolute RPM.

⁵⁷¹ See CTIA Year-End 2008 Wireless Indices Report, at 115, 198-200.

Table 20
Average Revenue Per Text Message⁵⁷²

Year	Text Traffic Volume	Average Messages Per User	Text Messaging Revenues	Average Revenue Per Text Message
2005	81,208,225,767	476	\$2,991,666,181	\$0.037
2006	158,648,546,798	779	\$5,672,984,205	\$0.036
2007	362,549,531,172	1,572	\$8,976,574,961	\$0.025
2008	1,005,144,143,136	4,183	\$11,355,095,991	\$0.011

193. *Broadband Price Unit Metrics.* In contrast to mobile voice service, there is no single common unit of measure analogous to MOUs that can be used to track pricing trends for mobile broadband services on an aggregated basis. Although it is possible, using CTIA data, to derive average revenue per user for non-messaging data services (the numerator), CTIA does not report MB usage (the denominator). Therefore, we do not include a unit price measure for this increasingly important wireless service segment.

2. Wholesale Pricing

194. Resellers and MVNOs purchase minutes at wholesale prices from facilities-based mobile service providers. Contractual agreements between mobile network operators and resellers or MVNOs for wholesale prices differ among MVNOs because they depend upon rates that each MVNO negotiates with facilities based providers. These negotiated rates are generally not publicly available so it is difficult to track wholesale pricing in the mobile wireless sector in a comprehensive manner.

195. One analyst has estimated the pricing for Sprint Nextel's wholesale deal with Virgin Mobile USA prior to Sprint Nextel's acquisition of Virgin Mobile. According to this analyst, Virgin paid Sprint Nextel approximately \$0.02 per minute.⁵⁷³ The analyst states that the pricing was almost all variable, and Sprint Nextel's price structure was based on a tiered pricing system in which the company paid a certain per-minute rate for the first level of MOUs and then a lower per-minute rate for the next tiered level of usage, with the rate dropping for only the incremental minutes at the next tier level rather than for all the minutes used. Based on Virgin Mobile's retail pricing structure, the analyst estimated that Sprint Nextel received about 25 percent of the revenues generated by a Virgin Mobile customer.⁵⁷⁴

3. Intercarrier Roaming Rates and Revenue

196. Intercarrier roaming rates are set by contractual agreements that are confidential, and particular rates vary across agreements depending on what service providers have negotiated. However, an aggregate proxy for intercarrier roaming rates – average roaming revenue per minute of use of roaming service – can be derived from dividing reported annual roaming revenues by reported annual roaming minutes of use.

197. CTIA reported that “outcollect” roaming revenues⁵⁷⁵ for the entire mobile wireless industry decreased to \$3.739 billion in 2008 from \$3.742 billion in 2007.⁵⁷⁶ This is consistent with the trend over the past decade where annual roaming revenues have fluctuated between \$3.5 billion and \$4.2 billion. However, during this same period total industry revenues increased dramatically, from \$40

⁵⁷² CTIA Year-End 2008 Wireless Indices Report, at 115, 198-200; Commission estimates.

⁵⁷³ *Slumdog Millionaires*, at 22.

⁵⁷⁴ *Id.* at 24.

⁵⁷⁵ CTIA's measure is one of “outcollect” roamer traffic revenues; in other words, the revenues generated by roamers in the providers' markets. CTIA Year-End 2008 Wireless Indices Report, at 92-99.

⁵⁷⁶ See also Table C-1, Appendix C, *infra*.

billion to \$148.1 billion. Therefore, the contribution of roaming revenues to total service revenues continued its decline: from 4.1 percent in 2004, to 3.3 percent in 2005, to 2.8 percent in 2006, to 2.7 percent in 2007, and to 2.5 percent in 2008, which is down from over ten percent in 1999.⁵⁷⁷

198. Similarly, while reported annual roaming traffic has grown significantly during this same period, roaming minutes as a percentage of total minutes has dropped significantly. Roaming minutes increased from 13 billion minutes in 1999 to 121.4 billion minutes in 2008. Yet this growth has been much slower than overall traffic growth, which increased from 147.7 billion minutes to 2.2 trillion minutes. Therefore, roaming as a percentage of overall traffic has decreased from 8.8 percent in 1999 to 5.5 percent in 2008, a nearly 40 percent relative decline.⁵⁷⁸

199. As reported in Table 21 below, average roaming revenue per minute has progressively declined over time, from just over 30 cents per minute in 1999 to between three and four cents per minute in recent years.

Table 21
Roaming Revenues and Rates⁵⁷⁹

	Roaming Revenues (in \$000s)	Percent Change	Percent of Total Service Revenues	Roaming MOUs	Percent of Total MOUs	Average Roaming Revenue Per Minute ⁵⁸⁰
1999	\$4,085,417	16.71%	10.2%	13,038,555,635	8.8%	\$0.31
2000	\$3,882,981	(4.96%)	7.4%	20,852,266,390	8.1%	\$0.19
2001	\$3,752,826	(3.35%)	5.7%	27,811,907,410	6.1%	\$0.13
2002	\$3,895,511	3.80%	5.1%	43,846,470,833	7.1%	\$0.09
2003	\$3,766,267	(3.32%)	4.3%	56,828,973,359	6.8%	\$0.07
2004	\$4,210,330	11.79%	4.1%	71,440,711,110	6.5%	\$0.06
2005	\$3,786,332	(10.07%)	3.3%	115,008,338,841	7.7%	\$0.03
2006	\$3,494,294	(7.71%)	2.8%	91,991,570,460	5.1%	\$0.04
2007	\$3,742,015	7.09%	2.7%	107,615,715,912	5.1%	\$0.03
2008	\$3,739,274	(0.07%)	2.5%	121,438,208,469	5.5%	\$0.03

F. Revenue

200. Revenues for the U.S. mobile wireless industry have increased each year between 2004 and 2008, although the annual growth rate for industry revenues has been in decline since 2007 (see Chart 27). In 2008, mobile wireless service providers generated approximately \$150.6 billion in revenues, up 6.9 percent from 2007. For the first half of 2009, industry revenue totaled \$75.8 billion, a 4.3 percent increase over the first half of 2008.⁵⁸¹

⁵⁷⁷ *Id.* This is for the entire 12-month period.

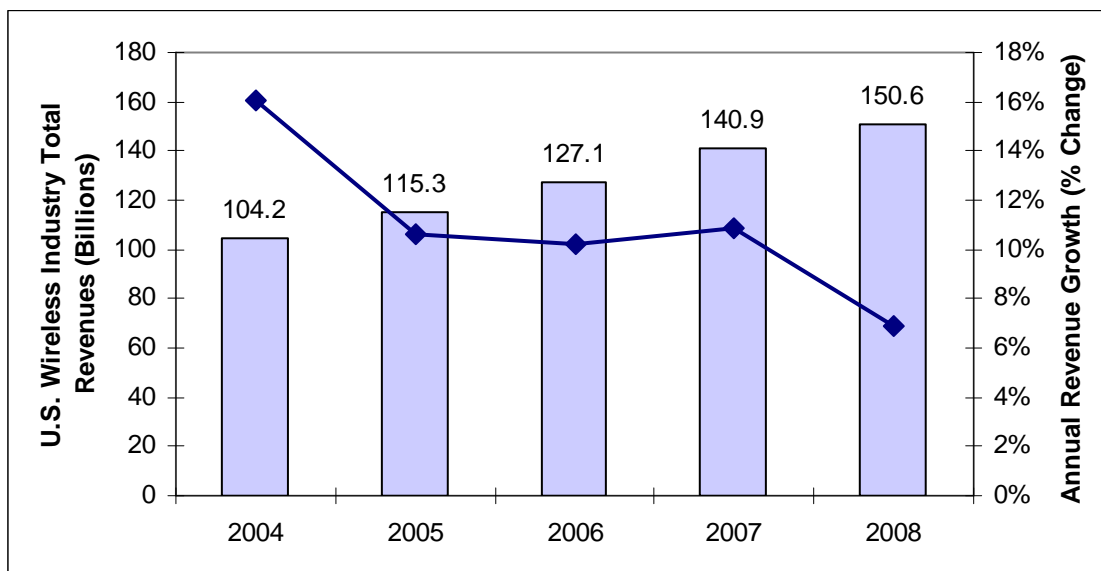
⁵⁷⁸ *CTIA Year-End 2008 Wireless Indices Report*, at 185.

⁵⁷⁹ *CTIA Year-End 2008 Wireless Indices Report*.

⁵⁸⁰ This is a blended average.

⁵⁸¹ *CTIA Mid-Year 2009 Wireless Indices Report*.

Chart 27
Wireless Industry Service Revenues⁵⁸²

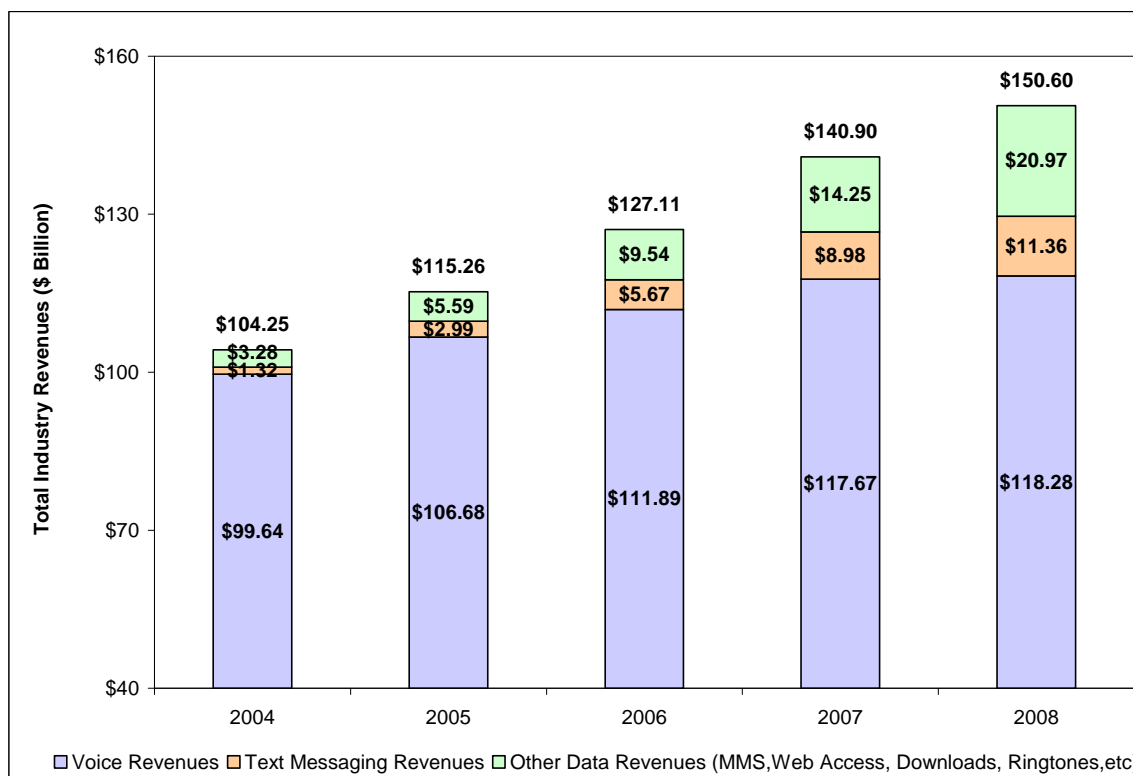


201. We examine mobile wireless service revenues by dividing CTIA's estimates of service revenue into three segments: voice, messaging, and other data services.⁵⁸³ As shown in Chart 28, all three revenue categories – voice, text messaging, and other data revenues – continued to grow in 2008. However, the share of messaging and other data revenue in total service revenue rose while the share of voice revenue declined proportionally.

⁵⁸² CTIA Year-End 2008 Wireless Indices Report.

⁵⁸³ We estimate voice revenue by excluding CTIA's estimate of wireless data revenue from its estimate of total service revenue. The estimate of text messaging revenue, which includes instant messaging and SMS, is collected and reported as a separate revenue category by CTIA. We estimate other data revenue by excluding CTIA's estimate of text messaging revenue from its estimate of wireless data revenue. Other data revenue includes Internet access and various other data services such as games, ringtones, application downloads and multimedia messaging services. We estimate ARPU for voice, messaging and other data services by dividing each of the revenue estimates by CTIA's yearly estimate for total subscribers.

Chart 28
Total Mobile Wireless Industry Revenues⁵⁸⁴



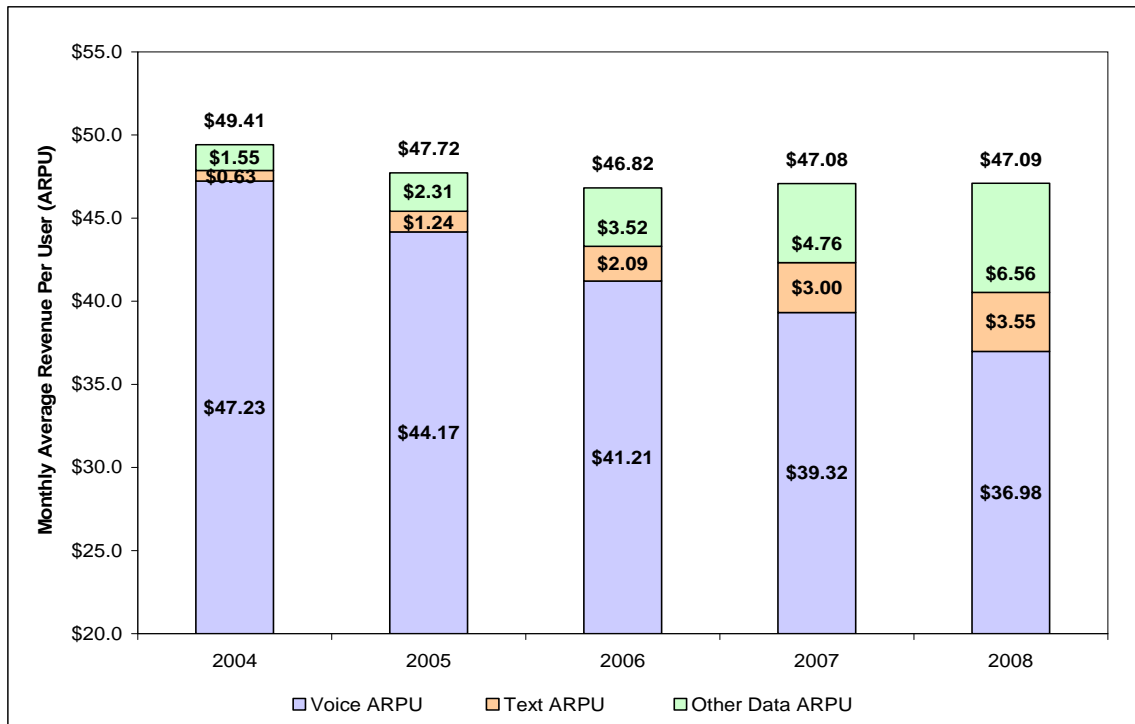
202. ARPU is a financial metric widely-used in analyzing the mobile wireless industry. In 1999, one estimate of ARPU used by CTIA, average local monthly bill (ALMB), began increasing following a decade of declines, rising to \$50.64 in December 2004, a 28 percent increase from the low of \$39.43 in 1998 (see Table 19).⁵⁸⁵ Since the 2004 peak, ALMB has fluctuated around the \$50 level, and closed 2008 at \$50.07. As seen in Table 19, declining industry-wide voice ARPU (as measured by ALMB excluding data revenues) continued to be offset by growth in data ARPU. According to CTIA, in the last half of 2008, data revenues amounted to 23.2 percent of total wireless service revenues, compared to 17.9 percent a year earlier.

203. CTIA's alternate measure of ARPU shows that both messaging and other data ARPU rose steadily between 2004 and 2008, while voice ARPU steadily declined during the same period (see Chart 29). In 2008, the increases in messaging ARPU and other data ARPU just offset the decline in voice ARPU, leaving blended ARPU virtually unchanged from 2007 at slightly more than \$47.00. Of this total, voice ARPU represented nearly \$37.00, with messaging ARPU at \$3.55 and other data ARPU at \$6.56. Messaging ARPU and other data ARPU represented a proportionally larger share of blended ARPU in 2008 as compared with 2007.

⁵⁸⁴ CTIA Year-End 2008 Wireless Indices Report.

⁵⁸⁵ There are different ways of calculating ARPU. The measure used here and shown in Table 19 is CTIA's "average local monthly bill," which does not include toll or roaming revenues (CTIA calls it "the equivalent of 'local ARPU'"). Robert F. Roche and John-Paul Edgette, *CTIA's Wireless Industry Indices, Semi-Annual Data Survey Results: A Comprehensive Report from CTIA Analyzing the U.S. Wireless Industry, Year-End 2007 Results*, May 2008, at 183 (*CTIA Year-End 2007 Wireless Indices Report*). CTIA defines an alternative measure of ARPU, which includes roaming revenues but not toll revenue. For a comparison between these two measures, see *Id.* at 185.

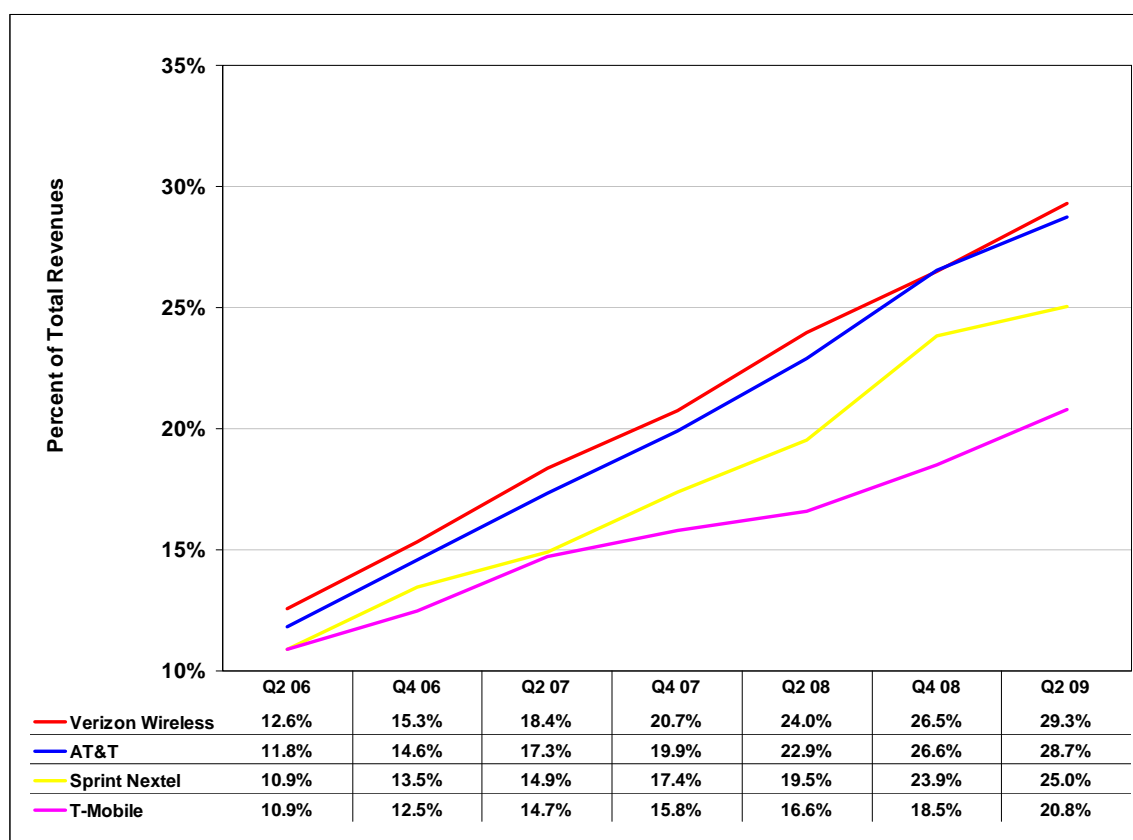
Chart 29
Monthly ARPU by Type of Service⁵⁸⁶



204. The growth in data revenue as a percentage of total revenue for the individual four nationwide service providers is shown in Chart 30. While data revenues have been growing at all four providers, data accounts for a larger percentage of total revenue at Verizon Wireless and AT&T. In the second quarter of 2009, data revenue accounted for close to 30 percent of Verizon Wireless's and AT&T's total revenue, as compared to 25 percent at Sprint Nextel and 21 percent at T-Mobile.

⁵⁸⁶ CTIA Year-End 2008 Wireless Indices Report; Commission analysis. Voice ARPU calculation includes toll revenues.

Chart 30
Wireless Data Revenue as a Percentage of Total Revenue⁵⁸⁷



205. We believe the trends of declining voice ARPU and rising data ARPU are the result of several factors, including further declines in the per-minute price of mobile voice calls; an increase in the share of subscribers who typically spend less per month on mobile calls, such as prepaid and family plan customers;⁵⁸⁸ and an increase in mobile data usage and subscribership.⁵⁸⁹

206. The ARPU data shown below do not reflect the unlimited plan pricing changes, discussed above, that Verizon Wireless and AT&T announced in January 2010, and it is unclear how these pricing changes will affect ARPU going forward.⁵⁹⁰ While the shift of existing unlimited plan customers to the discounted plans would depress ARPU, this effect could be offset to the extent other customers respond to the reduction in the price of unlimited plans by migrating upward from lower-priced limited plans to unlimited offerings, and also to the extent new customers choose unlimited plans rather than less expensive limited plans.⁵⁹¹ In addition, Verizon Wireless's pricing plan changes were accompanied by the introduction of a new data plan requirement for certain types of handsets. The resulting increase in

⁵⁸⁷ Data provided by Sanford Bernstein Research.

⁵⁸⁸ See, e.g., Simon Flannery *et al.*, *Deteriorating Wireless Trends, Revisited*, Morgan Stanley, Equity Research, Jan. 18, 2007, at 3 (“a growing portion of these net adds are coming from lower-ARPU family plans, prepaid customers, and others receiving larger buckets of minutes at lower per-minute prices.”)

⁵⁸⁹ See Sections V.D.3, Mobile Data Traffic (Non-Messaging), and V.A.1, Mobile Wireless Subscribers by Type of Service, *infra*.

⁵⁹⁰ See Section IV.A, Price Rivalry: Developments in Mobile Service Pricing Plans, *supra*.

⁵⁹¹ Simon Flannery *et al.*, *Quick Comment: Verizon's Price Plan Changes Should Not Rattle Postpaid Market*, Morgan Stanley, Equity Research, Jan. 15, 2010, at 1.

data revenue may offset the revenue impact of the reduction in unlimited voice pricing, leaving revenue and ARPU unchanged or slightly higher.⁵⁹²

207. CTIA does not collect and report data on non-service revenue, specifically, revenue from the sale of handsets and other wireless equipment. Macquarie Research estimates that non-service revenue from equipment sales has also grown steadily since 2004, amounting to nearly \$20 billion in 2008.⁵⁹³

G. Investment

208. Investment, as measured by capital expenditures, also referred to as “capital spending” or “CAPEX,” is funds spent during a particular period to acquire or improve long-term assets, such as property, plant, or equipment.⁵⁹⁴

209. Over the past decade, mobile wireless providers have invested significantly in wireless structures and equipment. Between 1998 and 2008, industry-wide capital expenditures by wireless providers exceeded \$240 billion.⁵⁹⁵ In the mobile wireless industry, CAPEX primarily consists of spending to upgrade and expand networks to increase data connection speeds, enable more reliable service, and improve coverage.⁵⁹⁶

210. Data from two sources reveal slightly different capital investment trends. As shown in Table 22, data from the Census Bureau suggests that, after decreasing by more than 20 percent between 2006 and 2007, capital expenditures by wireless providers rebounded in 2008, increasing by approximately 15 percent over the previous year to more than \$25.5 billion. However, data from CTIA suggests that, while the mobile wireless industry has continued to invest in network expansions and upgrades, capital investment has been declining over the past four years. CTIA reports that incremental capital investment by wireless operators totaled \$20.2 billion in 2008, a 4.4 percent decrease from the \$21.14 spent in 2007 and a 20 percent decrease from the \$25.2 billion spent in 2005.⁵⁹⁷ CTIA also reports that capital investment during the first half of 2009 totaled \$8.9 billion for the wireless industry, a 7.4 percent drop from the first half of 2008.⁵⁹⁸

⁵⁹² Jonathan Chaplin, *et al.*, *Breaking View: VZ Pricing Changes Not Deflationary*, Credit Suisse, Equity Research, Jan. 15, 2010, at 1. However, since, as discussed above, Verizon Wireless may have introduced the new data plan requirement as a means of recovering the cost of steeper handset subsidies, ARPU is not necessarily a reliable indicator of the net effect of these changes. See Section IV.A, Price Rivalry: Developments in Mobile Service Pricing Plans, *supra*.

⁵⁹³ Data provided by Macquarie Research.

⁵⁹⁴ *A Dictionary of Finance and Banking* (2nd ed.), Oxford University Press, 1997, at 50-51. There are differing opinions on what constitutes capital spending versus non-capital spending.

⁵⁹⁵ See U.S. Census Bureau, Annual Capital Expenditures Surveys, 1999-2008.

⁵⁹⁶ AT&T Inc., SEC Form 10-K, filed Feb. 25, 2009, at 8, 24; Sprint Nextel, SEC Form 10-K, filed Feb. 27, 2009, at 17; CTIA NOI Comments at 32.

⁵⁹⁷ *CTIA Year-End 2008 Wireless Indices Report*, at 124; CTIA PN Comments at 13; CTIA NOI Comments at 32.

⁵⁹⁸ *CTIA Mid-Year 2009 Wireless Indices Report*, at 127.

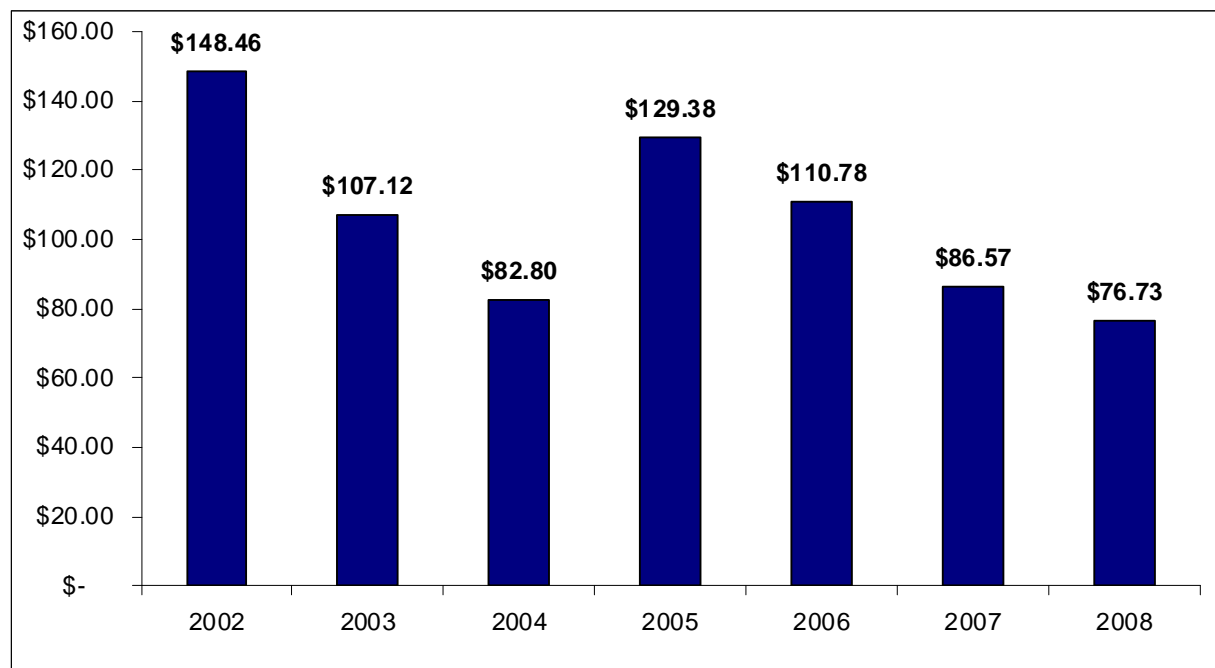
Table 22
Annual Capital Expenditures by Wireless Service Providers⁵⁹⁹

	2004	2005	2006	2007	2008
Census Bureau: Total Annual Capital Expenditures (in billions)	\$24.0	\$27.3	\$27.9	\$22.2	\$25.5
Census Bureau: Percent Change in Capital Expenditures from Previous Year	14.3%	13.9%	2.2%	(20.5%)	15.1%
CTIA: Total Annual Incremental Capital Investment (in billions)	\$14.1	\$25.2	\$24.4	\$21.1	\$20.2
CTIA: Percent Change in Incremental Capital Investment from Previous Year	(12.0%)	78.8%	(3.2%)	(13.4%)	(4.6%)

211. According to CTIA, incremental capital investment per subscriber has been declining as well over the past four years and at greater rates than total investment, as shown in Chart 31. During 2008, capital investment per subscriber fell 11 percent to \$76.73 from its 2007 level of \$86.57. From 2005 to 2008, annual capital investment per subscriber fell 40 percent.

⁵⁹⁹ U.S. Census Bureau, Service Annual Survey Data, 2007-2008; U.S. Census Bureau, Annual Capital Expenditures Surveys, 2004-2008; *CTIA Year-End 2008 Wireless Indices Report*.

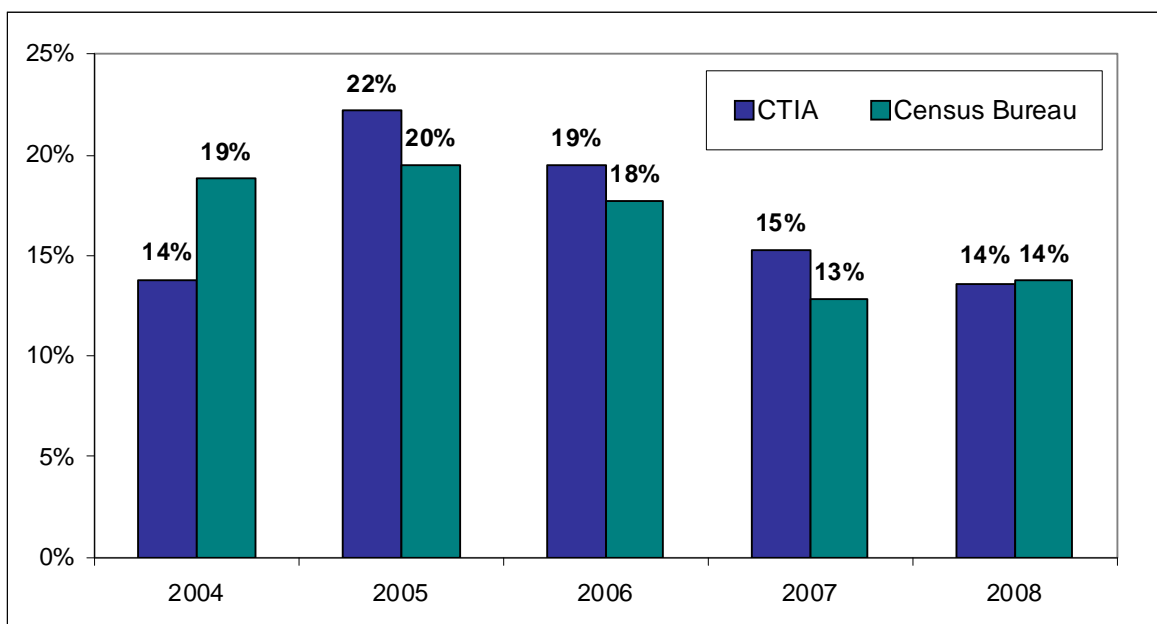
Chart 31
Annual Incremental Capital Investment per Subscriber⁶⁰⁰



212. Data from both CTIA and the Census Bureau show that annual capital investment as a percentage of total industry revenue has been declining (see Chart 32). According to CTIA data, CAPEX as a percentage of total revenue declined from 22 percent in 2005 to 14 percent in 2008. Census Bureau data shows that CAPEX as a percentage of total industry revenue fell from 19.5 percent in 2005 to 13.8 percent in 2008.

⁶⁰⁰ CTIA Year-End 2008 Wireless Indices Report.

Chart 32
Annual Capital Investment as a Percentage of Industry Revenue⁶⁰¹



213. As shown in Chart 33, CAPEX trends in recent years have varied from operator to operator. AT&T, for example, reported that its wireless CAPEX increased 42 percent in 2008 and was used primarily to expand the capacity of its network and for HSPA upgrades.⁶⁰² In addition, T-Mobile's CAPEX increased 35 percent during 2008 as the company has been building out its 3G network.⁶⁰³ On the other hand, Sprint Nextel's CAPEX declined 53 percent in 2008 and an additional 52 percent in 2009. Sprint Nextel's average quarterly CAPEX as a percentage of service revenue also dropped from 14.3 percent in 2007 to 6.2 percent in 2008, and to 3.8 percent for the first three quarters of 2009.⁶⁰⁴ According to one analyst, the reasons for Sprint Nextel's decrease in CAPEX include the company's negative growth, which resulted in reduced capacity needs and reduced investment in cell sites,⁶⁰⁵ and the company's decision to resell 4G service, thereby reducing its need to invest directly in further network upgrades. As discussed below, Sprint Nextel has invested in Clearwire and holds an ownership interest in the company, and is currently reselling Clearwire's 4G WiMAX service.⁶⁰⁶

⁶⁰¹ U.S. Census Bureau, Annual Capital Expenditures Surveys, 2004-2008; *CTIA Year-End 2008 Wireless Indices Report*.

⁶⁰² AT&T Inc., SEC Form 10-K, filed Feb. 25, 2009, at 8, 24.

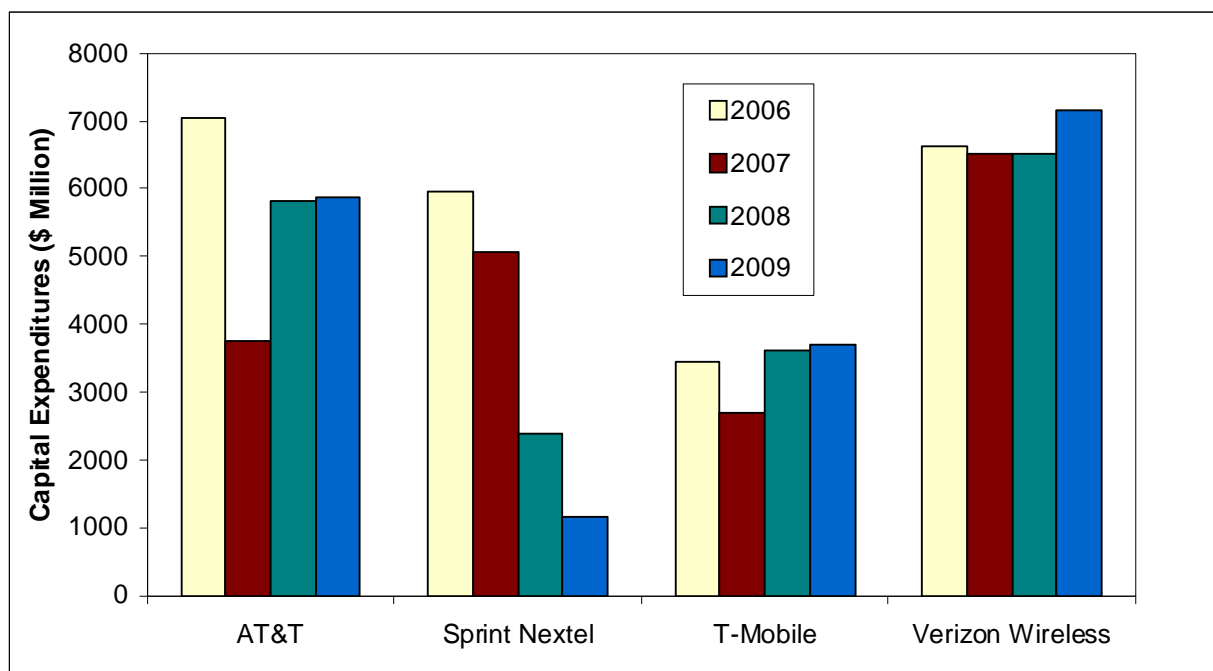
⁶⁰³ See Chart 33; *The Haves and the Have-Nots Diverge*, at 20.

⁶⁰⁴ *US Wireless 411 3Q09*, at 50.

⁶⁰⁵ Craig Moffett, et al., *U.S. Wireless Industry Scorecard: The Haves and the Have-Nots Diverge... Industry Growth Stabilizes at 4.2% in Q3*, Bernstein Research, Nov. 6, 2009, at 20; Sprint Nextel, SEC Form 10-K, filed Feb. 27, 2009, at 55. Sprint stated that the decline in Capex in 2008 was also the result of fewer IT projects and the completion in 2007 of various wireless initiatives. Sprint Nextel, SEC Form 10-K, filed Feb. 27, 2009, at 55.

⁶⁰⁶ See Section IV.B.1.a, Service Provider Technology Deployments, *infra*. Sprint Nextel, SEC Form 10-K, filed Feb. 27, 2009, at 3, 17, 24 (“[W]e are dependent on Clearwire to quickly build, launch and operate a viable, national 4G network. . . . Our intention is to integrate these 4G services with our products and services”).

Chart 33
Capital Expenditures by Service Provider⁶⁰⁷



H. Profitability

214. In order to improve upon the competitive analysis of previous *Reports*, the Wireless Telecommunications Bureau, in May 2009, released a *Public Notice* soliciting data and information on suitable profitability measures.⁶⁰⁸ The *Fourteenth Report Public Notice* discussed measures of profitability including various rates of return, free cash flow, and EBITDA.⁶⁰⁹ Measures of profitability and provider performance are widely used by industry observers and analysts.⁶¹⁰ They can provide useful indicators of absolute and relative provider performance, entry and exit conditions, growth conditions, costs, the intensity of rivalry, and provider pricing policies. Previous *Reports* have considered indicators of provider performance such as market share, exit from the industry, net additions, churn, and ARPU. For some purposes, measures of profitability and cash flow improve on these other indicators of provider performance because measures of profitability reflect firm costs and can be used to compute rates of return.

1. Measuring Profitability

215. A true measure of economic profit, especially in a capital intensive industry such as the

⁶⁰⁷ *US Wireless 411 3Q09*, at 47; John C. Hodulik, *et al.*, *US Wireless 411, Version 25.0*, UBS, Sept. 18, 2009, at 67; Verizon Communications, Inc., SEC Form 10-K, filed Feb. 24, 2009.

⁶⁰⁸ *Fourteenth Report Public Notice* 24 FCC Rcd at 5629. Discussions of profitability measures were included in Consumer Federation of America, *et al.* Comments at 38, and Mercatus Comments at 12-13.

⁶⁰⁹ *Fourteenth Report Public Notice* 24 FCC Rcd at 5629.

⁶¹⁰ See, e.g., *US Wireless 411 4Q08* and *US Wireless 411 2Q09*; *Clearwire Corporation Subscriber Trends Encouraging, Churn a Concern*, Morgan Stanley, Morgan Stanley Research, Feb. 25, 2010; *Verizon Mobile Subs Strong But Wireline Disappoints*, REUTERS, Jan. 26, 2010; *MetroPCS, Leap Both Bitten By Competition*, WALL STREET JOURNAL, Aug. 7, 2009.

mobile wireless industry,⁶¹¹ would reflect cash flows over a period of time that is long enough to recoup investment costs, and would account for a firm's weighted average cost of capital. Examples of such a measure include Return on Invested Capital (ROIC)⁶¹² or Economic Value Added (EVA).⁶¹³ Such a metric would depart from the net income (*i.e.*, accounting profits) that communication providers report to the Securities and Exchange Commission, in several respects. First, it may value capital costs on a basis that may differ from the depreciation methods providers use to calculate net income.⁶¹⁴ Second, it would require some data that is currently reported only in a consolidated statement, which includes non-wireless operating units, to be either reported or estimated at the level of the provider's mobile wireless operating segment.⁶¹⁵ Because limitations on data availability make it difficult to measure true economic profit, we consider some proxy metrics in place of a true measure of profitability. Below we discuss three readily available measures of cash flow of mobile wireless segments that industry observers often use as indicators of mobile wireless segment profitability and as metrics to compare the performance of mobile wireless segments of different communication providers. Each of these indicators incorporates different elements of a firm's costs.

216. *Earning Before Interest and Taxes (EBIT)*. EBIT is the accounting profit of a company before interest expenses and corporate taxes are deducted.⁶¹⁶ EBIT deducts from revenue the cost of equipment sold to users (*e.g.* the price paid by a provider for the handsets that it sells to consumers), service costs (*e.g.* network interconnection, roaming, and long-distance costs), selling, general, and administrative costs, but it does not deduct costs such as interest payments on debt and corporate income taxes. EBIT has the advantages of being a general indicator of the performance of mobile wireless segments and it deducts operating costs that would also be deducted in more detailed profitability estimates. However, as interest payments on debt and corporate income taxes are generally recurrent cash flow obligations, some experts argue that these measures may not always be good estimates of operating cash flow.⁶¹⁷ Federal and State corporate income taxes can be over one-third of pre-tax income and they are deducted in most profit formulas.⁶¹⁸ Further, EBIT data is sensitive to accounting practices for

⁶¹¹ Mobile wireless networks are relatively capital intensive. See Section III.D.2., Non-Regulatory Entry and Exit Conditions, and Section IV.B.1, Network Coverage and Technology Upgrades, *infra*.

⁶¹² See, Tom Copeland, *et al.*, *Valuation: Measuring and Managing the Value of Companies* (2nd ed.), John Wiley & Sons, 1995, at 163.

⁶¹³ See James Grant, *Foundations of Economic Value Added* (2nd ed.), Wiley, 2002.

⁶¹⁴ For example, deducting CAPEX from EBITDA is an alternative to depreciating CAPEX over its useful lifetime. Depreciation assumptions and methods can vary across firms and not all depreciation methods are suitable for calculating profitability measures. See *A Dictionary of Finance and Banking* (2nd ed.), Oxford University Press, 1997, at 100. See also, *Modern Industrial Organization*, at 249-250.

⁶¹⁵ For example, some providers report some interest and tax expenses only on a consolidated basis across their wireline, wireless, and other segments.

⁶¹⁶ See *A Dictionary of Finance and Banking* (2nd ed.), Oxford University Press, 1997, at 112 (defining EBIT as "The profit of a company as shown on the profit and loss account, before deducting the variables of interest and tax. This figure, which is used in calculating many ratios, enables better comparisons to be made with other companies").

⁶¹⁷ See, *e.g.*, B. Tunick, *In the GAAP/EBITDA World Nothing's Easy*, INVESTMENT DEALER'S DIGEST, Sept. 16, 2002, Vol. 68, Issue 35, at 30; M. Fridson, *EBITDA Is Not King*, Journal of Financial Statement Analysis, Spring 1998, Vol. 3, Issue 3, at 59; *Let's Agree to Agree on What EBITDA Means*, Bank Loan Report, Vol. 23, No. 26, June 30, 2008. See D. Shook, *EBITDA's Foggy Bottom Line*, BUSINESSWEEK ONLINE, Jan. 14, 2003, available from the database Business Source Premier, (stating that if a firm has interest payments equal to 20 percent of EBITDA then EBITDA will ignore one of the firm's largest expenses).

⁶¹⁸ The statutory federal corporation income tax is 35 percent for corporate income over \$18,333,333. See IRS, *Publication 542, Corporations*, at 17, Rev. Feb. 2006, available at <http://www.irs.gov/pub/irs-pdf/p542.pdf>.

depreciation and mergers. We do not discuss EBIT data in this *Report*.

217. *Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA)*. EBITDA equals accounting profits before deducting interest expenses, corporate income taxes, depreciation, and amortization.⁶¹⁹ EBITDA differs from EBIT in that EBIT deducts depreciation and amortization. An advantage of EBITDA is that it is widely used by industry observers, such as equity analysts, as an indicator of profitability in the telecommunications sector.⁶²⁰ However, EBITDA does not account for capital expenditures or cash flow expenses such as interest and taxes. To the extent that capital expenditures are proportionately similar across firms and over time, EBITDA can be a useful measure of relative performance. We discuss EBITDA data below.

218. *EBITDA minus Capital Expenditures (EBITDA minus CAPEX)*. EBITDA minus CAPEX equals EBITDA, discussed above, less the capital investment incurred in the same time period. EBITDA minus CAPEX incorporates capital spending into the profitability measure, and as such provides a rough approximation of free cash flow.⁶²¹ Although it is a better approximation of cash flow than EBITDA because it deducts capital expenditures, we note that capital expenditures may differ from estimates of annual capital costs that are often used to replace depreciation figures in estimates of economic profits.⁶²² Also, EBITDA minus CAPEX does not account for purchases of spectrum licenses, a significant expense of mobile wireless providers. We discuss EBITDA minus CAPEX data below.

219. EBITDA per subscriber data for selected service providers are presented in Chart 34. Standardizing EBITDA by subscribers facilitates cross-provider comparisons and makes EBITDA directly comparable to ARPU, another measure of provider performance discussed in this *Report*. As shown in Chart 34, in 2008, the difference between the provider with the highest EBITDA per subscriber (Verizon Wireless) and the provider with the lowest (Leap) was \$14.09. Among the four national providers, AT&T and Verizon Wireless had the highest EBITDA per subscriber since 2007. Sprint Nextel has seen its EBITDA per subscriber decline significantly over the past several years. The differences in EBITDA per subscriber across providers may reflect many underlying factors including different characteristics of service and product offerings, different customer preferences, different network designs and capabilities, different cost structures, scale economies, and the degree of competitive rivalry. The changes in EBITDA per subscriber for individual providers can also reflect changes particular to the provider; for example, acquisitions of networks in mergers or changes in service and product offerings over time. It is possible that some of the correlated changes across providers reflect macroeconomic effects on demand.

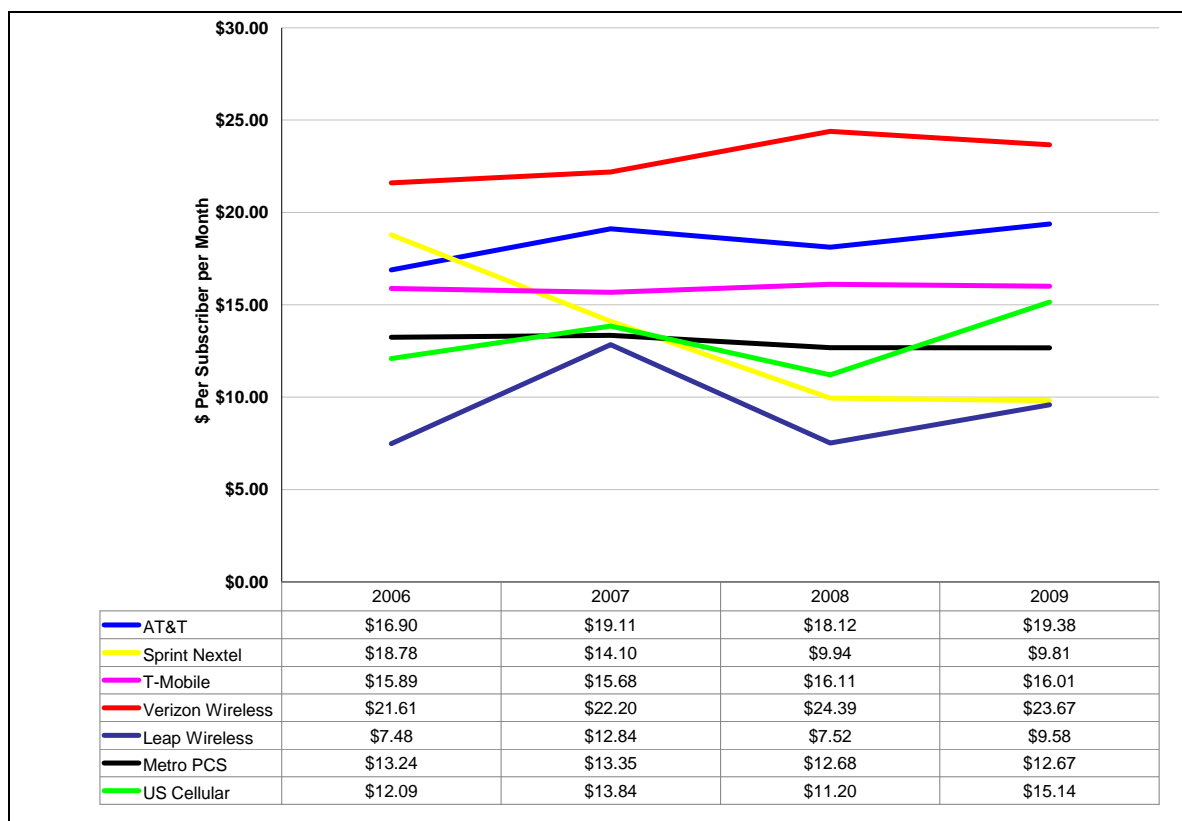
⁶¹⁹ The definition of EBITDA is an extension of EBIT, also excluding Depreciation and Amortization. EBITDA is readily calculated from a provider's SEC 10-K form even if the provider does not report EBITDA.

⁶²⁰ See, e.g., *US Wireless 411 2Q09*, at 2 (EBITDA is the accounting definition used for operating cash flow).

⁶²¹ See Donald E. Kieso, et al., *Intermediate Accounting* (11th ed.), John Wiley & Sons, Inc., 2004, at 197 (Defining free cash flow as net cash provided by operating activities less capital expenditures less dividends. Some companies do not subtract dividends because they believe these expenditures to be discretionary. Net cash provided by operating activities adjusts net income for depreciation and amortization, but not for interest expenses and tax expenses. Free cash flow is interpreted as the amount of discretionary cash flow a company has for purchasing additional investments, retiring its debt, purchasing treasury stock, or adding to its liquidity.) See, also, Tom Copeland, et al., *Valuation: Measuring and Managing the Value of Companies* (2nd ed.), John Wiley & Sons, 1995, at 167 (stating that free cash flow is the total after-tax cash flow generated by the company and available to all providers of the company's capital, both creditors and shareholders).

⁶²² See also, *Modern Industrial Organization*, at 247.

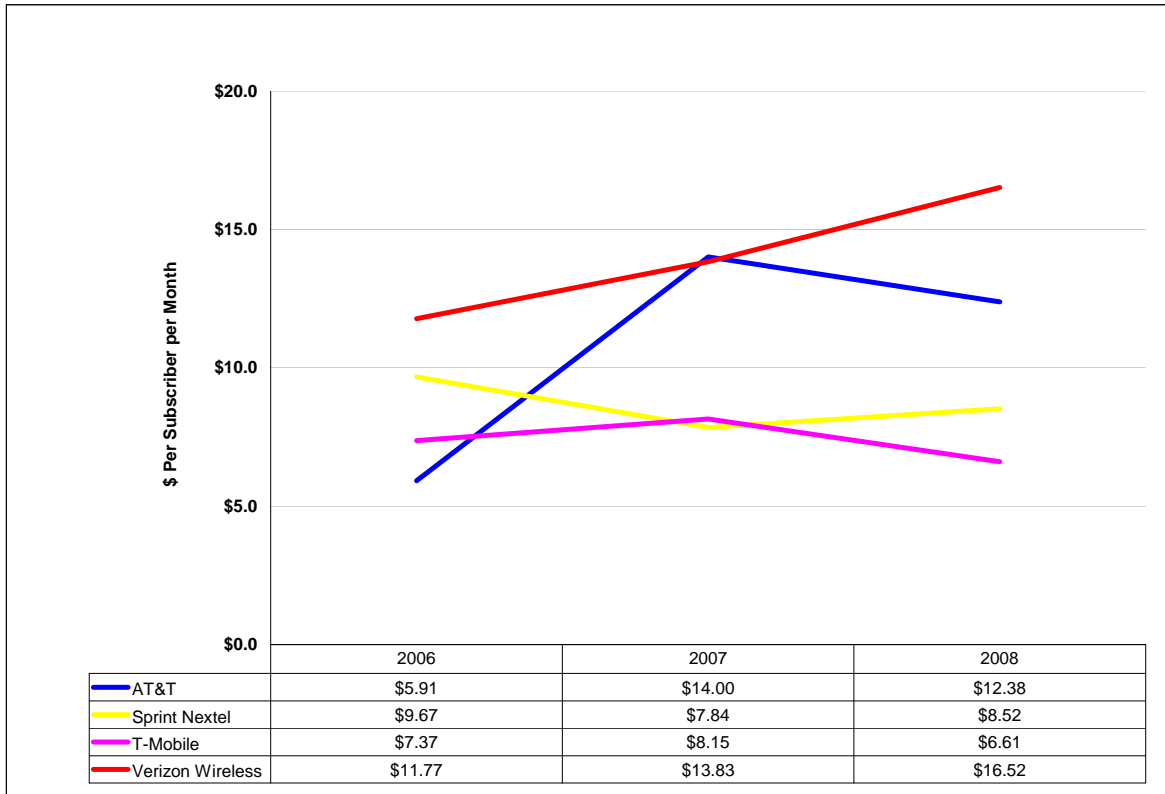
Chart 34
EBITDA per Subscriber (Selected Providers)⁶²³



220. EBITDA minus CAPEX per subscriber data for selected service providers, presented in Chart 35, may provide a sense of the relative profitability of the providers on a per subscriber basis. As with EBITDA per subscriber data, EBITDA minus CAPEX per subscriber data are directly comparable to ARPU data. Between 2006 and 2008, the EBITDA minus CAPEX per subscriber of the top four nationwide providers varied between a low of \$5.9 for AT&T in 2006 to a high of \$16.5 for Verizon Wireless in 2008. In these three years Sprint Nextel and T-Mobile have remained in a range between \$6.5 and \$10. The difference between the highest and lowest EBITDA minus CAPEX per subscriber was \$5.9 in 2006, \$6.2 in 2007, and \$9.9 in 2008. Verizon Wireless experienced annual increases between 2006 and 2008, whereas the other three nationwide providers have experienced both increases and decreases. ARPU, EBITDA, and EBITDA minus CAPEX are presented together in Chart 36 to facilitate comparison within this family of measures.

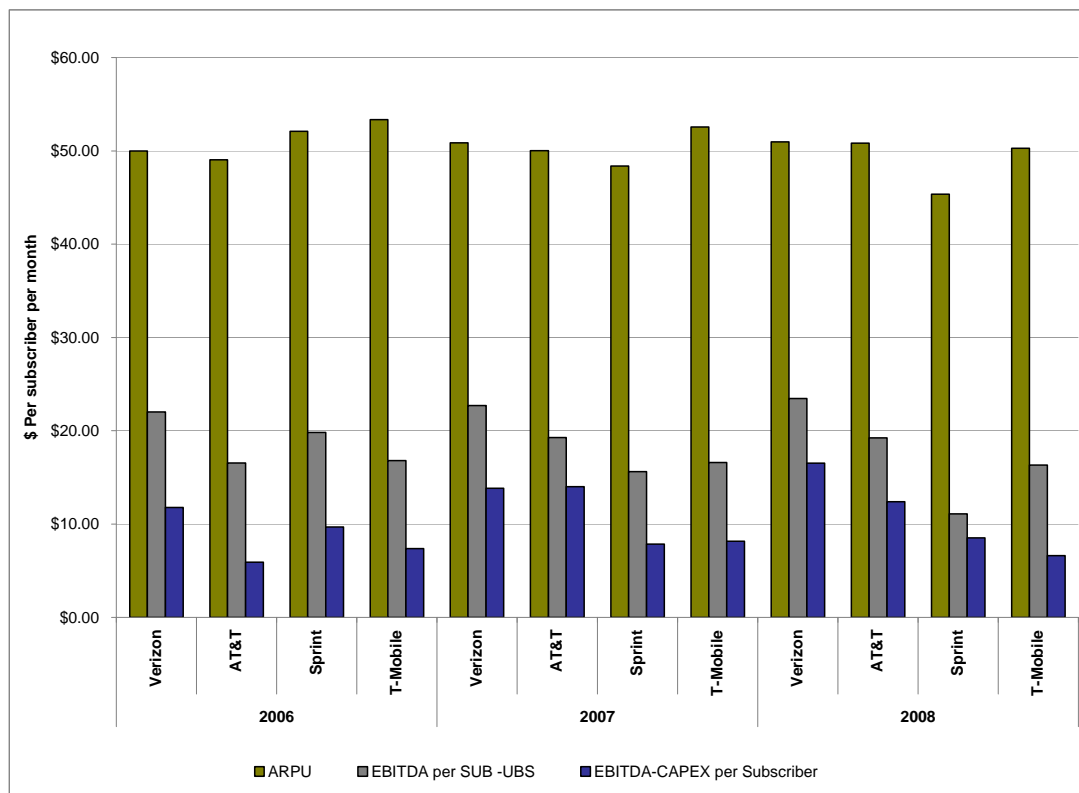
⁶²³ UBS, *US Wireless 411 Reports*, 2006 – 2009.

Chart 35
EBITDA minus CAPEX per Subscriber per Month (Selected Providers)⁶²⁴



⁶²⁴ UBS, *US Wireless 411 Reports*, 2006 – 2009

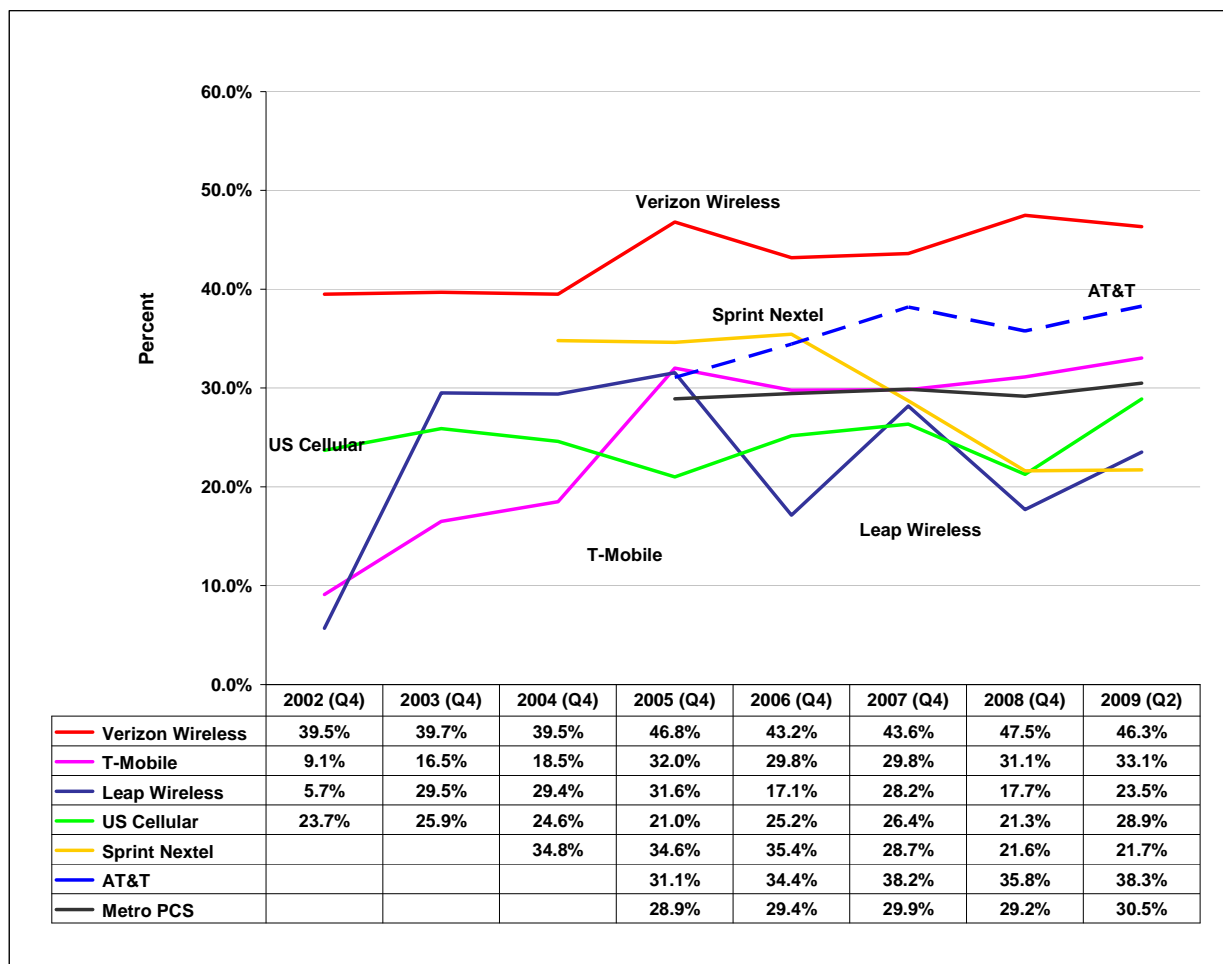
Chart 36
Comparison of ARPU, EBITDA, and EBITDA minus CAPEX⁶²⁵



221. EBITDA as a percentage of service revenue, also called EBITDA margin, appears in Chart 37 and provides another indicator of mobile wireless segment profitability. Standardizing EBITDA by service revenues facilitates cross-provider comparisons. In 2008, the difference between the provider with the highest EBITDA margin (Verizon Wireless) and the provider with the lowest (Leap) was 29.6 percent. Since 2007, the two largest national providers were the only providers with EBITDA margins greater than 35 percent. Verizon Wireless has remained in a band between 43 percent and 48 percent since 2005, increasing in 2008 relative to 2007. AT&T has remained between 31 percent and 39 percent, decreasing in 2008 relative to 2007. Between 2004 and 2008, Sprint Nextel declined from nearly 35 percent to approximately 22 percent. Since 2005, T-Mobile and MetroPCS remained between 28 percent and 33 percent.

⁶²⁵ UBS, *US Wireless 411 Reports*, 2006 – 2009

Chart 37
Reported EBITDA Margins: 2002 – 2009 (Selected Providers)⁶²⁶



I. Network Quality

222. A semi-annual study conducted by J.D. Power measures wireless call quality performance in terms of the number of problems per 100 calls (PP100), where a lower score reflects fewer problems and higher wireless call quality performance.⁶²⁷ Prior to the 2009 study, the number of reported wireless call quality problems for the industry overall declined for three consecutive reporting periods and then remained relatively stable from 2007 to 2008 at 15 problems per 100 calls, the lowest

⁶²⁶ UBS, *US Wireless 411 Reports*, 2006 – 2009. Data is for the fourth quarter, except for 2009, which is second quarter data.

⁶²⁷ J.D. Power and Associates Reports: *The Gap in Call Quality Performance Among Carriers Narrows As Competition Intensifies Across the Wireless Service Industry*, Press Release, J.D. Power, Mar. 18, 2009 (“Gap in Call Quality Performance Among Carriers Narrows”); J.D. Power, *2009 Wireless Call Quality Volume 1*, available at <http://jdpower.com/telecom/articles/2009-Wireless-Call-Quality-Volume-1> (2009 Wireless Call Quality Volume 1). The study measures wireless call quality based on seven customer-reported problem areas that impact overall carrier performance: dropped calls; static/interference; failed connection on first try; voice distortion; echoes; no immediate voicemail notification; and no immediate text message notification. The *2009 Wireless Call Quality Volume 1* is based on responses from 27,754 wireless customers. The study was fielded between July and December 2009.

level in the history of the study.⁶²⁸ The J.D. Power 2009 Wireless Call Quality Performance Study (Volume 1) indicates that network quality for the industry overall has held steady since the 2008 study, with the number of problems reported by consumers remaining virtually unchanged at 15 problems per 100 calls.⁶²⁹

223. The same study further indicates that, while overall industry performance has remained the same, the gap in call quality performance among the major providers included in the study has closed significantly as compared with previous years.⁶³⁰ In particular, while call quality performance among wireless providers still varies at the regional level, the gap between the highest- and lowest-ranked providers for the overall industry has narrowed from eight problems per 100 calls in the 2008 Volume 2 study to only five problems per 100 calls in the 2009 Volume 1 study.⁶³¹ According to J.D. Power, this trend toward greater parity is primarily the result of decreases in reported problems by customers of AT&T and Sprint Nextel and slight increases in reported problems by customers of both Verizon Wireless and Alltel.⁶³² Based on these findings, J.D. Power concludes that there is now less differentiation between the better-performing providers and those that struggle with network quality performance, compared with previous studies.⁶³³ Nevertheless, despite experiencing a slight increase in reported problems, Verizon Wireless remains the industry leader in network performance overall.⁶³⁴

224. One challenge facing service providers is ensuring that bandwidth consumption by data-intensive smartphone users does not degrade the quality of service for those users and other mobile wireless subscribers on the network.⁶³⁵ Reports suggest that iPhone users have experienced service quality problems on AT&T's broadband network, including dropped calls, delayed text and voice messages, and slow download speeds, particularly during periods of peak use in dense urban areas with higher concentrations of iPhone users.⁶³⁶ According to reports, the deterioration in service quality is due in part to the popularity of the iPhone and the challenges associated with architecting a network to keep up with the increased demand for data services.⁶³⁷ As detailed above, AT&T is devoting the majority of its capital spending to various measures aimed at upgrading and expanding the capacity of its 3G network in order to fix these problems and meet the rising demands on the network from bandwidth-heavy data

⁶²⁸ *Thirteenth Report*, 24 FCC Rcd at 6286-6287, ¶¶ 214-216.

⁶²⁹ *2009 Wireless Call Quality Volume 1*.

⁶³⁰ *Id.*

⁶³¹ *Gap in Call Quality Performance Among Carriers Narrows*.

⁶³² *2009 Wireless Call Quality Volume 1*.

⁶³³ *Id.*

⁶³⁴ *Id.*

⁶³⁵ Tom Kaneshige, *AT&T iPhone Users Irrate at Idea of Usage-Based Pricing*, PCWORLD, Dec. 14, 2009. As discussed above, iPhone and other smartphone users are responsible for a significant portion of data traffic and consume significantly more bandwidth than average mobile wireless subscribers. See Section V.D.3, Mobile Data Traffic (Non-Messaging), *supra*.

⁶³⁶ Jenna Wortham, *Customers Angered as iPhones Overload AT&T*, NEW YORK TIMES, Sept. 3, 2009; Jared Newman, *Network Woes? Hate the iPhone, Not AT&T*, PCWORLD, Sept. 4, 2009. Service quality problems are reported to be particularly pronounced in the cities of New York and San Francisco, where Piper Jaffray analyst Gene Munster estimates that AT&T's network "shoulders as much as 20 percent of all the iPhone users in the United States." Jenna Wortham, *Customers Angered as iPhones Overload AT&T*, NEW YORK TIMES, Sept. 3, 2009.

⁶³⁷ *Wireless Service and Handset Pricing – Pressure Building*, at 2; Jenna Wortham, *Customers Angered as iPhones Overload AT&T*, NEW YORK TIMES, Sept. 3, 2009.

applications.⁶³⁸ Although reports have focused on the quality of service on AT&T's network, rival service providers may confront the same network challenges as smartphone penetration increases.

J. Economic Impact of Mobile Wireless Services

225. Wireless industry contributions to the U.S. economy include investment, job creation, and increased productivity. According to CTIA, wireless services delivered close to \$100 billion in "value added" contributions to the U.S. GDP in 2007.⁶³⁹ In addition, one study estimates that during the fifteen years between 1992 and 2007, economic contributions from wireless services grew faster than the rest of the U.S. economy, averaging over 16 percent annual growth compared to approximately 3 percent for the remainder of the economy.⁶⁴⁰ However, the same study also reveals that the average annual growth rate for economic contributions from wireless services decreased to 11.2 percent for the period from 2002 to 2007, down from 19.1 percent for the period between 1997 and 2002.⁶⁴¹

226. As discussed above, mobile wireless service providers have invested heavily in network deployment and equipment, including mobile broadband networks. According to one recent study, there is a multiplier effect for investment in mobile wireless broadband networks, with a seven-to-tenfold increase in GDP compared to the initial investment.⁶⁴² As the authors explain, investment in wireless broadband infrastructure is similar to building a roadway in that it "not only generates jobs and income for the builders of the road, but provides opportunities for others to create new businesses and homes along the roadway."⁶⁴³ As a result, while investment in mobile wireless infrastructure increases the availability, capacity, speed, and reliability of services, it also provides indirect benefits, such as creating new businesses and sources of revenue, enhancing health care and public safety services, and helping consumers reach goods, services, jobs, and educational opportunities.⁶⁴⁴ Moving forward, new investment in mobile broadband infrastructure may offer additional opportunities for investment and economic growth in both the wireless sector and economy as a whole.

227. Investment and growth in the wireless sector in recent years has also spurred job creation and generated additional economic benefits through increased productivity. For instance, wireless providers directly employ more than 268,000 people, a number that has grown about six percent year-over-year for the last four years.⁶⁴⁵ Beyond direct employment by wireless providers, CTIA claims that approximately 2.4 million American jobs are either directly or indirectly dependent upon the U.S.

⁶³⁸ See Section IV.B.1, Network Coverage and Technology Upgrades, *supra*. *Wireless Service and Handset Pricing – Pressure Building*, at 2; Jenna Wortham, *Customers Angered as iPhones Overload AT&T*, NEW YORK TIMES, Sept. 3, 2009.

⁶³⁹ Letter from Christopher Guttman-McCabe, CTIA, to Chairman Julius Genachowski, *et al.*, FCC, GN Docket No. 09-51, WT Docket Nos. 08-165, 09-66 (filed July 9, 2009) at 2.

⁶⁴⁰ *Id.* at Attach., Harold Furchtgott-Roth, *The Wireless Sector: A Key to Economic Growth in America* (Jan. 2009) at 1.

⁶⁴¹ Letter from Christopher Guttman-McCabe, CTIA, to Chairman Julius Genachowski, *et al.*, FCC, GN Docket No. 09-51, WT Docket Nos. 08-165, 09-66 (filed July 9, 2009), Attach., Harold Furchtgott-Roth, *The Wireless Sector: A Key to Economic Growth in America* (Jan. 2009) at 27, Table 11.

⁶⁴² Alan Pearce and Michael S. Pagano, *Accelerated Wireless Broadband Infrastructure Deployment: The Impact on GDP and Employment*, 18 MEDIA L. & POL'Y, Spring 2009, at 12, 15.

⁶⁴³ *Id.* at 13.

⁶⁴⁴ *Id.* at 15-18.

⁶⁴⁵ Letter from Christopher Guttman-McCabe, CTIA, to Chairman Julius Genachowski, *et al.*, FCC, GN Docket No. 09-51, WT Docket Nos. 08-165, 09-66 (filed July 9, 2009) at 18, citing *CTIA Mid-Year 2009 Wireless Indices Report*.

wireless industry.⁶⁴⁶ In addition, one study predicts that the U.S. wireless industry may create two to three million new jobs between 2005 and 2015.⁶⁴⁷ Wireless services also create opportunities for increased productivity in American businesses, with one study projecting that productivity gains from the deployment and use of wireless broadband services could generate nearly \$860 billion in additional GDP between 2005 and 2016.⁶⁴⁸

⁶⁴⁶ Letter from Christopher Guttman-McCabe, CTIA, to Chairman Julius Genachowski, *et al.*, FCC, GN Docket No. 09-51, WT Docket Nos. 08-165, 09-66 (filed July 9, 2009) at 18.

⁶⁴⁷ Roger Entner and David Lewin, Ovum, *The Impact of the U.S. Wireless Telecom Industry on the U.S. Economy – A Study for CTIA-The Wireless Association*, Sept. 2005, at 3, 30.

⁶⁴⁸ Roger Entner, Ovum, *The Increasingly Important Impact of Wireless Broadband Technology and Services on the U.S. Economy: A Follow Up to the 2005 Ovum Report on the Impact of the U.S. Wireless Telecom Industry on the U.S. Economy – A Study for CTIA-The Wireless Association*, 2008, at 4, 10.

VI. MOBILE WIRELESS SERVICES: CONSUMER BEHAVIOR

228. Consumer behavior in response to price increases and adverse changes in service is an important indicator of the level of competition in the mobile wireless services industry. If consumers are sufficiently well-informed to take prices and other non-price factors into account, they are in a better position to choose the provider that offers the best terms. If enough consumers have the ability and propensity to switch service providers in response to a change in price or non-price factors, then mobile wireless service providers will have an incentive to compete vigorously to gain customers and retain their current customers. Consumers will be more effective in constraining wireless service provider behavior when the transaction costs they incur in choosing and switching providers are low. Transaction costs depend on, among other factors, subscribers' access to and ability to use information, and economic and non-economic barriers to switching providers.

A. Consumer Switching Costs

229. In the context of mobile wireless services, consumer switching costs are costs that a consumer incurs when past investment specific to her current service provider must be duplicated for a new service provider. First, there is the information cost associated with the consumer's need to obtain sufficiently detailed information about the offerings of other service providers. Second, wireless service consumers that have entered into multi-month service subscriptions with their service providers may be liable for early termination fees (ETF) if they choose to prematurely terminate their contracts. Third, there are the costs associated with obtaining a new wireless handset or unlocking the old handset when changing service providers. A potentially related handset change cost is the cost of reacquiring applications purchased for their current handset that may not be transferrable to a new handset.

230. A reasonable proxy to determine whether switching costs are high enough to prevent consumers from making changes is churn. As discussed below, churn refers to the percentage of current customers an operator loses over a given period of time, *i.e.*, a company's gross loss of customers during that time period. By examining the magnitude and trend over time of service provider churn, we can quantify the degree to which consumers have both the desire and the ability to change service providers to better meet their mobile wireless service needs.⁶⁴⁹

1. Access to Information on Mobile Wireless Services

231. In order to make informed decisions, consumers need detailed information about the availability, quality, and features of mobile wireless services. Obtaining such information requires the expenditure of time and, in some cases, money on the part of the wireless service consumer. A number of third parties – such as *Consumer Reports*, trade associations, marketing and consulting firms, and several web sites – provide consumers with an overview and comparison of the mobile wireless services available in their area.⁶⁵⁰ In addition, J.D. Power's web site posts the results of its annual wireless user surveys, which rate wireless service providers by region based on overall customer satisfaction, call quality, and customer service.⁶⁵¹

⁶⁴⁹ Churn only measures consumers that have left a particular service provider; it does not measure consumers that wanted to switch, but were unable to do so.

⁶⁵⁰ See *Thirteenth Report*, 24 FCC Rcd at 6270, ¶ 178; CTIA PN Comments at 36-37; CTIA NOI Comments at 67-69.

⁶⁵¹ J.D. Power, *Wireless*, www.jdpower.com (visited Jan. 14, 2010). For example, according to the J.D. Power 2009 Wireless Consumer Smartphone Customer Satisfaction Study, Apple ranks highest in customer satisfaction with smartphone manufacturers, while LG ranks highest among traditional mobile phone users. *Id.* In addition, several websites, such as billshrink.com, myrateplan.com, reviews.cnet.com/cell-phone-buying-guide, and prepaidreviews.com, provide consumers with free and user-friendly means to identify the best wireless service to meet their needs. BillShrink states in recent comments to the Commission that the public needs increased access to service coverage maps, dropped call data, service plan and pricing transparency, service contract detail, and explicit (continued....)

232. Implementation of initial trial periods in multi-month service subscriptions is a policy that may alleviate a “buyer’s regret” problem. Some wireless service providers have implemented formal procedures to permit consumers to use their service on a trial basis for periods ranging from 14 to 30 days, consistent with one of the elements of CTIA’s Consumer Code.⁶⁵²

233. The Commission continues to receive consumer complaints about various aspects of mobile wireless service. As GAO notes in a November 2009 report about mobile wireless service, about 84 percent of adult wireless users are very or somewhat satisfied with their wireless service, but approximately ten percent are very or somewhat dissatisfied.⁶⁵³ The *GAO Report* also notes that 19 states have rules or regulations governing wireless service.⁶⁵⁴ The Commission is working to address the issues raised in the *GAO Report* by improving consumer access to needed information and coordinating with states to more efficiently and effectively respond to consumer complaints about mobile wireless services. In August 2009, the Commission initiated a *Notice of Inquiry* proceeding seeking comment on consumer information, disclosure, and truth-in-billing practices for services it regulates.⁶⁵⁵ The Commission now has a record that was created in response to that inquiry, which will help determine whether or not additional regulatory actions may be needed to ensure that consumers have sufficient information to make informed decisions about a mobile wireless service provider.⁶⁵⁶ In addition, in May 2010, the FCC’s Consumer and Governmental Affairs Bureau sought comment on the feasibility of instituting usage alerts and cut-off mechanisms that would provide mobile wireless consumers with a way to monitor their voice, text, and data usage, as well as the various charges they may incur in connection with such usage.⁶⁵⁷

2. Early Termination Fees (ETFs)

234. The practice of assessing ETFs against postpaid subscribers when they cancel their wireless service agreement or plan before the expiration of its term represents probably the largest quantifiable cost to consumers who wish to switch service providers. According to information obtained by the Commission from Telogical Systems, these charges are the same nationwide and range from \$175 to \$350 per phone number among the four nationwide mobile wireless service providers.⁶⁵⁸ Additional

(Continued from previous page) —————

information about additional charges on wireless bills such as taxes and various fees. See, e.g. BillShrink.com Comments to CG Docket No. 09-158, Oct. 13, 2009, at 1.

⁶⁵² See CTIA, *Consumer Code for Wireless Service*, <http://files.ctia.org/pdf/ConsumerCode.pdf> (visited Apr. 28, 2010). The ability of consumers to terminate a wireless service contract within 14 days is also one of a number of provisions of the Assurance of Voluntary Compliance agreed to by AT&T (then Cingular), Sprint Nextel, and Verizon Wireless with the attorneys general of 32 states on June 25, 2004. See <http://www.nasuca.org/archive/CINGULAR%20AVC%FINAL%20VERSION.pdf>, visited Mar. 15, 2010.

⁶⁵³ *FCC Needs to Improve Oversight of Wireless Phone Service*, GAO Report, Nov. 2009, at 8. (*GAO Report*)

⁶⁵⁴ *Id.* at 27-8. The states that have rules or regulations that apply to wireless carriers are: Alaska, Arizona, California, Colorado, Connecticut, Hawaii, Indiana, Iowa, Louisiana, Massachusetts, Mississippi, Montana, Nebraska, New Mexico, North Dakota, Ohio, Rhode Island, South Dakota, and West Virginia.

⁶⁵⁵ Consumer Information and Disclosure, Truth-in-Billing and Billing Format, IP-Enabled Services, CG Docket No. 09-158, *Notice of Inquiry*, 24 FCC Rcd 11380 (2009).

⁶⁵⁶ *Id.*

⁶⁵⁷ See “Comment Sought on Measures Designed to Assist U.S. Wireless Consumers to Avoid ‘Bill Shock,’” CG Docket No. 09-158, *Public Notice*, DA 10-803 (CGB rel. May 11, 2010). Similar usage alerts and notification mechanisms were adopted by the European Union in June 2009. *Id.*

⁶⁵⁸ An exception is the new Google Nexus One handset. Those who terminate their contracts for this T-Mobile Google phone will be charged \$350, \$200 by T-Mobile as an early service termination fee, and \$150 by Google as an equipment recovery fee within the first 120 days of service. Amy Schatz, *Google Lowers Nexus One Termination Fee*, WALL STREET JOURNAL, Feb. 8, 2010, available at <http://online.wsj.com/article/SB10001424052748703615904575053641103601412.html>.

ETFs may be imposed by certain authorized agents or third-party vendors.⁶⁵⁹

235. As discussed in previous *Reports*, all four nationwide providers have implemented policies to pro-rate ETFs over the course of the contract term, and pro-rated ETFs lower the costs to consumers who switch service providers by progressively reducing the fee they pay to cancel their service early.⁶⁶⁰ However, the Consumer and Governmental Affairs Bureau (CGB) and the Wireless Telecommunications Bureau (WTB) have sought information from certain mobile wireless providers regarding their assessment of ETFs, especially in connection with advanced devices and smartphones, and the impact such ETFs have on consumers' ability to switch providers. Specifically, on December 4, 2009, the CGB and WTB requested information from Verizon Wireless regarding its assessment of a \$350 early termination fee for advanced devices. CGB and WTB asked, among other things, why the provider decided to increase the ETF for smartphones from \$175 to \$350, how it defines a device as an "advanced device," and how consumers receive information about the ETF.⁶⁶¹ Verizon Wireless responded to the CGB and WTB on December 18, 2009, stating in part that the "higher [ETF] associated with advanced devices reflects the higher costs associated with offering those devices to consumers at attractive prices, the costs and risks of investing in the broadband network to support these devices, and other costs and risks."⁶⁶²

236. Subsequently, on January 26, 2010, the Chiefs of CGB and WTB sent letters to four mobile wireless service providers – Verizon Wireless, Sprint Nextel, AT&T, and T-Mobile – as well as Google, asking each company to detail how it determines and assesses the ETFs, as well as how it notifies consumers about ETFs.⁶⁶³ The letters noted that "[o]ur discussions with wireless companies since December indicate that there is no standard framework for structuring and applying ETFs throughout the wireless industry," noting that the ETFs are substantial (and in some cases are increasing) and have an important impact on consumers' ability to switch providers.⁶⁶⁴ CGB and WTB also stated that it is essential that consumers fully understand what they are signing up for – both in the short term and over the life of the contract – when they accept a service plan with an early termination fee.⁶⁶⁵ In light of those concerns, the Bureaus requested, among other things, that each wireless company provide a

⁶⁵⁹ See, e.g., Verizon Wireless, *Service Agreement*, http://www.verizonwireless.com/b2c/globalText?textName=CUSTOMER_AGREEMENT&jspName=footer/customerAgreement.jsp (visited Jan. 14, 2010).

⁶⁶⁰ See *Thirteenth Report*, 24 FCC Rcd at 6272-73, ¶ 185; CTIA PN Comments at 29-30; CTIA NOI Comments at 43.

⁶⁶¹ *WTB ETF Letter to Verizon Wireless*, n. 239.

⁶⁶² Letter from Kathleen Grillo, Senior Vice President, Federal Regulatory Affairs, Verizon, to Ruth Milkman, Chief, Wireless Telecommunications Bureau, FCC, and Mark Stone, Acting Chief, Consumer and Government Affairs Bureau, FCC, WT Docket No. 05-194, CG Docket No. 09-158 (Dec. 18, 2009).

⁶⁶³ See, e.g., Letter from Joel Gurin, Chief, Consumer and Government Affairs Bureau, and Ruth Milkman, Chief, Wireless Telecommunications Bureau, FCC, to Kathleen Grillo, Senior Vice President, Federal Regulatory Affairs, Verizon, DA 10-136 (Jan. 26, 2010); Letter from Joel Gurin, Chief, Consumer and Government Affairs Bureau, and Ruth Milkman, Chief, Wireless Telecommunications Bureau, FCC, to Robert W. Quinn, Jr., Esq., Senior Vice President-Federal Regulatory, AT&T Services, Inc., DA 10-132 (Jan. 26, 2010); Letter from Joel Gurin, Chief, Consumer and Government Affairs Bureau, and Ruth Milkman, Chief, Wireless Telecommunications Bureau, FCC, to Thomas J. Sugrue, Vice President, Government Affairs, T-Mobile, DA 10-135 (Jan. 26, 2010); Letter from Joel Gurin, Chief, Consumer and Government Affairs Bureau, and Ruth Milkman, Chief, Wireless Telecommunications Bureau, FCC, to Vonya B. McCann, Esq., Senior Vice President, Government Affairs, Sprint Nextel Corporation, DA 10-137 (Jan. 26, 2010); and Letter from Joel Gurin, Chief, Consumer and Government Affairs Bureau, and Ruth Milkman, Chief, Wireless Telecommunications Bureau, FCC, to Richard S. Whitt, Esq., Washington Telecom and Media Counsel, Google, Inc., DA 10-133 (Jan. 26, 2010).

⁶⁶⁴ *Id.*

⁶⁶⁵ *Id.*

description of how it set up its ETFs, the rationales for the fees, and what options consumers have to learn about the fees and manage their obligations.⁶⁶⁶ All of the five companies responded by February 23, 2010, describing their practices regarding disclosure of ETFs to consumers and stating generally that they give consumers adequate notice about the applicable ETFs that apply; that ETFs allow them to subsidize handset purchases — including purchases of smartphones — for customers; and that wireless providers normally recover those subsidies over the life of a contract, but cannot do so when a customer ends a contract early.⁶⁶⁷

237. Some providers offer service plans that do not have ETFs. For example, in addition to its multi-month plans with ETFs, Verizon Wireless also offers a month-to-month agreement with all of its nationwide pricing plans that allows customers to terminate their plans at the end of any month without paying an ETF.⁶⁶⁸ Customers who choose Verizon Wireless's new month-to-month option either purchase new devices from Verizon Wireless at the full retail price, or procure their own CDMA devices.⁶⁶⁹ Another way that consumers can avoid ETFs entirely is to purchase mobile wireless service on a prepaid basis, instead of agreeing to enter into a long-term service contract.⁶⁷⁰ In addition, the five largest mobile wireless service providers have all implemented various policies that allow subscribers to change elements of their service contracts without triggering the start of a new contract term, thus reducing the likelihood these subscribers will be affected by an ETF.⁶⁷¹

238. The emergence of a secondary market segment for mobile wireless service contracts may also help promote competition by facilitating consumers' ability to switch service providers. In most cases, wireless service providers allow customers to get out of their contracts without paying an ETF by transferring the remaining contract term to someone else who meets the provider's credit requirements.⁶⁷² A number of websites exist to facilitate transfers of mobile wireless contracts under these provisions.⁶⁷³ In particular, the websites help mobile wireless customers avoid paying penalties for early termination by

⁶⁶⁶ Letter from Kathleen Grillo, Senior Vice President, Federal Regulatory Affairs, Verizon, to Joel Gurin, Chief, Consumer and Government Affairs Bureau, and Ruth Milkman, Chief, Wireless Telecommunications Bureau, FCC, CG Docket No. 09-158 (Feb. 23, 2010); Letter from Robert W. Quinn, Jr., Esq., Senior Vice President-Federal Regulatory, AT&T Services, Inc., dated Feb. 23, 2010 in CG Docket No. 09-158 to Joel Gurin, Chief, Consumer and Government Affairs Bureau, and Ruth Milkman, Chief, Wireless Telecommunications Bureau, FCC; Letter from Thomas J. Sugrue, Vice President, Government Affairs, T-Mobile, dated Feb. 23, 2010 in CG Docket No. 09-158 to Joel Gurin, Chief, Consumer and Government Affairs Bureau, and Ruth Milkman, Chief, Wireless Telecommunications Bureau, FCC; Letter from Vonya B. McCann, Esq., Senior Vice President, Government Affairs, Sprint Nextel Corporation, dated Feb. 23, 2010 in CG Docket No. 09-158 to Joel Gurin, Chief, Consumer and Government Affairs Bureau, and Ruth Milkman, Chief, Wireless Telecommunications Bureau, FCC; and Letter from Richard S. Whitt, Esq., Washington Telecom and Media Counsel, Google, Inc., dated Feb. 23, 2010 in CG Docket No. 09-158 to Joel Gurin, Chief, Consumer and Government Affairs Bureau, and Ruth Milkman, Chief, Wireless Telecommunications Bureau, FCC.

⁶⁶⁷ *Id.*

⁶⁶⁸ *No Contract Required – New Month-to-Month Agreement Gives Verizon Wireless Customers Even More Freedom*, Press Release, Verizon Wireless, Sept. 22, 2008.

⁶⁶⁹ *Id.*

⁶⁷⁰ See Section IV.A.2, Prepaid Service, *supra*.

⁶⁷¹ See Section IV.A, Price Rivalry: Developments in Mobile Service Pricing Plans, *supra*.

⁶⁷² Lauren Tara Lacapra, *Breaking Free of a Cellular Contract*, WALL STREET JOURNAL, Nov. 30, 2006, at D1 (*Breaking Free of a Cellular Contract*) (noting that this “loophole” in mobile phone contracts is available “to nearly all customers with long-term plans”).

⁶⁷³ Several web-based services that are available include: cellswapper (available at www.cellswapper.com, visited Jan. 12, 2010); trademycellular (available at www.trademycellular.com, visited Jan. 12, 2010); celltradeusa (available at www.celltradeusa.com, visited Jan. 12, 2010); and cashmoneylife (available at www.cashmoneylife.com, visited Jan. 12, 2010).

putting them in touch with people seeking a mobile wireless contract. Although these sites charge existing mobile wireless customers a range of fees to transfer or cancel a mobile wireless service contract, the fees to transfer a contract through these web sites generally are much lower than the ETFs customers would otherwise have to pay.⁶⁷⁴ As an additional enticement to potential contract buyers, many contract sellers offer to transfer their mobile handsets free of charge.⁶⁷⁵ In addition to a possible free handset, other potential advantages to contract buyers include avoiding a service activation fee and obtaining a shorter contract than if they had contracted directly with a mobile wireless service provider. Finally, at least one wireless service provider, Cellular South, offers to pay the ETF to entice a consumer to move to its network, thus eliminating the ETF as a cost of switching.⁶⁷⁶

3. Handsets, Handset Locking, and Handset Applications

239. Another potential cost of switching to a new service provider is the cost of replacing the handset when a consumer wishes to change from one wireless service provider to another that employs a different air interface. Even if both providers employ the same underlying air interface, handset replacement may be necessary because there is also the fact that many handset models are produced to the specifications of a single wireless service provider to enable certain functionalities unique to that service provider.

240. In addition, most handsets sold in the United States are “locked,” meaning that they normally will operate only on a single wireless network. Locking can prevent a consumer from taking a handset from one service provider to another, unless the handset is reprogrammed.⁶⁷⁷ The ability of a consumer to unlock a handset varies depending on the service provider. For example, GSM operators have different policies regarding handset unlocking. Whereas T-Mobile will provide an “unlock code” after the subscriber account has been active at least 90 days so that the same handset can be used on another operator’s GSM network,⁶⁷⁸ AT&T only releases unlock codes to subscribers under certain circumstances, and will not do so at all for iPhones.⁶⁷⁹ CDMA handsets are more difficult to unlock because they do not use a removable Subscriber Identification Module (SIM) card and must be reprogrammed by CDMA provider in order to be unlocked.⁶⁸⁰

241. Another increasingly important switching cost associated with smartphones is the stranding of mobile applications purchased for a particular handset that cannot be transferred to or used on a new handset. Mobile applications are typically tied to a single mobile wireless operating system. As a result, if a consumer with a smartphone were to contemplate switching either to a new service provider or to new handset using a different operating system with the same service provider, she would likely consider the cost associated with reacquiring applications purchased for use on the current handset that

⁶⁷⁴ See *Breaking Free of a Cellular Contract*.

⁶⁷⁵ *Id.*

⁶⁷⁶ See Cellular South, *Three Reasons to Switch to Cellular South*, <https://www.cellularsouth.com/switchnow/index.html> (visited Jan. 14, 2010).

⁶⁷⁷ Some handset manufacturers directly sell unlocked handsets in their Internet shops and through non-provider retailers. See, e.g., the manufacturer Internet shops selling unlocked handsets at <http://www.motorola.com/Consumers/US-EN/Home>, <http://www.nokiausa.com/> and https://www.google.com/phone/choose?locale=en_US&s7e=. See also, Section VII.B.1, Mobile Wireless Handsets/Devices and Operating Systems, *infra*.

⁶⁷⁸ See T-Mobile, *SIM Cards and Unlocking Your Phone*, http://search.t-mobile.com/inquirapp/ui.jsp?ui_mode=question&question_box=unlock (visited Apr. 28, 2010).

⁶⁷⁹ See AT&T, *Answer Center – What is the Unlock Code for My Phone?*, <http://www.wireless.att.com/answer-center/main.jsp?solutionId=55002&t=solutionTab> (visited Apr. 28, 2010).

⁶⁸⁰ See Cell Phone Forums, *Unlocking a CDMA Phone*, <http://cellphoneforums.net/general-cell-phone-forum/t206579-unlocking-cdma-phone.html> (visited 3/8/2010).

could not be used on the new handset.

4. Number Portability

242. Local number portability (LNP) refers to the ability of users of telecommunications services to retain, at the same location, existing telecommunications numbers when switching from one telecommunications carrier to another.⁶⁸¹ Subscribers can port numbers between two mobile wireless service providers (intramodal porting) or between a mobile wireless provider and wireline carrier (intermodal porting).⁶⁸²

243. Prior to the Commission's actions to require local number portability, the cost and inconvenience to consumers of changing to a new telephone number was considered a significant barrier to switching, reducing the likelihood a consumer would move to a new service provider and thus impeding competition. Now that consumers can retain their telephone numbers within a given geographic area, this switching cost has been significantly reduced as a consideration in determining whether or not to change mobile wireless service providers. In fact, the average number of wireless subscribers per month porting their phone number from one mobile wireless provider to another has been steadily increasing over the past few years to approximately 1.2 million per month in 2008.⁶⁸³

B. Churn as a Measure of Consumer Switching Costs

244. Churn refers to the percentage of current customers an operator loses over a given period of time, *i.e.*, a company's gross loss of customers during that time period.⁶⁸⁴ Mobile wireless service providers usually express churn in terms of a percent of their subscribers per month. For example, an operator might report an average monthly churn of two percent, which is equivalent to the loss of about 24 percent of its current customers per year.

245. Most providers report churn rates for postpaid subscribers of between 1.5 percent and 3.3 percent per month (see Chart 38).⁶⁸⁵ Churn rates had been decreasing for a number of years; however, the trend has shown a slight increase over the last few quarters, with the nationwide providers averaging a monthly churn rate of two percent in the fourth quarter of 2008.⁶⁸⁶ Prepaid subscriber churn is typically significantly higher, over four percent per month, as seen in the graph of "comparative churn" below. Churn is a significant expense for the mobile wireless industry. The magnitude of this expense can be estimated by multiplying the number of subscribers lost by the average cost to acquire a new subscriber. For example, using data for the end of 2008, AT&T lost an estimated 1.2 million subscribers per month, multiplied by its estimated average cost to acquire a new subscriber of \$528.93, yielding an estimated cost

⁶⁸¹ 47 C.F.R. § 52.21(l).

⁶⁸² Under the Commission's rules and orders, covered mobile wireless providers operating in the 100 largest MSAs were required to begin providing number portability by November 24, 2003. Mobile wireless providers outside of the top 100 MSAs were required to be LNP-capable by May 24, 2004. 47 C.F.R. § 52.31(a); Verizon Wireless's Petition for Partial Forbearance From Commercial Mobile Radio Services Number Portability Obligation and Telephone Number Portability, *Memorandum Opinion and Order*, 17 FCC Rcd 14972, 14986, ¶ 31 (2002). In an October 2007 ruling, the Commission also expanded local number portability to VoIP, among other things. Telephone Number Requirements for IP-Enabled Services Providers, *Report and Order, Declaratory Ruling, Order on Remand, and Notice of Proposed Rulemaking*, 22 FCC Rcd 19531 (2007).

⁶⁸³ Craig Stroup and John Vu, *Numbering Resource Utilization in the United States*, FCC, Sept. 2009, at 35 (*March 2009 NRUF Report*).

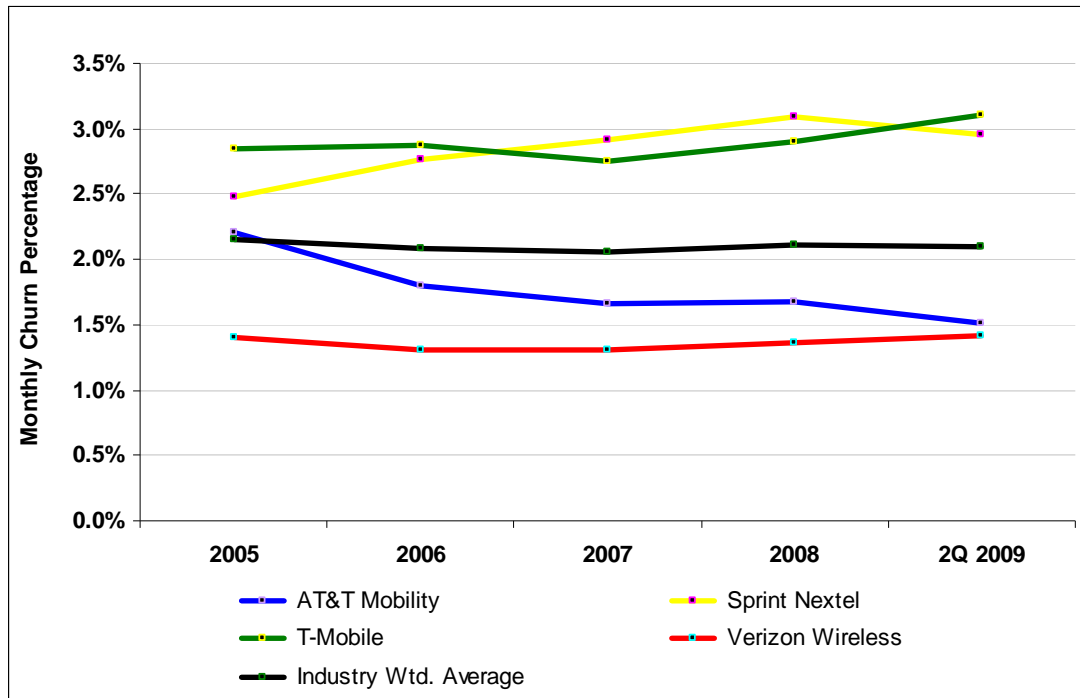
⁶⁸⁴ CTIA defines it as "a measure of the number of subscribers disconnecting from service during the period." *CTIA Mid-Year 2009 Wireless Indices Report*, at 70.

⁶⁸⁵ *US Wireless 411 3Q09*, at 20 (Table 16: Monthly Churn). *See also*, CTIA NOI Comments at 69.

⁶⁸⁶ *US Wireless 411 3Q09*, at 6. *See also Eleventh Report*, 21 FCC Rcd 10947 at 11005, ¶ 145 for reasons for the earlier decline.

to replace the 1.2 million lost subscribers in a month of almost \$652 million.⁶⁸⁷

Chart 38
Blended Churn Reported by Four Nationwide Service Providers⁶⁸⁸



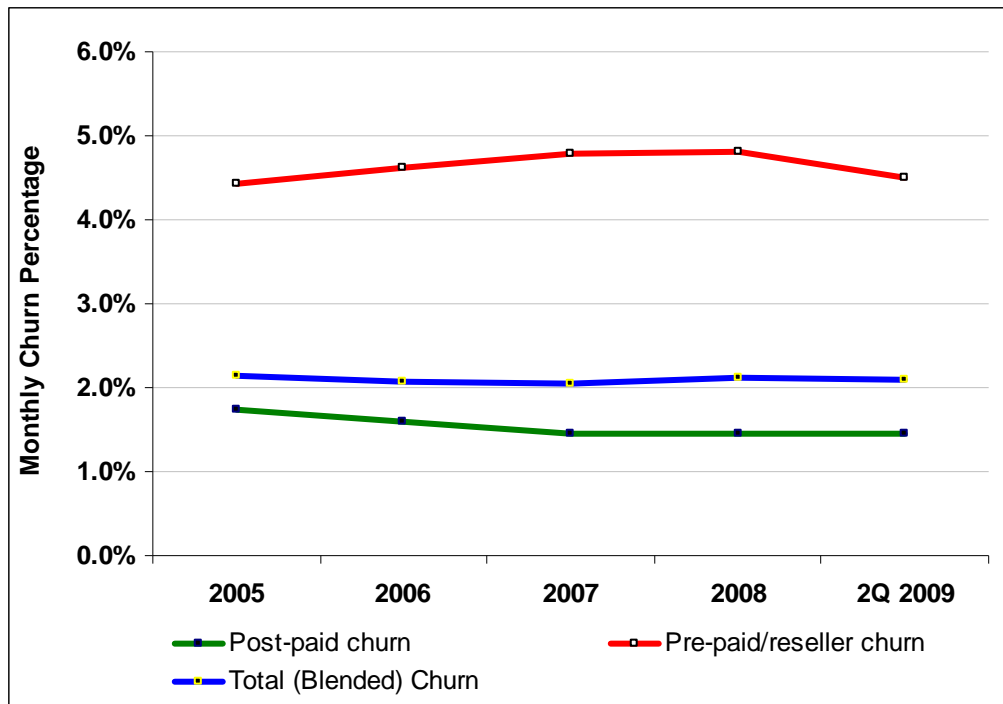
246. *Comparative Churn.* Many service providers report churn for postpaid subscribers separately from prepaid subscribers. As can be seen in the following graph of comparative churn rates, prepaid subscribers are more likely than a post paid subscriber to terminate a relationship with a wireless service provider because they are not constrained by a contract.⁶⁸⁹ Chart 39 helps to illustrate the trends in churn for different subscriber types.

⁶⁸⁷ *Wireline & Wireless Telecom Services*, Bank of America/Merrill Lynch, Mar. 26, 2009, at 14.

⁶⁸⁸ Data provided by Bernstein Research. Annual churn is an average for each of the four quarters. Verizon Wireless is combined with Alltel.

⁶⁸⁹ *Leap Wireless & Metro PCS: Low Cost Prepaid Wireless...A Survival Story; Initiating Coverage at Outperform*, Bernstein Research, Dec 14, 2009.

Chart 39
Comparative Churn⁶⁹⁰



247. *Subscriber Lifetime.* Based on industry and reported service provider churn, one can also calculate the number of months an average subscriber is expected to remain a customer of a particular wireless service provider. This measure is referred to as the subscriber lifetime, and is calculated by dividing one by the monthly churn rate. Subscriber lifetime can also be used to derive ancillary subscriber metrics (such as Total Lifetime Revenue per user, and Lifetime revenues for voice and data revenues). As indicated by Table 23, the national weighted average lifetime of a subscriber to one of the four national providers has recently ranged between 48 and 56 months.⁶⁹¹ The lifetime of subscribers to prepaid service providers, such as Leap and MetroPCS, is significantly lower at a range of 19 to 30 months for Leap and 17 to 25 months for Metro PCS, reflecting the higher churn rates experienced by these companies.⁶⁹²

⁶⁹⁰ Data provided by Bernstein Research. Annual churn is an average for each of the four quarters. Verizon Wireless is combined with Alltel.

⁶⁹¹ Calculation of Monthly Lifetime is based on Blended Churn, thus postpaid and prepaid churn calculations would provide different measures.

⁶⁹² *Id.*

Table 23
Lifetime of Subscribers (Months)⁶⁹³

	1Q07	2Q07	3Q07	4Q07	1Q08	2Q08	3Q08	4Q08	1Q09	2Q09
National Operators										
AT&T	59	63	59	59	59	63	59	63	63	67
Verizon Wireless	91	77	77	83	77	83	71	67	67	71
Sprint Nextel	43	48	43	42	37	48	45	45	45	48
T-Mobile	38	37	34	36	38	37	33	30	32	32
National Wtd. Average	56	56	53	53	48	53	50	50	53	56
Regional/Other Operators										
US Cellular	59	48	45	48	56	53	48	50	53	45
Alltel	56	59	53	56	56	53	50	--	--	--
Centennial Cellular	45	56	43	42	43	50	37	40	45	45
Centennial PCS	37	42	42	38	42	40	38	36	34	34
Cincinnati Bell	29	28	28	29	30	27	25	23	29	31
Leap	29	23	19	24	28	26	23	26	30	23
MetroPCS	25	21	19	21	25	22	21	20	20	17
Regional/Other Wtd. Avg.	45	42	37	40	37	34	30	30	31	26
Industry Wtd. Average	53	53	50	53	48	53	48	48	50	53

248. Churn can serve as a reasonable proxy to measure whether or not consumer switching costs are detrimental to competition among mobile wireless service providers.⁶⁹⁴ Churn rates indicate that approximately one quarter of customers switch their service providers each year, thereby providing some indication that some customers are not locked in, although all consumers may incur costs when switching service providers.

⁶⁹³ *US Wireless 411 2Q09*; Commission estimates.

⁶⁹⁴ Mercatus NOI Comments at 11.

VII. INPUT AND DOWNSTREAM SEGMENTS OF THE MOBILE WIRELESS ECOSYSTEM

A. Input Segments

249. In the following sections, we consider key factors of production of wireless services. We examine whether and how such “upstream” or input segments, including spectrum, infrastructure and backhaul facilities, affect market performance. As we observe below, these critical input segments may affect competition in the provision of mobile wireless service.

1. Spectrum

250. In this section, we briefly describe the Commission’s allocation and licensing of commercial wireless spectrum that is used for the provision of mobile voice, and mobile broadband and other data services. We then provide an overview of the overall spectrum holdings among different providers. We also discuss how spectrum in different frequency bands can affect an operator’s ability to provide broadband service.

a. Availability of Mobile Wireless Services Spectrum

251. Access to spectrum is a precondition to the provision of mobile wireless service. Ensuring that sufficient spectrum is available for incumbent licensees, as well as for entities that need spectrum to enter the market, is critical for promoting competition, investment, and innovation. Incumbent licensees may need additional spectrum to increase their coverage or capacity as they grow their subscriber bases and meet increasing demand, while new entrants need access to spectrum to enter the market and compete with established licensees. Through the years, the Commission has increased the amount of spectrum available for the provision of mobile wireless services. This spectrum has been made available in different frequency bands, in different bandwidths and licensing areas.

252. Currently, mobile wireless operators primarily use licenses associated with three different frequency bands to provide mobile voice and, in most cases, mobile data services: Cellular (in the 850 MHz band), SMR (in the 800/900 MHz band), and broadband PCS (in the 1.9 GHz band). Over the past several years, additional spectrum bands have become available – BRS/EBS in the 2.5 GHz band, AWS in the 1.7/2.1 GHz band, and the 700 MHz band – which are beginning to enable the provision of additional and competitive voice and mobile data services.⁶⁹⁵ By examining the history of the available frequency bands and associated service rules, it is possible to trace the growth of the mobile wireless industry and the introduction of new competition in the mobile wireless marketplace.⁶⁹⁶

(i) Frequency Bands

253. *Cellular.* The Commission began licensing Cellular spectrum in 1982, eventually making a total of 50 megahertz available. The band was divided into two blocks, licensed by Cellular Market Area (CMA). At the time of initial licensing, one of the two cellular channel blocks in each market was awarded to a local incumbent wireline carrier, while the other block was awarded to another entity in order to promote competition. The Commission completed licensing the majority of cellular operators in 1991. Cellular licensees provided the first widely-used mobile services.⁶⁹⁷ Historically, they have held much of the share of mobile services provided in most markets across the country.

254. *SMR.* By the early 1990s, mobile voice services were also provided using approximately

⁶⁹⁵ A more detailed description of spectrum available for mobile wireless service is provided in Appendix A. There are other bands – including 2.3 GHz (WCS), 1670-1675 MHz, and 901-902 MHz (Narrowband PCS) – that are licensed under the Commission’s flexible Part 27 or Part 24 rules and can be used to provide CMRS. Appendix A also includes a discussion of the 3650-3700 MHz band, which can be used to provide wireless broadband service.

⁶⁹⁶ Appendix A of this Report provides a more detailed discussion of these frequency bands.

⁶⁹⁷ See *Third Report*, 13 FCC Rcd at 19749, 19779, pp. 3, 29.

20 megahertz of SMR spectrum in the 800 and 900 MHz bands. The Commission had established SMR in 1974 to provide for land mobile communications on a commercial basis. The Commission initially licensed SMR spectrum in non-contiguous bands, on a site-by-site basis.⁶⁹⁸ The Commission has since licensed additional SMR spectrum on an EA basis, through the auction process. Although the primary use for SMR traditionally was dispatch services,⁶⁹⁹ providers such as Nextel acquired significant amounts of SMR spectrum and were successful in launching mobile telephony services in the 1990s, which competed with licensees using cellular spectrum in the provision of mobile telephony services.⁷⁰⁰

255. *Broadband PCS.* Between 1995 and 1999, the Commission auctioned 120 megahertz of broadband PCS, in different bandwidths and licensing areas, in the 1850-1910 MHz and 1930-1990 MHz bands. More efficient digital wireless technologies had been developed, representing an advancement over existing analog cellular networks. This newly available spectrum facilitated the growth and development of a more competitive mobile wireless marketplace. By 1998, 87 percent of the U.S. population (by Basic Trading Area) was served by three or more providers, and 54 percent by five or more providers;⁷⁰¹ by 2008, 96 percent of the U.S. population (by census block) was served by three or more providers, and 65 percent by five or more.⁷⁰² Between 1995 and 2008, the price per minute of mobile wireless service dropped 84 percent,⁷⁰³ while the number of subscribers increased over 700 percent.⁷⁰⁴ With increased competition came increased innovation: broadband PCS service providers offered new pricing plans, introduced smaller handsets with increased functionality, and facilitated mass market acceptance of mobile wireless service. This heightened competition and investment was fueled by the great investment made by the mobile industry during this timeframe: cumulative investment in the industry more than tripled from \$19 billion to over \$70 billion from 1994 to 2000,⁷⁰⁵ and the number of cell sites more than quadrupled, from 18,000 to over 80,000.⁷⁰⁶

256. *BRS and EBS.* In 2004, the Commission adopted revisions to the rules and band plan governing BRS and EBS in the 2.5 GHz band that restructured this band to facilitate the use of this spectrum, totaling approximately 194 megahertz, for mobile and fixed broadband services.⁷⁰⁷ Since then, BRS and EBS licensees have been transitioning to the revised band plan, a process that is nearly complete. In 2008, Clearwire began deploying mobile broadband services using this spectrum in various

⁶⁹⁸ The “900 MHz” SMR band refers to spectrum allocated in the 896-901 and 935-940 MHz bands; the “800 MHz” band refers to spectrum allocated in the 806-824 and 851-869 MHz bands. See 47 C.F.R. § 90.603; see also 47 C.F.R. § 90.7 (defining “specialized mobile radio system”).

⁶⁹⁹ Dispatch services allow two-way, real-time, voice communications between fixed units and mobile units (e.g., between a taxicab dispatch office and a taxi) or between two or more mobile units (e.g., between a car and a truck). See *Fifth Report*, 15 FCC Rcd at 17727-28, for a detailed discussion.

⁷⁰⁰ Nextel and Sprint combined their spectrum holdings in a merger completed in 2005, becoming Sprint Nextel Corporation. See <http://www.sprint.com/companyinfo/history/> (visited Mar. 8, 2010).

⁷⁰¹ See *Third Report*, 13 FCC Rcd at 19768, p. B-4, Table 3A (1998).

⁷⁰² See *Thirteenth Report*, 24 FCC Rcd at 6210, ¶ 40, Table 1.

⁷⁰³ See *id.* at 6277, ¶ 193, Table 12 (2009).

⁷⁰⁴ See *id.* at 6314, Table A-1 (2009).

⁷⁰⁵ *CTIA Year-End 2008 Wireless Indices Report*, at 126.

⁷⁰⁶ *Id.* at 150.

⁷⁰⁷ Since the release of the *Thirteenth Report*, the Commission completed Auction 86, which offered 78 BRS licenses: 75 licenses covering various Basic Trading Areas (BTAs), including one partial BTA, and 3 licenses covering BRS service areas in the Gulf of Mexico. The Commission completed the auction on October 30, 2009. See “Auction of Broadband Radio Service Licenses Closes; Winning Bidders Announced for Auction 86,” *Public Notice*, 24 FCC Rcd 13572 (2009).

markets across the country.⁷⁰⁸

257. *AWS.* In 2006, the Commission auctioned a total of 90 megahertz of AWS spectrum. Since 2008, several licensees (*e.g.*, T-Mobile, MetroPCS, and Leap) have begun to deploy AWS services across the country.⁷⁰⁹ Several other major holders from the 2006 auction (*e.g.*, Verizon Wireless, AT&T, and SpectrumCo) have not yet announced deployment plans for this spectrum.

258. *700 MHz.* The auctions of 700 MHz spectrum in 2003 and 2008, combined with the completion of the Digital Television transition in June 2009, have made an additional 74 megahertz of spectrum available for mobile and fixed commercial services.⁷¹⁰ Of this total, 58 megahertz is paired spectrum with sufficient channel widths to support mobile broadband. Beginning in 2010, Verizon Wireless, AT&T, and other licensees of 700 MHz spectrum are expected to begin rolling out services for mobile broadband in this band.⁷¹¹

259. *Other Spectrum Bands.* Other spectrum bands that are potentially available for the provision of mobile voice and broadband services include spectrum in the Wireless Communications Service (WCS) in the 2.3 GHz band, the 1.4 GHz band, and the 1670-1675 MHz band,⁷¹² as well as MSS spectrum.⁷¹³ These bands are not discussed further here because, as yet, services offered in these bands do not impact competition in mobile wireless services.

⁷⁰⁸ See Section IV.B.1.a, Service Provider Technology Deployments, *supra*.

⁷⁰⁹ As mentioned in the *Thirteenth Report*, T-Mobile had launched HSPA service, using its AWS spectrum, in 13 major U.S. markets as of September 2008. As of August 2009, T-Mobile's HSPA network covered 121 million people in 176 cities, with anticipated coverage of 200 million people in an additional 100 cities by the end of 2009. MetroPCS has announced that it plans to begin deploying LTE beginning in the second half of 2010 using its AWS spectrum licenses. See Section IV.B.1.a, Service Provider Technology Deployments, *supra*.

⁷¹⁰ The 74 megahertz includes 4 megahertz of spectrum in the 700 MHz Guard Bands, which are not included in Table 24. Portions of the lower 700 MHz band were auctioned previously in Auctions 44, 49, and 60. See *Tenth Report*, 20 FCC Rcd at 15940, ¶ 80. The Digital Television transition ensured that the 700 MHz spectrum was cleared of broadcast use, and thus made available for commercial mobile services, no later than June 12, 2009.

⁷¹¹ See Section IV.B.1.a, Service Provider Technology Deployments, *supra*, for a discussion of technological deployments in recently-licensed mobile wireless frequency bands.

⁷¹² See Appendix A for additional discussion of WCS, the 1.4 GHz band, and the 1670-1675 MHz band.

⁷¹³ See Section III.B.4, Mobile Satellite Service Providers, *supra*, for a discussion of MSS.

Table 24
Flexible Use Spectrum Usable for Mobile Wireless Services⁷¹⁴

Spectrum Band	Megahertz (Rounded)
Cellular	50
SMR*	19
Broadband PCS	120
AWS-1	90
700 MHz	70
BRS/EBS**	194
WCS	20
1.4 and 1.6 GHz	13
1910-15/1990-95 MHz***	10

* Includes post-800 MHz Band Reconfiguration ESMR spectrum at 817-824 MHz and 862-869 MHz.

**BRS/EBS spectrum is calculated based on the post-transition band plan described in 47 C.F.R. §27.5(i)(2). EBS licenses must be held by educational institutions; however, EBS licensees can lease a significant portion of their spectrum to commercial operators.

*** Held by Sprint Nextel as a result of the 800 MHz Band Reconfiguration.

(ii) Facilitating Access to Spectrum Among Multiple Providers

260. In addition to increasing the availability of commercial mobile wireless spectrum, the Commission has had different policies relating to service and technical rules, licensing and assignment, and spectrum aggregation that have affected market entry. We discuss here several prominent Commission policies that have affected spectrum holdings over the past two decades.

261. *Flexible Use Policies.* Initially, the Commission's rules restricted the use of cellular spectrum to analog service. More recently, the Commission has adopted a general policy of providing licensees with significant flexibility to decide which services to offer and what technologies to deploy on spectrum used for the provision of mobile wireless services. For example, licensees have the flexibility to deploy next-generation wireless technologies that allow them to offer high-speed mobile data services using their existing spectrum.⁷¹⁵

262. *Spectrum Aggregation.* The Commission has adopted different policies through the years with regard to aggregation of commercial mobile spectrum. As mentioned above, when first licensing 50 megahertz of Cellular spectrum, the Commission required that two different Cellular licensees serve each local market in order to promote competition between mobile telephony providers. In 1994, as the Commission prepared to make an additional 120 megahertz of spectrum available through broadband PCS auctions, it adopted a CMRS spectrum cap as a means to preserve competitive opportunities in the mobile communications marketplace, retain incentives for innovation, and promote the efficient use of spectrum.⁷¹⁶ Under these CMRS spectrum aggregation limits, which were modified in 1999, no entity could control more than 45 megahertz of Cellular, SMR, and broadband PCS spectrum (which altogether

⁷¹⁴ This table only includes the terrestrial, flexible use frequency bands discussed in this section of the *Report*.

⁷¹⁵ 47 C.F.R. § 24.3.

⁷¹⁶ Implementation of Sections 3(n) and 332 of the Communications Act, *Third Report and Order*, 9 FCC Rcd 7988, 7999, 8100-8110, ¶¶ 16, 238-265 (1994) (*CMRS Third Report and Order*). In adopting spectrum aggregation limits, the Commission was "recognizing the possibility that mobile service licensees might exert undue market power or inhibit market entry by other service providers if permitted to aggregate large amounts of spectrum." *Id.* at 8100 ¶ 239. It stated that if firms were to aggregate sufficient amounts of spectrum, it is possible that they could unilaterally or in combination exclude efficient competitors, reduce the quality of service available to the public, and increase prices to the detriment of consumers. *Id.* at 8104 ¶ 248.

totaled approximately 190 megahertz) in any given cellular market.⁷¹⁷ The Commission eliminated the spectrum cap beginning in 2003, moving instead to a case-by-case market analysis of proposed merger transactions to address potential competitive concerns if providers sought to aggregate their spectrum holdings in particular markets.⁷¹⁸

263. *Spectrum Screen.* In 2004, the Commission adopted a “spectrum screen” to assist in its analysis of potential competitive concerns raised by transactions in which providers were aggregating spectrum. This screen identified particular markets in which the spectrum aggregation exceeded a pre-determined amount of spectrum, set at approximately one-third of the critical spectrum input.⁷¹⁹ In those markets, the Commission conducted further analysis to determine whether sufficient spectrum capacity would be available to other providers to compete effectively; in markets where this would not be the case, the Commission required divestiture of spectrum.⁷²⁰ As additional spectrum has become available in recent years, the Commission has continued to revise its policies for analyzing spectrum aggregation, including modifications to its spectrum screen, as it seeks to ensure competition in the provision of mobile wireless services.⁷²¹

264. *Secondary Market Transactions and Spectrum Leasing.* The Commission also has adopted secondary market policies to facilitate spectrum access. Subject to the Commission’s approval, which includes review of spectrum aggregation for potential competitive harm, licensees may buy and sell licenses, in whole or in part (through partitioning and/or disaggregation), on the secondary market. In 2003, as part of its secondary market policies, the Commission adopted rules to permit mobile wireless licensees to lease all or a portion of their spectrum usage rights for any length of time within the license term, and over any geographic area encompassed by the license.⁷²² Further, the Commission’s secondary markets policies also allow licensees to enter into “dynamic” leasing arrangements, where the licensee and spectrum lessee can share use of the same spectrum through the use of cognitive radio technologies.⁷²³ The Commission’s secondary market policies allow existing licensees to obtain

⁷¹⁷ *CMRS Third Report and Order*, 9 FCC Rcd at 8105-8110, ¶¶ 252-265. See also 1998 Biennial Regulatory Review, Spectrum Aggregation Limits for Wireless Telecommunications Carriers, WT Docket No. 98-205, *Report and Order*, 15 FCC Rcd 9219, 9254-57 ¶¶ 80-84 (2000). The CMRS spectrum cap only covered services that had spectrum of 5 megahertz or more (thus excluding narrowband CMRS) in order to ensure that providers using the spectrum could compete with one another. *CMRS Third Report and Order*, 9 FCC Rcd at 8105 ¶ 252. For the purposes of calculating spectrum holdings under the CMRS cap, the Commission counted SMR spectrum as 10 megahertz. *Id.* at 8113-14 ¶ 275. In 1999, the Commission raised the CMRS spectrum cap to 55 megahertz in rural market areas (RSAs). Biennial Regulatory Review, Spectrum Aggregation Limits for Wireless Telecommunications Carriers, *Report and Order*, 15 FCC Rcd 9219, 9256-57 (1999).

⁷¹⁸ See 2000 Biennial Regulatory Review – Spectrum Aggregation Limits for Commercial Mobile Radio Services, WT Docket No. 01-14, *Report and Order*, 16 FCC Rcd 22668, 22669-71 ¶¶ 2-6 (2001) (*Second Biennial Review Order*). The Commission also raised the spectrum cap to 55 megahertz in all markets during the sunset period. *Id.* at 22671 ¶ 6.

⁷¹⁹ Applications of AT&T Wireless Services, Inc. and Cingular Wireless Corporation For Consent to Transfer Control of Licenses and Authorizations, *Memorandum Opinion and Order*, 19 FCC Rcd 21522, 21568-69 ¶ 109 (2004).

⁷²⁰ *Id.* at 21620-21, ¶ 255.

⁷²¹ See, e.g., *AT&T-Dobson Order*, 22 FCC Rcd at 20311, ¶¶ 26-30; *Verizon Wireless-ALLTEL Order*, 23 FCC Rcd at 17473, ¶ 53; *Sprint Nextel-Clearwire Order*, 23 FCC Rcd at 17591, ¶ 53.

⁷²² *Ninth Report*, 19 FCC Rcd at 20631, ¶ 84.

⁷²³ Promoting Efficient use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets, WT Docket No. 00-230, *Second Report and Order, Order on Reconsideration, and Second Further Notice of proposed Rulemaking*, 19 FCC Rcd 17503, 17547-49 ¶¶ 87-90 (2004) (*Secondary Markets Second R&O*); Service Rules for the 698-746, 747-762 and 777-792 MHz Bands; Implementing a Nationwide, Broadband, Interoperable (continued....)

additional spectrum capacity and expand their coverage areas to better meet the needs of their customers, while also providing new entrants with additional opportunities to access to spectrum so that they can compete.

b. Analysis of Spectrum Holdings Overall

265. Because spectrum is a key input to the provision of mobile wireless service, the different spectrum holdings of major providers potentially affect their ability to compete. These spectrum holdings include licenses obtained when the spectrum was first licensed for mobile services, such as through the original Cellular assignments or through the auction process (*e.g.*, PCS, AWS, or 700 MHz spectrum), as well as spectrum obtained through various secondary market transactions. As the tables and charts below illustrate, several wireless providers hold significant amounts of spectrum that is usually considered viable for mobile service.⁷²⁴

266. Verizon Wireless and AT&T each hold significant amounts of 700 MHz, Cellular, broadband PCS, and AWS spectrum. Sprint Nextel holds SMR spectrum, acquired through its merger with Nextel in 2005, as well as substantial holdings of PCS licenses. T-Mobile's spectrum holdings are in both the PCS and AWS bands.⁷²⁵ Regional provider US Cellular holds Cellular, PCS, and AWS licenses, while MetroPCS and Leap chiefly hold PCS and AWS spectrum. Unlike the rest, Clearwire, which is affiliated with Sprint Nextel,⁷²⁶ has holdings in the 2.5 GHz band, where it holds the predominant amount of BRS spectrum, and has access to much EBS spectrum through leasing arrangements. Finally, as the charts below reveal, smaller providers also hold Cellular, 700 MHz, PCS, and AWS licenses in parts of the United States.

267. Table 25 reveals that five providers together – Verizon Wireless, AT&T, T-Mobile, as well as Sprint Nextel and Clearwire – hold more than 80 percent of all of the spectrum, measured on a MHz-POPs basis, that is suitable for the provision of mobile wireless services. Table 26 shows megahertz holdings for each provider, weighted by population. Finally, Chart 40 is a graph of providers' spectrum holdings by frequency band, measured on a MHz-POPs basis.

(Continued from previous page) _____

Public Safety Network in the 700 MHz Band, WT Docket Nos. 06-150, PS Docket No. 06-229, *Second Report and Order*, 22 FCC Rcd 15289, 15374-80 ¶¶ 231-248 (2007).

⁷²⁴ See *infra* Tables 25-26 and Charts 40-41. The data in these tables and charts generally reflect transactions through 2009. They include the AT&T/Centennial transaction as well as the divestitures required as part of the Verizon Wireless-Alltel transaction. With respect to the Verizon Wireless-Alltel divestitures, licenses that were divested have been included in the "Other" category.

⁷²⁵ T-Mobile holds a very small amount of spectrum below 1 GHz.

⁷²⁶ See Section III.E.1, Entry, *supra*.

Table 25
Percentage Spectrum Holdings, Measured on a MHz-POPs Basis
by Provider, by Frequency Band*
(Providers Listed by Number of Subscribers as of 2Q 2009)

Licensee	700 MHz	Cellular (850 MHz)	SMR (800/900 MHz)	PCS (1.9 GHz)	AWS (1.7/2.1 GHz)	BRS (2.5 GHz)	EBS Leases (2.5 GHz)
Verizon Wireless	42.7%	48.5%	0.0%	15.4%	15.0%	0.0%	0.0%
AT&T	24.3%	42.3%	0.0%	25.9%	11.2%	0.0%	0.0%
Sprint Nextel	0.0%	0.0%	93.0%*	26.8%	0.0%	0.0%	0.0%
T-Mobile	0.0%	0.0%**	0.0%	19.7%	27.5%	0.0%	0.0%
MetroPCS	0.5%	0.0%	0.0%	2.6%	5.9%	0.0%	0.0%
US Cellular	2.7%	4.3%	0.0%	1.8%	2.0%	0.0%	0.0%
Leap	0.0%	0.0%	0.0%	2.3%	8.8%	0.0%	0.0%
Other	29.8%	4.9%	7.0%*	5.5%	29.6%	13.7%*	38.0%*
Clearwire	0.0%	0.0%	0.0%	0.0%	0.0%	86.3%*	62.0%*
Grand Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

* These are estimates based on the available data.

** T-Mobile holds a very small amount of Cellular spectrum.

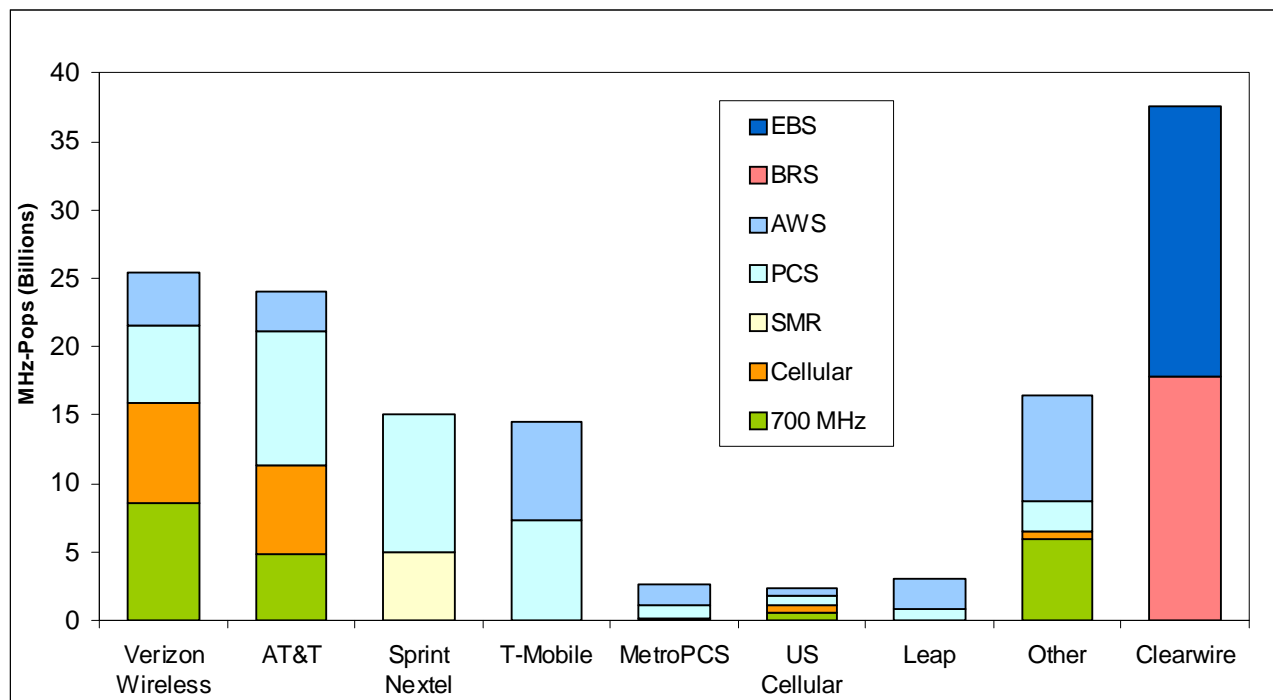
Table 26
Population-Weighted Average Megahertz Holdings*
by Provider, by Frequency Band
(Providers Listed by Number of Subscribers as of 2Q 2009)

Licensee	700 MHz	Cellular	SMR	PCS	AWS	BRS	EBS
Verizon Wireless	29.9	24.3	0.0	20.0	13.5	0.0	0.0
AT&T	17.0	21.2	0.0	33.7	10.1	0.0	0.0
Sprint Nextel	0.0	0.0	17.7	34.8	0.0	0.0	0.0
T-Mobile	0.0	0.0**	0.0	25.6	24.8	0.0	0.0
MetroPCS	0.4	0.0	0.0	3.4	5.3	0.0	0.0
US Cellular	1.9	2.2	0.0	2.3	1.8	0.0	0.0
Leap	0.0	0.0	0.0	3.0	7.9	0.0	0.0
Other	20.9	2.5	1.3	7.2	26.6	10.1	42.8
Clearwire	0.0	0.0	0.0	0.0	0.0	63.4	69.8

* Weighted average megahertz is the sum of the provider's MHz-POPs, divided by the U.S. population.

** T-Mobile holds a very small amount of Cellular spectrum.

Chart 40
Mobile Wireless Provider Spectrum Holdings by Band
Weighted by Population



c. Analysis of Spectrum Holdings by Spectrum Characteristics

268. In addition to considering the quantity of spectrum to which providers have access, we also consider the characteristics of particular spectrum that is available for licensing and assignment. Two licensees may hold equal quantities of bandwidth but nevertheless hold very different spectrum assets. As discussed below, it has long been recognized that spectrum resources in different frequency bands can have widely disparate technical characteristics. In particular, in the United States, there are frequency bands suitable for mobile broadband services at very different frequencies: the 700 MHz and Cellular (850 MHz) bands fall below 1 GHz,⁷²⁷ and the AWS, PCS, and BRS/EBS bands – at around 2 and 2.5 GHz – are well above 1 GHz. The different propagation characteristics of these bands impact how they can be used to deliver mobile services to consumers. Bidders in recent auctions in the United States also appear to have recognized these differences, which helps explain the significantly different prices per MHz-POP in the AWS-1 and 700 MHz auctions. There may be important complementarities associated with a provider having access to spectrum in both the lower and higher frequency bands. Not only has the Commission recognized these differences in past proceedings, but regulators in other countries have also adopted policies taking these differences into account as additional spectrum becomes available.

269. Lower frequency bands – such as the 700 MHz and Cellular bands – possess more

⁷²⁷ Although SMR spectrum also falls below 1 GHz, broadband operations using this spectrum have not been shown to be viable pending completion of 800 MHz rebanding, as noted in the National Broadband Plan, given the interference protection provided to neighboring public safety operations per 47 CFR § 90.672. *See* National Broadband Plan, Chapter 5 n. 63. In addition, the commercial SMR spectrum in the 900 MHz band currently is interleaved with Business/Industrial/Land Transportation services, and thus is best suited for narrowband deployments.

favorable intrinsic spectrum propagation characteristics than spectrum in higher bands.⁷²⁸ “Low-band” spectrum can provide superior coverage over larger geographic areas, through adverse climate and terrain, and inside buildings and vehicles. As the Commission has noted in the 700 MHz band proceeding, this lower frequency spectrum had “excellent propagation” characteristics that, in contrast to higher frequency bands such as PCS and AWS spectrum, “make it ideal for delivering advanced wireless services to rural areas.”⁷²⁹ Several commenters in this and related proceedings also have noted the advantages of lower frequency spectrum for coverage and penetration.⁷³⁰ In its consideration of mobile wireless competition issues, DOJ has noted the differences between the use of lower and higher frequency bands.⁷³¹ Regulators in other countries also have recognized the distinctive characteristics between lower and higher frequency bands. As lower frequency spectrum is becoming available for mobile services in other countries, some regulators are adopting policies intended to help facilitate the wider distribution of this newly available spectrum.⁷³² Low-band spectrum is sometimes referred to as “beachfront” spectrum given its superior propagation features.⁷³³

⁷²⁸ See, e.g., Service Rules for the 698-746, 747-762, and 777-792 MHz Bands, WT Docket No. 06-150, 22 FCC Rcd 15289, 15349 ¶ 158, 15354-55 ¶ 176, 15400-401 ¶ 304 (2007) (*700 MHz Band Second R&O*) (recognizing the excellent propagation characteristics of 700 MHz band spectrum); *White Spaces Report and Order*, 23 FCC Rcd at 16807, 16820-21 ¶ 32 (propagation characteristics of the TV bands enable service at greater ranges than in the 2.4GHz band).

⁷²⁹ See, e.g., *700 MHz Band Second R&O*, 22 FCC Rcd at 15349, ¶ 158.

⁷³⁰ See, e.g., NTELOS comments at 9 (Cellular and 700 MHz licenses are the “optimum spectrum ranges for delivering mobile services”); Letter from Kathleen O’Brien Ham, T-Mobile, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 09-66 (filed Nov. 25, 2009) (*T-Mobile Nov. 25, 2009 Ex Parte Letter*), Attachment at 8-9; Letter from Kathleen O’Brien Ham, T-Mobile, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 09-66 (filed Apr. 26, 2010) (*T-Mobile Apr. 26, 2010 Ex Parte Letter*); Letter from Tamara Preiss, Verizon Wireless, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 09-66 (filed May 12, 2010) (*Verizon Wireless May 12, 2010 Ex Parte Letter*), at 2; Comcast Comments, GN Docket No. 09-157 (filed Sept. 30, 2009), at 9-12.

⁷³¹ See *United States of America et al. v. Verizon Communications Inc. and ALLTEL Corporation*, Competitive Impact Statement, Case No. 08-cv-1878, at 5-6 (filed Oct. 30, 2008), available at <http://www.justice.gov/atr/cases/f238900/238947.pdf> (“... because of the characteristics of PCS spectrum, providers holding this type of spectrum generally have found it less attractive to build out in rural areas.”); *United States of America v. AT&T Inc. and Dobson Communications Corporation*, Competitive Impact Statement, Case No. 1:07-cv-01952, at 5, 11, 13 (filed Oct. 30, 2007), available at <http://www.justice.gov/atr/cases/f227300/227309.pdf> (“... the propagation characteristics of [1900 MHz PCS] spectrum are such that signals extend to a significantly smaller area than do 800 MHz cellular signals. The relatively higher cost of building out 1900 MHz spectrum, combined with the relatively low population density of the areas in question, make it unlikely that competitors with 1900 MHz spectrum will build out their networks to reach the entire area served by” the two 800 MHz Cellular providers).

⁷³² For instance, in its auction of mobile spectrum that began in April of 2010, Germany has placed restrictions on the amount of sub-1GHz spectrum (in the 800 MHz band) that any mobile service provider could obtain, depending on how much sub-1 GHz spectrum a particular mobile provider already holds. See *Decision of the President’s Chamber of the Federal Network Agency for Electricity, Gas, Telecommunications, Post, and Railway*, Oct. 16, 2009, at 6, 9 available at http://www.bundesnetzagentur.de/cae/servlet/contentblob/138364/publicationFile/3682/DecisionPresidentChamberTenor_ID17495pdf.pdf. In March 2010, the United Kingdom (UK) Government similarly proposed a spectrum cap for the upcoming auction of sub-1 GHz spectrum (in the 800 MHz band). Draft Statutory Instruments, The Wireless Telegraphy Act 2006 (Directions to OFCOM), Mar. 2010, at 5, available at http://www.opsi.gov.uk/si/si2010/draft/pdf/ukdsi_9780111497319_en.pdf. The UK Government also proposed that there be a spectrum cap on total mobile services spectrum that any provider could hold.

⁷³³ See, e.g., *T-Mobile April 26, 2010 Ex Parte Letter* (stating that lower band spectrum is widely considered “beachfront” spectrum because of its propagation characteristics).

270. Low-band spectrum can enable the same level of service, at a lower cost, than higher-frequency bands, such as the 1.9 GHz PCS band, the 1.7/2.1 GHz AWS band, and the 2.5 GHz BRS/EBS band.⁷³⁴ A licensee that exclusively or primarily holds spectrum in a higher frequency range generally must construct more cell sites (at additional cost) than a licensee with primary holdings at a lower frequency in order to provide equivalent service coverage, particularly in rural areas.⁷³⁵ The National Institute of Standards and Technology (NIST) developed a propagation model comparing the 700 MHz, 1.9 GHz, and 2.4 GHz spectrum bands. It concluded that the favorable propagation characteristics meant that coverage using the same transmission power differed significantly, translating into the need for less infrastructure: while it required nine cells at 2.4 GHz and four cells at 1.9 GHz to span 100 meters squared, it was projected to require only one cell at 700 MHz.⁷³⁶ Similarly, an analysis using the Okumura-Hata model shows that rural, suburban, and urban cell sizes at 700 MHz are more than three times larger than cells in the PCS band.⁷³⁷

271. The higher value that many providers have placed on low-band spectrum with respect to the provision of mobile service – especially mobile broadband service – is demonstrated by a comparison of market valuations. The recent auctions of AWS and 700 MHz spectrum (Auctions 66 and 73, respectively) provide a basis for comparison, as both auctions involved large quantities of paired spectrum in a relatively close timeframe. In the 2008 auction of 700 MHz spectrum, the average price for the 700 MHz spectrum was \$1.28 per MHz-pop.⁷³⁸ This unit price was more than twice the average price of \$0.54 per MHz-pop for AWS spectrum auctioned in 2006.⁷³⁹

272. Conversely, higher-frequency spectrum may be particularly effective for providing significant capacity, or increasing capacity, within a smaller geographic area.⁷⁴⁰ In certain situations, higher frequency bands can achieve greater improvements in capacity. For instance, capacity

⁷³⁴ See, e.g., *T-Mobile Nov. 25, 2009 Ex Parte Letter*, Attachment at 8-9 (a network built using lower frequencies requires many fewer cell sites for the same coverage using higher frequencies). See also, *Morgan Stanley Mobile Internet Report*, at 313-314 (lower spectrum allocations, such as 700 MHz spectrum, help lower capital expenditures by broadening reach); John Stankey, President and CEO, AT&T Operations, Inc., January 28, 2010 (Q4 2010 Earnings Call) (noting that 850 MHz Cellular spectrum is “very high quality with terrific propagation characteristics. It is very effective penetrating buildings...As customers make the shift to more data-intensive devices, we think this is important for the perceived quality of their overall experience”).

⁷³⁵ While propagation characteristics are important with regard to coverage in urban areas, especially in-building coverage, site spacing in these areas can also be driven by the need for capacity. AT&T, for instance, notes that it cannot be assumed that lower frequency bands will require fewer cells or be more economical to deploy because other factors also affect propagation – including the presence of large buildings in urban areas or other physical impediments. It states that “in areas that are capacity limited, there is likely to be no difference in the number of cells required at 700 MHz vs. 2.5 GHz.” AT&T NOI Comments at 81-83.

⁷³⁶ NIST, *700 MHz Band Channel Propagation Model*, <http://www.nist.gov/itl/anttd/emntg/700mhz.cfm> (visited Apr. 29, 2010). See *T-Mobile Apr. 26, 2010 Ex Parte Letter* (stating that lower band spectrum is widely considered “beachfront” spectrum because of its propagation characteristics, and citing the NIST model).

⁷³⁷ Okumura-Hata is a widely used RF propagation. See John S. Seybold, *Introduction to RF Propagation*, Wiley-Interscience, 2005.

⁷³⁸ See generally FCC, *Auction 73 – 700 MHz Band*, http://wireless.fcc.gov/auctions/default.htm?job=auction_summary&id=73.

⁷³⁹ See generally FCC, *Auction 66 – Advanced Wireless Services*, http://wireless.fcc.gov/auctions/default.htm?job=auction_summary&id=66.

⁷⁴⁰ *Verizon Wireless May 12, 2010 Ex Parte Letter* at 2-3. See also Letter from Jeanine Poltronieri, AT&T, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 09-66 (filed May 6, 2010) (*AT&T May 13, 2010 Ex Parte Letter*) at 2-3.

enhancement technologies such as MIMO may perform better at higher frequencies.⁷⁴¹ In addition, while spectral efficiency is the same for all spectrum bands when using a given technology (and bandwidth),⁷⁴² there currently is significantly more spectrum above 1 GHz that is potentially available for use (as shown by Table 24, above). Further, in many parts of these higher bands, spectrum is licensed in larger contiguous blocks,⁷⁴³ which can enable operators to deploy wider channels and simplify device design. Thus higher-frequency spectrum can be ideally suited for providing high capacity where it is needed, such as in high-traffic urban areas.⁷⁴⁴

273. Some analysts also have observed that there can be important complementarities that come with holding spectrum assets in different frequency bands, noting that combination of sub-1 GHz and higher frequency spectrum may be optimal. For example, low frequency spectrum can be deployed ubiquitously with relatively few cell sites, providing a base layer of coverage that extends to wide areas in rural America as well as deep into buildings in urban areas. However, in urban areas where traffic concentration is high, this base coverage layer may be complemented with a capacity layer using high frequency spectrum.⁷⁴⁵ In this sense, higher-frequency spectrum is made more valuable by being combined with lower-frequency spectrum, and vice versa. Given these different spectrum characteristics, a licensee's particular mix of spectrum holdings may affect its ability to provide efficient mobile wireless services.

274. *Spectrum Holdings Below 1 GHz.* Three nationwide providers – Verizon Wireless, AT&T, and Sprint Nextel – hold licenses for CMRS/mobile broadband spectrum below 1 GHz, as do regional providers, such as US Cellular and Cellular South, MetroPCS, and several smaller companies, many of which have holdings in more rural areas of the country. T-Mobile, the fourth nationwide provider, has very few spectrum licenses below 1 GHz.

275. Of the sub-1 GHz spectrum, Verizon Wireless and AT&T each hold a significant amount of the Cellular and 700 MHz spectrum, while Sprint Nextel holds the majority of SMR spectrum (see Table 25). Specifically, when measured on a licensed MHz-POP basis, Verizon Wireless holds 48.5 percent of the Cellular spectrum and 42.7 percent of the 700 MHz spectrum, and AT&T holds 42.3 percent of the Cellular spectrum and 24.3 percent of the 700 MHz band spectrum. Adding these two bands together, Verizon Wireless holds 45 percent of the licensed MHz-POPs of the combined Cellular and 700 MHz band spectrum, AT&T holds 33 percent, and US Cellular holds approximately 5 percent. Several other, smaller providers' combined holdings total less than four percent of the Cellular but nearly a third of the 700 MHz spectrum. Meanwhile, Sprint Nextel holds nearly all of the SMR spectrum.

276. As discussed in previous reports, providers have been utilizing Cellular spectrum for mobile voice and data services for many years, using CDMA-based and GSM-based technologies (which continue to evolve), while providers have been utilizing SMR spectrum to offer mobile voice and data services using iDEN-based technologies. In recent years, providers have been upgrading their Cellular-based networks from 2G and 2.5G technologies to 3G technologies in most markets across the United States. As discussed earlier, SMR spectrum generally is not as suitable for broadband operations.⁷⁴⁶ Deployment of networks in the 700 MHz unpaired spectrum blocks have generally be limited, to date, to

⁷⁴¹ *Verizon Wireless May 12, 2010 Ex Parte Letter* at 3; *AT&T May 13, 2010 Ex Parte Letter* at 3.

⁷⁴² *AT&T May 13, 2010 Ex Parte Letter* at 2.

⁷⁴³ *Id.* at 3.

⁷⁴⁴ See Alan Hadden, *Mobile Broadband — Where The Next Generation Leads Us*, Global Mobile Suppliers Association, Dec. 2009, available at http://www.gsacom.com/downloads/pdf/GSA_IEEE_articles1209.php4.

⁷⁴⁵ *Id.* (“A combination of higher spectrum (e.g., 1.8 GHz, 2.1 GHz, 2.6 GHz) for the capacity layer, and sub-1 GHz spectrum for improved coverage in rural areas and for urban in-building, is considered optimal”).

⁷⁴⁶ See Para 254, *supra*.

mobile multichannel one-way video programming services.⁷⁴⁷ Verizon Wireless and AT&T have announced plans to deploy 4G broadband networks in the 700 MHz paired spectrum blocks in the coming years.⁷⁴⁸

277. *Spectrum Holdings Above 1 GHz.* All four nationwide providers hold spectrum above 1 GHz. Verizon Wireless, AT&T, and T-Mobile each hold a substantial number of PCS and AWS licenses, while Sprint Nextel holds significant amounts of PCS spectrum. Of the PCS and AWS spectrum held by nationwide providers, again based on MHz-POPs, Verizon Wireless holds approximately 15.3 percent of the PCS and 15 percent of the AWS spectrum, AT&T holds around 25.9 percent of the PCS and 11.2 percent of the AWS spectrum, Sprint Nextel approximately 26.8 percent of the PCS and none of the AWS, and T-Mobile approximately 19.7 percent of the PCS and nearly 28 percent of the AWS. US Cellular, MetroPCS, and Leap each hold some PCS and a somewhat higher percentage of the more recently auctioned AWS spectrum. Finally, other smaller providers hold approximately 5.5 percent of the PCS spectrum and nearly 30 percent of the AWS spectrum. Each of the nationwide providers, along with many others, offers mobile broadband and data services on 3G networks using some of this spectrum. MetroPCS also has announced plans to deploy 4G services using its AWS spectrum.⁷⁴⁹

278. Finally, as noted above, Clearwire holds substantial amounts of 2.5 GHz spectrum, comprised of BRS and EBS spectrum. It has been offering 4G broadband data services, using WiMAX technology, in markets across the country. None of the nationwide providers hold BRS/EBS spectrum, although Sprint Nextel has a majority ownership interest in Clearwire. Several smaller providers, including Xanadoo and Digital Bridge, are, like Clearwire, deploying WiMAX in their BRS and EBS spectrum holdings.⁷⁵⁰

279. *Relative Distribution of Spectrum Holdings Below and Above 1 GHz.* Chart 41 shows the spectrum holdings of nationwide wireless providers by frequency – licensees’ holdings under 1 GHz versus licensees’ holdings above 1 GHz. It provides a side-by-side comparison of each licensee’s holdings, in terms of total population-weighted average megahertz under 1 GHz and above 1 GHz.

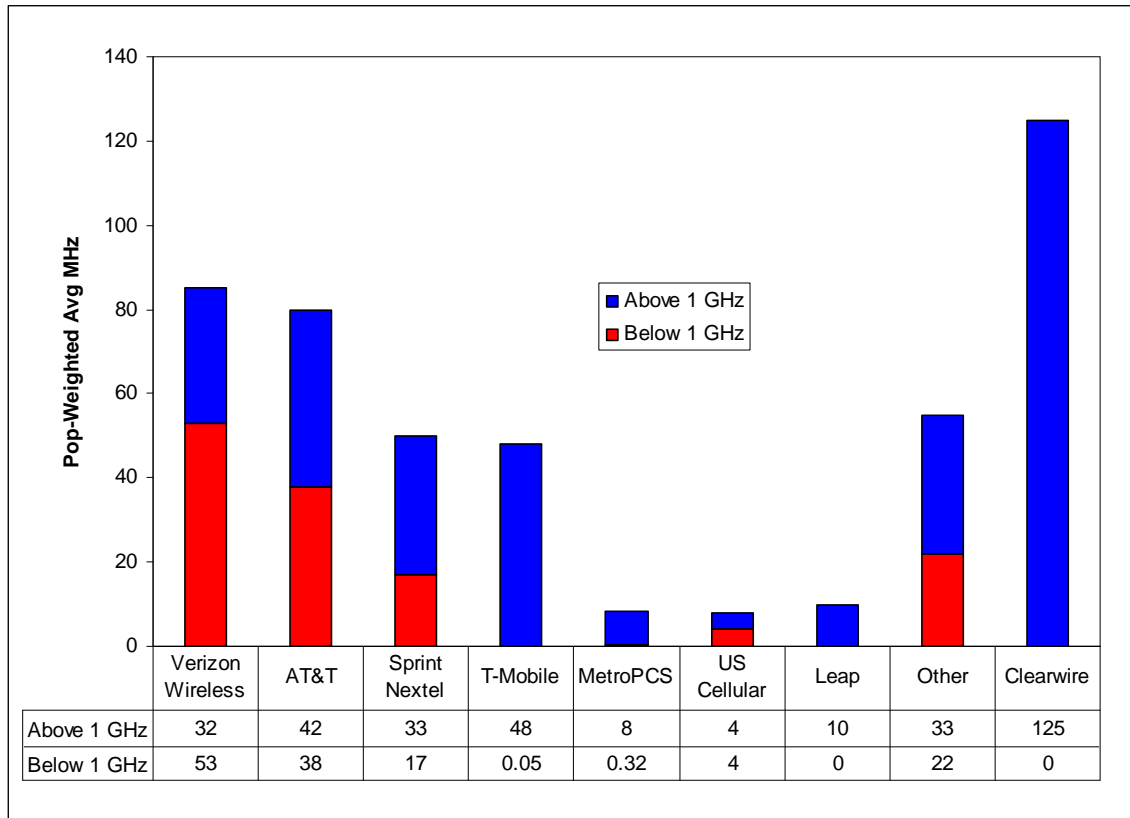
⁷⁴⁷ See, e.g., MediaFLO, *Enabling the Wireless Ecosystem*, http://www.mediaflo.com/about_us.html (visited Apr. 29, 2010).

⁷⁴⁸ See Section IV.B.1.a, Service Provider Technology Deployments, *supra*.

⁷⁴⁹ *Id.*

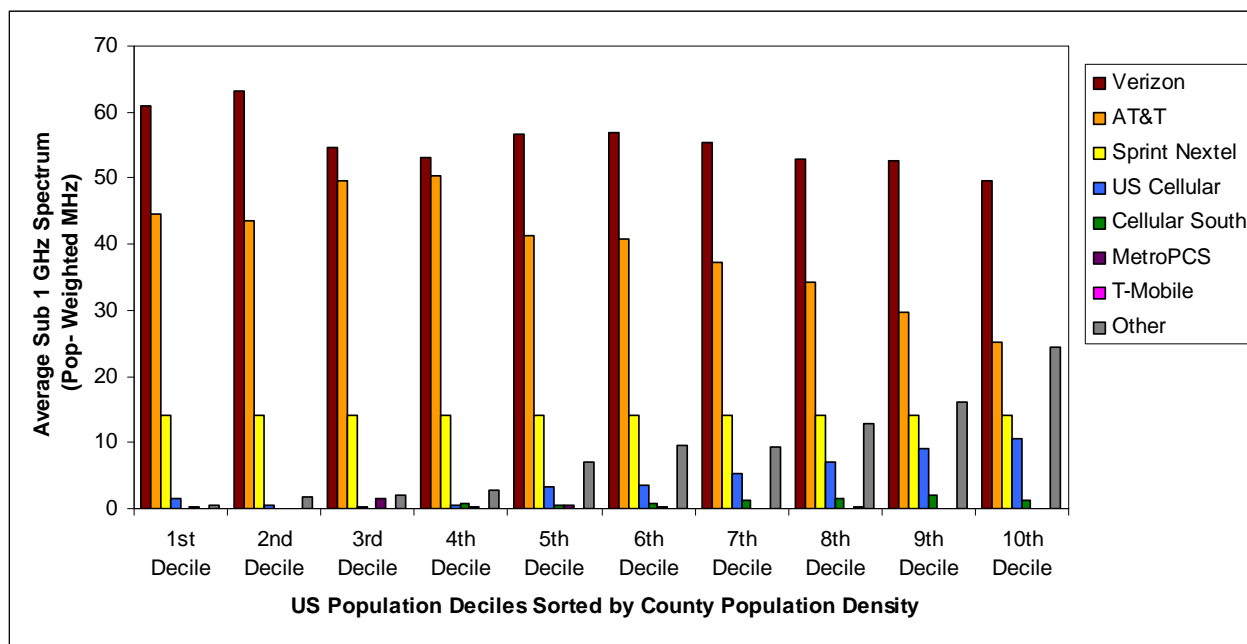
⁷⁵⁰ Digital Bridge Communications, *About DBC: Bringing Broadband to Underserved or Rural Communities Nationwide*, <http://www.digitalbridgecommunications.com/AboutDBC/tabid/84/Default.aspx> (visited Apr. 29, 2010); Xanadoo Company, *About Xanadoo*, <http://www.xanadoo.com/about.html> (visited Apr. 29, 2010).

Chart 41
Population-Weighted Average Megahertz Under/Over 1 GHz (Licensed Spectrum Only)



280. *Distribution of Spectrum by Population Density.* Chart 42 below shows how spectrum is nationally distributed by population density. Generally, as the population density decreases, the sub-1 GHz spectrum holdings of the large providers decrease, and those of regional and smaller companies increase.

Chart 42
Average Sub-1GHz Spectrum by Population Density Deciles



d. Competitive Effects of Spectrum Holdings

281. The Commission’s competition policies with respect to spectrum holdings have been designed to preserve competitive opportunities in the mobile wireless marketplace and retain incentives for efficiency and innovation. Its policies have evolved over the years as more and more spectrum has been made available for mobile services. These policies have also changed as the marketplace changes and technology evolves.

282. The mobile CMRS marketplace for mobile telephone services in 1995, when the *First Report* was issued, was very different from today’s marketplace. Until 2007, the Commission’s competition policies concerning the spectrum input market for mobile services focused on spectrum associated with three frequency bands – Cellular, SMR, and broadband PCS. These were the specific frequency bands that, until that time, the Commission had determined to be spectrum “suitable” for the provision of mobile services in the relevant product market, which the Commission had defined as the product market for “mobile telephony” services.⁷⁵¹ For purposes of its competitive analysis, the Commission has evaluated whether particular spectrum bands are “suitable” for mobile wireless services by determining whether the spectrum is capable of supporting mobile services given its physical properties and the state of the equipment technology, whether the spectrum is licensed with a mobile allocation and corresponding service rules, and whether the spectrum is committed to another use that effectively precludes its uses for mobile telephony.⁷⁵² Since the Commission first began applying a “spectrum screen” as part of its competitive analysis, the Commission has determined that additional spectrum should be part of its spectrum input analysis – including 700 MHz,⁷⁵³ AWS, and BRS

⁷⁵¹ See *AT&T-Dobson Order*, 22 FCC Rcd at 20311-312 ¶¶ 26-27 (2007).

⁷⁵² *Id.* at ¶ 26.

⁷⁵³ *Id.* at ¶ 31.

spectrum⁷⁵⁴ – and has continued to modify the spectrum screen as more spectrum has become available.⁷⁵⁵ The Commission also has recognized that the mobile services marketplace – including the product market – has evolved. In 2008, the Commission revised its competition policies, no longer limiting its competitive analysis to examination of the mobile telephony product market. Given the increasing prevalence of mobile broadband services, the Commission began examining a combined product market for both mobile telephony services and mobile broadband services.⁷⁵⁶

283. As discussed above, spectrum resources in different frequency bands have distinguishing features that can make some frequency bands more valuable or better suited for particular purposes. For instance, given the superior propagation characteristics of spectrum under 1 GHz, particularly for providing coverage in rural areas and for penetrating buildings, providers whose spectrum assets include a greater amount of spectrum below 1 GHz spectrum may possess certain competitive advantages for providing robust coverage when compared to licensees whose portfolio is exclusively or primarily comprised of higher frequency spectrum. As discussed above, holding a mix of frequency ranges may be optimal from the perspective of providing the greatest service quality at low cost.

2. Infrastructure Facilities

a. Background

284. Infrastructure facilities are a major input into the provision of mobile wireless service. These facilities are comprised largely of cellular base stations and towers or other structures on which the base stations are situated. A base station generally consists of radio transceivers, antennas, coaxial cable, a regular and backup power supply, and other associated electronics. These base stations are generally placed atop a purpose-built communications tower, or on a tall building, water tower, or other structure providing sufficient height above the surrounding area.⁷⁵⁷ The number of cell sites in use by wireless providers continues to grow in order to satisfy the increased demand created by new subscribers, accommodate additional airtime usage per subscriber largely caused by increased use of data services including broadband wireless and mobile Internet, expand geographic service area coverage and to improve coverage in existing service areas, and accommodate newer technologies. According to CTIA, the total number of cell sites in use by CTIA's members was 245,912 as of June 30, 2009.⁷⁵⁸ This represents an increase in the number of cell sites of 1.6 percent since December 31, 2008, 41 percent since June 30, 2004, and 66.5 percent since June 30, 2003.⁷⁵⁹ According to company reports, 204,817 of these cell sites, or 83 percent, were associated with the four major wireless providers.⁷⁶⁰ For the four major wireless service providers, the percentage increase in the number of cell sites in use between the

⁷⁵⁴ *Sprint Nextel-Clearwire Order*, 23 FCC Rcd at 17596-17600, ¶¶ 61-73. As discussed above, in reviewing proposed merger transactions that involve spectrum aggregation, the Commission examines market participants' holdings of suitable spectrum to ensure that there is sufficient spectrum available to competitors.

⁷⁵⁵ *See id.*

⁷⁵⁶ *See id.* at 17596 ¶ 61; *Verizon Wireless-ALLTEL Order*, 23 FCC Rcd at 17469-470, ¶¶ 45-47.

⁷⁵⁷ An alternative to the use of tall structures for cell sites is distributed antenna systems (DAS). DAS are comprised of a relatively large network of small cells that are connected by fiber optic cable and can be placed on such locations as utility poles, buildings, or traffic signal poles, in geographic areas where either constructing towers is not feasible, or where wireless traffic demands are too great to be met with fewer, large cells. Because DAS sites are unobtrusive, they are particularly desirable in areas with stringent zoning regulations, such as historic districts. Two major providers of such networks are ADC Telecommunications (<http://www.adc.com/us/en/>), and NextG Networks (<http://www.nextgnetworks.net/>).

⁷⁵⁸ *See CTIA Mid-Year 2009 Wireless Indices Report*, at 28; CTIA NOI Comments at 34-35.

⁷⁵⁹ *Id.*

⁷⁶⁰ AT&T reported 51,470 cell sites, Sprint 66,250, T-Mobile 45,397, and Verizon Wireless 45,397, as of June 30, 2009. *US Wireless 411 3Q09*, at 50.

end of the September 2008 and the end of September 2009 has been as follows: AT&T (5.5 percent), Sprint Nextel (0.8 percent), T-Mobile (6.6 percent), and Verizon Wireless (39.5 percent).⁷⁶¹

b. Communications Tower Industry

285. The most visible cell sites are those that are situated on relatively tall communications towers. As noted above, cell sites may also be located on buildings, municipal water towers, and church steeples, and some cell sites are located inside buildings to fill indoor coverage gaps. In addition, cell sites may be located at the lower levels of taller towers built to support other communications services, such as broadcast or public safety. With the growth of cell sites required to meet the needs of wireless service providers and their subscribers, a communications tower industry has evolved. A typical communications tower can accommodate five to six tenants, though the industry average of wireless tenants per tower is currently approximately 2 to 2.5.⁷⁶² This industry includes companies that own large numbers of towers on which they lease space to wireless service providers. In addition, there are a number of companies that help wireless service providers identify available tower or building space in needed geographic areas or, alternatively, arrange to construct towers where no appropriate facilities exist. The five largest independent tower companies are American Tower Corporation (American Tower), Crown Castle International (Crown Castle), Global Tower Partners, SBA Communications (SBA), and TowerCo.⁷⁶³ Additionally, the major wireless service providers own or lease a large number of cell sites.⁷⁶⁴

286. Analyst reports about the communications tower industry indicate that the financial health of this industry is dependent to a large extent on the wireless service providers and whether or not they have the capital resources to expand service to new geographic areas or to enhance the quality of service in current service areas. Analysts seem to be optimistic that the expansion of new wireless providers, such as Clearwire, into new markets,⁷⁶⁵ together with the deployment of newer technologies by existing wireless service providers to, bodes well for growth of the tower industry. Clearwire is reportedly planning to deploy approximately 19,000 cell sites by the end of 2010, while Verizon Wireless indicates it will need to have in place a total of between 60,000 and 70,000 cell sites in order to accommodate its current needs and the deployment of its LTE network,⁷⁶⁶ a projected increase of between 18,000 and 28,000 cell sites from June 30, 2009.⁷⁶⁷ This growth potential, together with low churn – due to the high cost to wireless service providers of switching towers – and the annuity-like revenue stream from long-term leases, which include standard annual price escalators of 3-5 percent, contribute to a

⁷⁶¹ *US Wireless 411 3Q09*, at 50. The significant increase in the number of Verizon Wireless cell sites is due largely to its acquisition of Alltel in January 2009.

⁷⁶² *SBA Communications*, Bank of America/Merrill Lynch, Mar. 27, 2009, at 10.

⁷⁶³ The companies are listed in order of size based on the number of towers owned. American Tower is the largest and TowerCo is the fifth largest. American Tower, Crown Castle, and SBA Communications are public companies, while Global Tower and TowerCo are privately held. According to Verizon Wireless, no single tower company owns more than 21 percent of all towers nationwide. See Verizon Wireless NOI Comments at 102.

⁷⁶⁴ Sprint sold many of its company-owned cell site structures in the past few years and then leased space on them, most recently selling approximately 3,000 towers to TowerCo. *TowerCo Completes Acquisition Of 3,080 Towers From Sprint Nextel For \$670 Million*, Press Release, TowerCo, Sept. 24, 2008. It is not possible to determine from publicly-available information the number of cell sites still owned by Sprint Nextel or any of the wireless service providers.

⁷⁶⁵ *Wireline & Wireless Telecom Services*, Bank of America/Merrill Lynch, Sept. 24, 2009, at 4.

⁷⁶⁶ Presentation by Nadine Manjaro, ABI Research, *PCIA Wireless Infrastructure Show Debrief*, at 2009 Wireless Infrastructure Show, Oct. 1, 2009, available at http://www.rcrwireless.com/assets/pdf/PCIA_Wireless2009_Debrief.pdf.

⁷⁶⁷ *US Wireless 411 3Q09*, at 50.

favorable financial outlook for the tower industry.⁷⁶⁸ For example, American Tower reported that its revenue increased 8.5 percent between the third quarter of 2008 and the third quarter of 2009, and 9.7 percent between the fourth quarter of 2008 and the fourth quarter of 2009;⁷⁶⁹ Crown Castle reported that its revenue increased 13 percent between the third quarter of 2008 and the third quarter of 2009, and 12 percent between the fourth quarter of 2008 and the fourth quarter of 2009;⁷⁷⁰ and SBA reported that its revenue increased 17.4 percent between the third quarter of 2008 and the third quarter of 2009, and 7.9 percent between the fourth quarter of 2008 and the fourth quarter of 2009.⁷⁷¹

c. Barriers to Cell Site Deployment

287. Two significant constraints faced by wireless services providers that need to add or modify cell sites are obtaining the funds needed to finance the capital expenditure, and obtaining the necessary regulatory and zoning approvals from state and local authorities.⁷⁷²

288. Co-locating base station equipment on an existing structure is often the most efficient and economical solution for existing and new wireless service providers that need new cell sites. Co-location is also commonly encouraged by zoning authorities to reduce the number of new communications towers.⁷⁷³ Due to the high cost to construct new towers, and the often considerable delay to obtain approvals from state and local authorities, wireless service providers will typically look first for existing towers or other suitable structures for new cell sites. Co-location is particularly useful in areas in which it is difficult to find locations to construct new towers.

289. The issue of excessive delays in the zoning approval process was the subject of a Petition for Declaratory Ruling filed by CTIA in 2008. CTIA sought Commission assistance to alleviate unnecessary delays in the process of obtaining approval to construct a new cell site, or to modify an existing site.⁷⁷⁴ The Commission solicited comments on the CTIA petition and developed a full and robust record. Based on the evidence in that record, the Commission agreed that the lack of timely action on a significant number of cell site applications was impeding the ability of wireless providers to improve and expand their service offerings. On November 18, 2009, the Commission adopted a Declaratory

⁷⁶⁸ *SBA Communications*, Bank of America/Merrill Lynch, Mar. 27, 2009, at 8.

⁷⁶⁹ *American Tower Corporation Reports Third Quarter 2009 Financial Results*, Press Release, American Tower, Nov. 3, 2009, available at http://phx.corporate-ir.net/phoenix.zhtml?c=98586&p=irol-newsArticle_Print&ID=1349946&highlight; *American Tower Corporation Reports Fourth Quarter and Full Year 2009 Financial Results*, Press Release, American Tower, Feb. 24, 2009, available at http://phx.corporate-ir.net/phoenix.zhtml?c=98586&p=irol-newsArticle_Print&ID=1394632&highlight.

⁷⁷⁰ *Crown Castle International Reports Third Quarter 2009 Results; Provides 2010 Outlook*, Press Release, Crown Castle, Nov. 3, 2009, available at <http://investor.crowncastle.com/phoenix.zhtml?c=107530&p=irol-newsArticle&ID=1350357&highlight>; *Crown Castle International Reports Fourth Quarter And Full Year 2009 Results*, Press Release, Crown Castle, Jan. 27, 2010, available at <http://investor.crowncastle.com/phoenix.zhtml?c=107530&p=irol-news&nyo=0>.

⁷⁷¹ *SBA Communications Corporation Reports 3rd Quarter 2009 Results*, Press Release, SBA, Oct. 29, 2009, available at <http://ir.sbasite.com/releasedetail.cfm?ReleaseID=420018>; *SBA Communications Corporation Reports 3rd Quarter 2009 Results*, Press Release, SBA, Feb. 25, 2010, available at <http://ir.sbasite.com/releasedetail.cfm?ReleaseID=447344>.

⁷⁷² There is no evidence that shortages of transmission equipment, including antennas, to install at cell sites, act as a barrier to cell site deployment.

⁷⁷³ See, e.g., Guilford County, NC, *Development Ordinance on Cellular Tower Placement*, www.co.guilford.nc.us/planning_cms (visited Jan. 25, 2010).

⁷⁷⁴ Petition for Declaratory Ruling to Clarify Provisions of Section 332(c)(7)(B) to Ensure Timely Siting Review and to Preempt under Section 253 State and Local Ordinances that Classify All Wireless Siting Proposals as Requiring a Variance, WT Docket No. 08-165, *Petition for Declaratory Ruling*, filed July 11, 2008.

Ruling which, among other things, defined presumptively reasonable time parameters for state or local zoning authorities to decide whether or not to approve a cell site application.⁷⁷⁵

d. Competitive Effects of Infrastructure Costs and the Independent Communications Tower Industry

290. Infrastructure capital expenses for a new entrant can be higher than those for existing service providers. Infrastructure capital expenses per cell site vary depending primarily on whether the infrastructure is to be added to an existing cell site or entails building a completely new cell site. Additionally, a new entrant would need to construct a core network that includes such components as switches to connect its cell sites, gateways to access other networks, authentication capabilities, and back-office capabilities such as billing and customer service. The infrastructure operating expenses should be quite similar regardless of whether they are associated with an existing or new cell site for an existing wireless service provider, or a new cell site for a new wireless service provider.

291. When communications towers are owned by independent companies rather than wireless service providers, it may increase efficiency in the industry, ease entry, and enhance wireless service competition. Unlike wireless service providers that may have an economic incentive to forestall competition in a given area by restricting or delaying competitors' access to towers or antenna structures that they own, tower companies independent of wireless service providers have an incentive to maximize revenues by leasing space to as many service providers as possible. Therefore, it may be easier for wireless service providers to add cell sites on independently-owned towers in order to expand their geographic coverage area or to enhance service within a current coverage area. In addition, the ability of wireless service providers to lease space for new cell sites on established towers can ease and speed their entry into new geographic areas by eliminating the need to build a new tower. The use of existing towers also reduces the capital requirements for both new entrants and existing wireless service providers because they only need to finance the purchase and installation of the transmission equipment to be used at the cell site.

292. However, we note that, in many geographic areas, the most desirable positions for antennas on communication towers are occupied by existing tenants, leaving subsequent tenants with a choice of antenna positions that may not be optimal for their needs. Even with the reduced entry costs associated with an independent tower industry, tower siting costs and scarcity of desirable antenna position may constitute significant entry barriers to new providers.

3. Backhaul Facilities

a. Background

293. Backhaul connections are an integral component of a wireless service provider's network. Backhaul facilities link mobile providers' cell sites to wireline networks, carrying wireless voice and data traffic for routing and onward transmission. As wireless data services increase as a percentage of a mobile wireless provider's overall traffic, consuming vastly greater bandwidth, existing backhaul solutions are increasingly strained. Wireless providers must have access to sufficient backhaul, in terms of capacity and speed, to avoid creating a communications bottleneck.⁷⁷⁶ As discussed above, estimates of average monthly backhaul costs range from hundreds of dollars (for a T1 line) to several thousand

⁷⁷⁵ Petition for Declaratory Ruling to Clarify Provisions of Section 332(c)(7)(B) to Ensure Timely Siting Review and to Preempt Under Section 253 State and Local Ordinances that Classify All Wireless Siting Proposals as Requiring a Variance, *Declaratory Ruling*, WT Docket No. 08-165, 24 FCC Rcd 13994, 14021 ¶ 71 (2009), *petition for recon. pending, petition for review pending*, City of Arlington v. FCC, No. 10-60039 (5th Cir., filed Jan. 12, 2010).

⁷⁷⁶ Service providers must provide backhaul for increasing numbers of cell sites and ensure that the backhaul solutions they employ provide sufficient capacity to support increasing use of wireless data services.

dollars per month.⁷⁷⁷ Cell site backhaul capacity is forecast to increase fourfold between 2007 and 2011.⁷⁷⁸

294. There currently are three major technologies for backhaul transmission: copper lines, microwave (fixed wireless), and optical fiber.⁷⁷⁹ Historically, copper circuits have been the predominant choice for backhaul traffic. The heavy reliance on copper transmission is diminishing. For example, one study estimated that 70.9 percent of backhaul traffic in 2009 would be carried via copper, 16.8 percent via fiber, and 12.3 percent via fixed wireless (including microwave).⁷⁸⁰ In comparison, in 2005, 85.5 percent of backhaul traffic was carried via copper, 5.8 percent by fiber, and 8.7 percent by fixed wireless.⁷⁸¹ In other words, the incidence of copper as the medium for backhaul transmission is estimated to have decreased by nearly 15 percent over four years.

b. Competitive Landscape

295. Providers of backhaul services include incumbent local exchange carriers, independent wireline companies, cable providers, and independent wireless operators. Wireless providers may purchase special access services,⁷⁸² including DS1s and DS3s, from third parties for backhaul. Wireless providers that are unaffiliated with a wireline provider often purchase special access services from the incumbent local exchange carriers against whose wireless affiliates they compete.⁷⁸³ One wireless service provider has claimed that over 98 percent of all DS1 circuits are purchased from incumbent local exchange carriers (LECs), as are the vast majority of DS3 connections.⁷⁸⁴

296. Backhaul costs currently constitute a significant portion of a mobile wireless operator's network operating expense, and the demand for backhaul capacity is increasing.⁷⁸⁵ Wireless providers unaffiliated with a wireline provider often must rely on their competitors' affiliates for access. The Commission is examining the current state of competition for special access services to ensure that rates for these services are just and reasonable.⁷⁸⁶ In light of the growing need for backhaul, cost-efficient access to adequate backhaul will be a key factor in promoting robust competition in the wireless marketplace.

⁷⁷⁷ See *MSV 700 MHz Comments* (hundreds of a dollars for a T1 line to \$2,000 for a DS3 connection); Space Data Corporation Comments, WT Docket No. 06-150, PS Docket No. 06-229, Exhibit A (filed June 20, 2008) (backhaul cost ranging from \$2,500 to \$6,000). See Section III.D, Entry and Exit Conditions, *supra*.

⁷⁷⁸ SNL Kagan, Communications Industry News, June 26, 2008, at 1 (citing Infonetics Research Analyst, Michael Howard).

⁷⁷⁹ Different protocols for data transmission (*e.g.*, TDM, Ethernet) can run over each type of physical facility.

⁷⁸⁰ *Wireless Backhaul Market Study*, New Paradigm Resources, Oct. 2008.

⁷⁸¹ *Id.* This study estimated that as of mid-2009, there were about 530,000 backhaul lines, for 230,000 cell sites in the United States. *Id.*

⁷⁸² Special access services do not use local switches; instead they employ dedicated facilities that run directly between two designated locations. See Special Access Rates for Price Cap Local Exchange Carriers, WC Docket No. 05-25, RM-10593, *Order and Notice of Proposed Rulemaking*, 20 FCC Rcd 1994, 1997, ¶ 7 (2005) (*Special Access NPRM*).

⁷⁸³ Other options, including higher bandwidth Ethernet services, are currently unavailable in a number of markets.

⁷⁸⁴ Sprint Nextel Comments, WC Docket No. 05-25 (filed Jan. 19, 2010), at ii.

⁷⁸⁵ Verizon Wireless NOI Comments at 95-96 (citing a study by Raymond James which estimates that the size of the backhaul market will grow from \$3 billion annually to \$8 to \$10 billion in the next three to five years, driven in large part by increases in wireless data traffic).

⁷⁸⁶ See "Parties Asked to Comment on Analytical Framework Necessary to Resolve Issues in the Special Access NPRM," *Public Notice*, 24 FCC Rcd 13638 (2009) (referring to the *Special Access NPRM*).

c. The Growing Need for Backhaul Solutions and Alternatives

297. Several recent trends in the mobile wireless market have led to the increased demands on backhaul capacity, making access to sufficient backhaul an increasingly central component of a mobile wireless provider's overall performance. First, the increased adoption of Internet-connected mobile computing devices, incorporating such advanced functionalities as video and Internet browsing, is consuming greater amounts of bandwidth. As the smartphone penetration rate increases, bandwidth-consuming data services are becoming an increasing percentage of a mobile wireless provider's overall traffic. As discussed above, it is estimated that global mobile data traffic grew 157 percent, from 33 terabytes in 2008 to 85 terabytes in 2009.⁷⁸⁷ Second, the proliferation of fixed-rate mobile Internet access plans enables subscribers to consume more services and greater bandwidth. As noted earlier, AT&T reported its network has seen an 18-fold increase in data traffic since the iPhone was introduced, with mobile data traffic increasing by over four times during the June 2008 to June 2009 period alone.⁷⁸⁸ Third, mobile wireless network data speeds have increased as technology has evolved, with the forthcoming 4G WiMAX and LTE technologies supporting even higher data throughput rates and lower latencies.

298. In light of the foregoing factors, identifying solutions to satisfy the growing demand for mobile backhaul is taking on increasing importance. The special access proceeding affects services generally provided over copper or fiber by wireline carriers regulated under price caps.⁷⁸⁹ Many wireless providers also use point-to-point microwave transmission. We note that the recently released National Broadband Plan recommends that the Commission take action to ensure that sufficient microwave spectrum is available to meet current and future demand for wireless backhaul, especially in the bands below 12 GHz.⁷⁹⁰ The National Broadband Plan also recommends that the Commission take further actions to enhance the flexibility and speed with which companies can obtain access to spectrum to use for wireless backhaul, which is critical to the deployment of wireless broadband and other wireless services.⁷⁹¹ The National Broadband Plan also includes several recommendations to facilitate the more efficient and economic installation of fiber facilities that may be used to meet the rapidly increasing demand for additional wireless backhaul capacity.⁷⁹²

B. Downstream Segments

1. Mobile Wireless Handsets/Devices and Operating Systems

299. Handsets and devices are becoming increasingly central to the dynamics of the overall wireless market. Recent studies show handsets playing an increasingly important role for consumers as a basis for choosing providers, although these studies differ as to the level of importance of handsets to consumers. For example, a recent report from Consumers Union provides data that suggests that many consumers switched to new wireless service providers in order to obtain a particular handset. Specifically, the report states that during the two-year period of 2008 through 2009, 38 percent of respondents who had switched providers did so because it was the only way to obtain the handset that

⁷⁸⁷ See Section V.D.3, Mobile Data Traffic (Non-Messaging), *infra*; Cisco Visual Networking Index: Global Mobile Traffic Forecast Update, Cisco, Jan. 29, 2009, at 6.

⁷⁸⁸ *MobileData: Traffic Jam Ahead?*, Bank of America/Merrill Lynch, Feb. 2, 2010.

⁷⁸⁹ We note that carriers are increasingly interested in transitioning from TDM to Ethernet and other packet based services, and that existing facilities – including copper and fiber facilities – may often be transitioned from TDM to IP to address increased demand at particular sites. In addition, evolving technologies may provide wireless carriers with more alternatives to using special access services, including deploying their own facilities.

⁷⁹⁰ *National Broadband Plan*, at 93.

⁷⁹¹ *Id.*

⁷⁹² *Id.* at 130 and 132-3.

they wanted.⁷⁹³ The same report also indicates that 27 percent of all respondents had a specific wireless handset in mind when they went shopping for a new handset.⁷⁹⁴ A first quarter 2009 survey by Nielsen Company shows handsets were the seventh most important reason consumers chose their existing wireless provider, although handset choice increased in importance to 6.4 percent from 2.9 percent in the third quarter of 2006.⁷⁹⁵ Recent analyst reports also identify access to handsets as an increasing challenge faced by mid-sized and small providers.⁷⁹⁶ An examination of the handsets/devices and operating systems segments reveals their importance to mobile wireless consumers and service providers.

a. Handsets/Devices

300. *Number of Manufacturers.* From 2006 to 2009 the number of mobile wireless handset manufacturers that distribute in the U.S. market has increased from eight to sixteen (Table 27).⁷⁹⁷ In June 2009, there were sixteen handset manufacturers offering a total of 260 handset models to mobile wireless service providers in the United States.⁷⁹⁸ Nine of these handset manufacturers each offered at least ten handset models.

Table 27
Handset Manufacturers and Handset Models Offered, U.S., 2006-2009

	2006 (Nov.)	2007 (Nov.)	2008 (Dec.)	2009 (June)
Total Number of Reporting Handset Manufacturers	8	12	12	16
Total Number of Reporting Handset Manufacturers Offering Ten or More Handset Models	5	8	8	9
Total Number of Handset Models Offered by Reporting Handset Manufacturers	124	168	346	260

301. *Innovation.* Over the past two years handset manufacturers have introduced a growing number of smartphones with the following features: an HTML browser that allows easy access to the Internet, an operating system that provides a standardized interface and platform for application

⁷⁹³ *Best Cell Phone Service*, CONSUMER REPORTS, Jan. 2010.

⁷⁹⁴ *Id.*

⁷⁹⁵ Roger Entner, *When Choosing A Carrier Does the iPhone Really Matter?*, NIELSEN WIRE, Aug. 10, 2009.

⁷⁹⁶ See, e.g., *USM/TDS, 4Q09 Preview: Wireless Remains Challenging*, Morgan Stanley, Feb. 23, 2010; *Company Update, Cincinnati Bell, Inc. (CCB)*, Goldman Sachs, Feb. 11, 2010)

⁷⁹⁷ These figures based on data from hearing aid compatibility reports filed by handset manufacturers from 2006 to 2009. For reports prior to July 2009, see FCC Docket 07-250; for reports after July 2009, see the FCC Hearing Aid Compatibility status reporting site at <http://wireless.fcc.gov/hac/index.htm?job=home>. These reports include information (such as handset maker, model name, starting available date and end available date) for each handset model offered by the handset manufacturer during the reporting period.

⁷⁹⁸ Handset manufacturers filed their hearing aid compatibility status reports by July 15, 2009, for the reporting period from January 1 to June 30, 2009. Starting in July 2010, handset manufacturers are required to file their hearing aid compatibility status reports annually on July 15 for the twelve month reporting period from July 1st of the prior year to June 30th of the reporting year. See also <http://wireless.fcc.gov/hac/index.htm?job=home> for more details on these reports. 47 C.F.R. § 20.19.

developers, and a larger screen size than a traditional handset.⁷⁹⁹ In contrast to traditional handsets with applications that include voice and messaging, smartphones have more user-friendly interfaces that facilitate access to the Internet and software applications. Ten handset manufacturers offered a total of 56 smartphones in June 2009.⁸⁰⁰ Table 28 lists the top five smartphone and handset manufacturers, by number of models offered, that distributed in the United States in June 2009. RIM, HTC and Samsung offered the most smartphone models, while Samsung, Motorola and LG offered the most handset models in June 2009.⁸⁰¹

Table 28
Smartphone Manufacturers Offering Largest Number of Smartphone Models (U.S., June 2009)

Top Five Smartphone Manufacturers	Number of Smartphone Models
RIM	13
HTC	11
Samsung	10
LG	5
Palm	4
Total	38

Table 29
Handset Manufacturers Offering Largest Number of Handset Models (U.S., June 2009)

Top Five Handset Manufacturers	Number of Handset Models
Samsung	72
Motorola	52
LG	31
Sony Ericsson	22
Nokia	21
Total	177

302. Since Apple entered the handset business in June 2007 with the touchscreen *iPhone*, many handset manufacturers have responded with their own touchscreen smartphones. For example, Sony Ericsson launched its first touchscreen smartphone, *XPERIA™ XI*, based on the Window Mobile 6.1 platform, in February 2008.⁸⁰² HTC introduced the smartphone *G1*, powered by the Android operating system, in September 2008.⁸⁰³ Nokia unveiled its touchscreen smartphone *5800 XpressMusic*

⁷⁹⁹ See Section IV.B.3, Differentiation in Mobile Wireless Handsets/Devices, *supra* (defining smartphone for purposes of this report).

⁸⁰⁰ Based on data from hearing aid compatibility status reports filed by handset manufacturers in July 2009, available at <http://wireless.fcc.gov/hac/index.htm?job=home>.

⁸⁰¹ Based on data from hearing aid compatibility status reports filed by handset manufacturers in July 2009, available at <http://wireless.fcc.gov/hac/index.htm?job=home>.

⁸⁰² See *Sony Ericsson Launches the New Brand XPERIA with the Unveiling of XPERIA XI*, Press Release, Sony Ericsson, Feb. 10, 2008, available at <http://www.sonyericsson.com/cws/companyandpress/pressreleases/pressrelease/pressreleaseoverview/xperiaxi-us-20080210?cc=us&lc=en>.

⁸⁰³ See *T-Mobile Unveils the T-Mobile G1 – the First Phone Powered by Android*, Press Release, T-Mobile, Sept. 23, 2008, available at <http://www.t-mobile.com> (continued....)

based on the Symbian operating system in October 2008.⁸⁰⁴ Palm launched its touchscreen smartphone *Pre*, based on the Palm webOS platform, in June 2009.⁸⁰⁵ Motorola announced its touchscreen smartphone DROID based on the Android 2.0 platform in October 2009.⁸⁰⁶ Garmin, a leading Global Positioning System (GPS) device provider, entered the smartphone business with its touchscreen *Nuviphone G60* in October 2009.⁸⁰⁷ Huawei introduced its touchscreen smartphone *Tap* in October 2009.⁸⁰⁸ Google recently started selling its own smartphone *Nexus One* (manufactured by HTC) in its online store.⁸⁰⁹ LG offers at least 17 touchscreen smartphones⁸¹⁰ and Nokia offers at least six.⁸¹¹

303. With the convergence of mobile wireless handsets and portable computing technologies, other traditional computer manufacturers (besides Apple) have entered the handset/device business and are offering touchscreen smartphones. Acer, a computer manufacturer, entered the handset/device business when it unveiled multiple models at the World Mobile Congress trade show in Barcelona in January 2010.⁸¹² Dell announced it will soon offer its first Android-based smartphone, *Mini 3*, for AT&T.⁸¹³ Lenovo, another computer manufacturer, introduced its first Android-based smartphone, *LePhone*, in January 2010.⁸¹⁴

304. *Share of Mobile Devices.* According to comScore, a marketing information company, in December 2009, the top five handset manufacturers in the United States accounted for 82.8 percent of mobile devices currently in use, and all other manufacturers accounted for the remaining 17.2 percent (Table 30).⁸¹⁵

(Continued from previous page) —————

mobile.com/company/PressReleases_Article.aspx?assetName=Prs_Prs_20080923&title=T-Mobile%20Unveils%20the%20T-Mobile%20G1%20-%20the%20First%20Phone%20Powered%20by%20Android.

⁸⁰⁴ See *Nokia Amps Up Music Offering with New Nokia 5800 XpressMusic*, Press Release, Nokia, Oct. 2, 2008, available at <http://www.nokia.com/press/press-releases/archive/archiveshowpressrelease?newsid=1256590>.

⁸⁰⁵ See *Sprint to Offer Palm Pre Nationwide on June 6*, Press Release, Sprint Nextel, May 19, 2009, available at http://newsreleases.sprint.com/phoenix.zhtml?c=127149&p=irol-newsArticle_newsroom&ID=1289761&highlight.

⁸⁰⁶ See *Hello Humans: DROID by Motorola Arrives Next Week*, Press Release, Motorola, Oct. 28, 2009, available at <http://mediacenter.motorola.com/content/detail.aspx?ReleaseID=12058&NewsAreaID=2>.

⁸⁰⁷ See *AT&T and Garmin Announce a New Mobile Navigation Era with Nuvifone, the Navigation Phone*, Press Release, AT&T, Sept. 29, 2009, available at <http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=27177&mapcode>.

⁸⁰⁸ See Brian James Kirk, *T-Mobile Tap - a new affordable touchscreen handset*, MOBILE BURN, Oct. 7, 2009 at <http://www.mobileburn.com/news.jsp?Id=7976>.

⁸⁰⁹ See *Google Offers New Model for Consumers to Buy a Mobile Phone*, Press Release, Google, Jan. 5, 2010, available at http://www.google.com/intl/en/press/pressrel/20100105_phone.html.

⁸¹⁰ LG, *All LG Phones*, <http://www.lg.com/au/mobile-phones/all-lg-phones/index.jsp> (visited Apr. 29, 2010).

⁸¹¹ Nokia USA, *Compare Phones*, <http://www.nokiausa.com/find-products> (visited Apr. 29, 2010).

⁸¹² See *Acer Enters the Smartphone Market*, PCMag.COM, Feb. 17, 2009, at <http://www.pcmag.com/article2/0,2817,2341176,00.asp>. See also ACER, *Smartphone Series*, <http://www.acer.com/smartphone/> (visited on Jan. 12, 2010).

⁸¹³ See *At CES Dell Unveils First All Powerful Ultra Mobile Gaming System, Next Generation Smart Phones, Tablet Concepts and a New Line of Design Inspired Laptops*, Press Release, Dell, Jan. 7, 2010, available at <http://content.dell.com/us/en/corp/d/press-releases/2010-01-07-dell-at-ces-2010.aspx>.

⁸¹⁴ See Gabriel Madway, *Lenovo Enters Smartphone Fracas with "LePhone,"* REUTERS, Jan. 6, 2010, at <http://www.reuters.com/article/idUSTRE6060JF20100107>.

⁸¹⁵ See *comScore Reports December 2009 U.S. Mobile Subscriber Market Share*, Press Release, comScore, Feb. 8, 2010, available at

(continued....)

Table 30
Share of Mobile Devices in Use, U.S., 2009

Handset Manufacturer	Share of Mobile Devices in Use
Motorola	23.5%
LG	21.9%
Samsung	21.2%
Nokia	9.2%
RIM	7.0%
All Others	17.2%

305. *Technological Standards.* Handsets are manufactured for each of the commonly used wireless families of air interface standards, including the CDMA family (including 1xRTT and EV-DO), the GSM/WCDMA family (including GSM, GPRS, EDGE, WCDMA, HSDPA, and HSUPA), and iDEN. As the technical standards within each of these families progress, handsets are often built to support multiple air interfaces common to that family. This facilitates backwards compatibility with older technologies and migration to more efficient air interfaces over time. Handsets that are manufactured for one air interface family usually do not function on competing families of standards, although some handsets are designed to operate over more than one family. As of June 2009, handset variety was greatest for the GSM/WCDMA family, followed by the CDMA 1xRTT/EV-DO family. The iDEN standard has a comparatively small number of handsets.

Table 31
Handset Models Offered by Air Interface, U.S., 2006-2009

Air Interface	Total Handset Models Offered by Reporting Handset Manufacturers			
	2006 (Nov.)	2007 (Nov.)	2008 (Dec.)	2009 (June)
CDMA/1xRTT/ EV-DO ⁸¹⁶	81	118	146	115
GSM/WCDMA ⁸¹⁷	40	42	177	129
GSM/CDMA	0	0	0	2
iDEN	11	8	21	14
Total	124	168	346	260

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[http://www.comscore.com/Press Events/Press Releases/2010/2/comScore Reports December 2009 U.S. Mobile Subscriber Market Share](http://www.comscore.com/Press%20Events/Press%20Releases/2010/2/comScore%20Reports%20December%202009%20U.S.%20Mobile%20Subscriber%20Market%20Share).

⁸¹⁶ Our data currently cannot separate 1xRTT with EV-DO handsets from 1xRTT only handsets.

⁸¹⁷ The number of handset models with WCDMA was 50 in June 2009, 52 in December 2008, 9 in November 2007, and 3 in November 2006.

Table 32
Smartphone Models Offered by Handset Manufacturers by Air Interface, U.S., June 2009

Air Interface Type	Estimated Smartphone Models, June 2009
CDMA/1xRTT/ EV-DO	19
GSM/WCDMA ⁸¹⁸	35
GSM/CDMA	1
iDEN	1
Total	56

306. *Operating Systems.* The operating system of a smartphone is one of the major factors that determine the smartphone's ability to support mobile applications and Internet-based services. Applications and services may not be available for all operating systems, and applications that work with one operating system may not be readily transferable to another operating system. Smartphone operating systems are discussed more extensively in the section on mobile applications. Table 33 states that 96.2 percent of smartphones in use in December 2009 have an operating system from a top-five mobile operating system provider, while the remaining 3.8 percent of smartphones in use have other operating systems.⁸¹⁹

Table 33
Share of Smartphones in Use by Operating System, U.S., December 2009

Operating System	Share of Smartphones in Use
RIM	41.6%
Apple	25.3%
Microsoft	18.0%
Palm	6.1%
Google	5.2%
All Others	3.8%

307. The prevailing model for the distribution of handsets to U.S. consumers is a provider-as-retailer model in which manufacturers sell handsets in bulk quantities to service providers and then service providers sell them to consumers in handset-service bundles, either in pre-paid service plans or post-paid subscription service plans. Generally, handset manufacturers make their handsets available to many service providers and consumers have a wide choice of handsets from different service providers. However, there are two types of contractual arrangements that affect the distribution of handsets. The first is bundling contracts, which are contracts between a service provider and a consumer for a handset-service subscription bundle; the second is exclusive handset arrangements, where handset manufacturers grant exclusive distribution territories to providers. Both of these types of contracts potentially affect outcomes in the handset/device and mobile wireless services businesses and are discussed below.⁸²⁰

308. Service providers carry diverse handset portfolios and offer their customers a wide selection of handsets. As shown in Table 34, the average number of handset models offered by the eight

⁸¹⁸ The number of smartphone models with WCDMA was 25 in June 2009.

⁸¹⁹ See *comScore Reports December 2009 U.S. Mobile Subscriber Market Share*, Press Release, comScore, Feb. 8, 2010, available at [http://www.comscore.com/Press Events/Press Releases/2010/2/comScore Reports December 2009 U.S. Mobile Subscriber Market Share](http://www.comscore.com/Press%20Events/Press%20Releases/2010/2/comScore%20Reports%20December%202009%20U.S.%20Mobile%20Subscriber%20Market%20Share).

⁸²⁰ See Section VII.B.1.b, Key Factors Affecting Mobile Wireless Competition, *infra*.

largest facilities-based mobile wireless service providers⁸²¹ increased from 28 in November 2006 to 43 in December 2009. The average number of handset models offered by non-top eight service providers increased from 10 in November 2006 to 23 in December 2009.⁸²² Chart 43 shows the number of handset models and smartphone models offered by each of the top eight facilities-based service providers.⁸²³ All of the top eight providers sell at least one smartphone, except Leap, which, according to industry press reports, will begin offering its first 3G smartphone in 2010.⁸²⁴ Table 35 shows the number of service providers (including resellers) offering a particular manufacturer's smartphone models.

Table 34
Average Number of Handset Models Offered by Mobile Wireless Service Providers

	2006 (Nov.)	2007 (Nov.)	2008 (Dec.)	2009 (Dec.)
Average Number of Handset Models Offered by Top Eight Service Providers	28	30	46	43
Average Number of Handset Models Offered by Non-Top Eight Service Providers	10	12	20	23

⁸²¹ The top eight facilities-based providers include AT&T, Verizon Wireless, Sprint Nextel, T-Mobile, Alltel (merged with Verizon Wireless on January 9, 2009), US Cellular, MetroPCS, and Leap Wireless. Tracphone, the fifth largest service provider in the U.S., is not facilities-based.

⁸²² These figures are based on data from hearing aid compatibility status reports filed by service providers from 2006 to 2009, available at <http://wireless.fcc.gov/hac/index.htm?job=home>.

⁸²³ These figures are based on data from hearing aid compatibility status reports filed by service providers in January 2010.

⁸²⁴ *Wireless*, COMMUNICATIONS DAILY, Mar. 1, 2010, at 7.

Chart 43
Total Handset and Smartphone Models Offered by the Top Eight Facilities-Based Service Providers, Dec. 2009

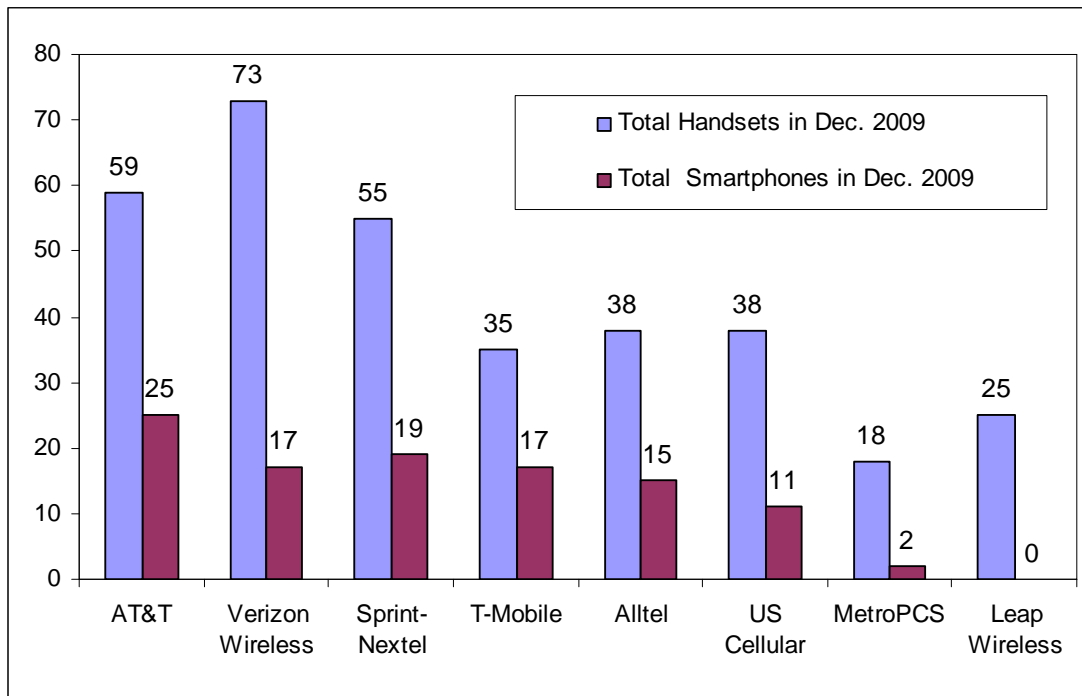


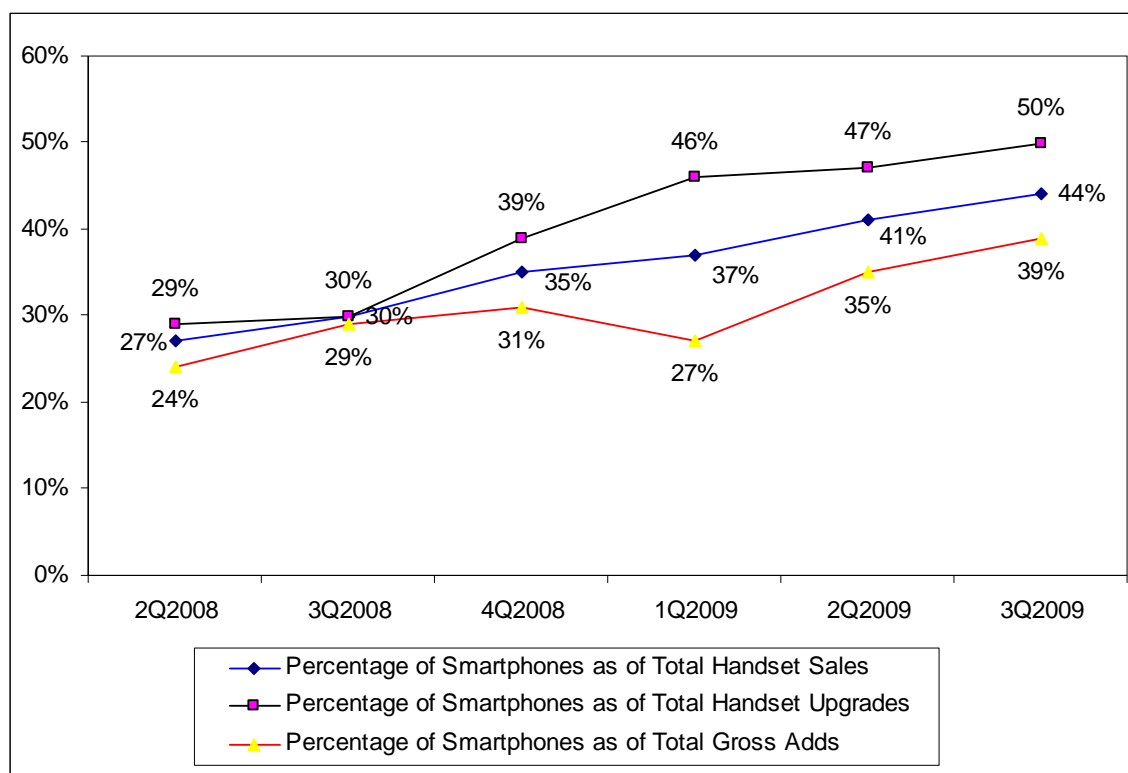
Table 35
Number of Service Providers (including Resellers) Offering a Manufacturer's Smartphones, Dec. 2009⁸²⁵

Manufacturer	Number of Service Providers (including Resellers)
HTC	128
RIM	116
Pantech	66
Samsung	66
Palm	55
Nokia	44
LG	40
Hewlett Packard	27
Motorola	14
Apple	5
Garmin	4
Sony Ericsson	3
Acer	1
Sharp	1

⁸²⁵ Hearing aid compatibility annual status reports filed by Jan. 15, 2010. 220 service providers offered at least one handset model in December 2009.

309. Smartphone sales and adoption rates have increased in recent years, as shown in Chart 44. Smartphones as a percentage of total handset sales increased from 27 percent in the second quarter of 2008 to 44 percent in the third quarter of 2009. Fifty percent of total handset upgrades were smartphones in the third quarter of 2009, up from 29 percent in the second quarter of 2008; and 39 percent of gross additions were smartphone users in the third quarter of 2009, up from 24 percent in the second quarter of 2008.⁸²⁶ Another analyst reports that smartphone sales increased from 9 million units in 2006 to 37 million units in 2008.⁸²⁷

Chart 44
Smartphone Adoption Rates in the United States 2008-2009⁸²⁸



310. According to one analyst, the average retail prices for all handsets and the smartphone subset, net of provider subsidies, decreased between 2006 and 2009. Chart 45 shows that the average price of smartphones after discounts decreased from \$220 in the fourth quarter of 2006 to \$120 in the fourth quarter of 2009, while the average price of all handsets after discounts decreased from \$85 in the fourth quarter of 2006 to \$50 in the fourth quarter in 2009.⁸²⁹ This analyst also estimates that the average discount offered on the original price (the advertised price before contract-related discounts) of available handsets was 80 percent for the U.S. wireless industry in the last quarter of 2009, up from an average discount of 60 percent in late 2006.⁸³⁰

⁸²⁶ *Smartphone Adoption Steadily Rising*, at 3.

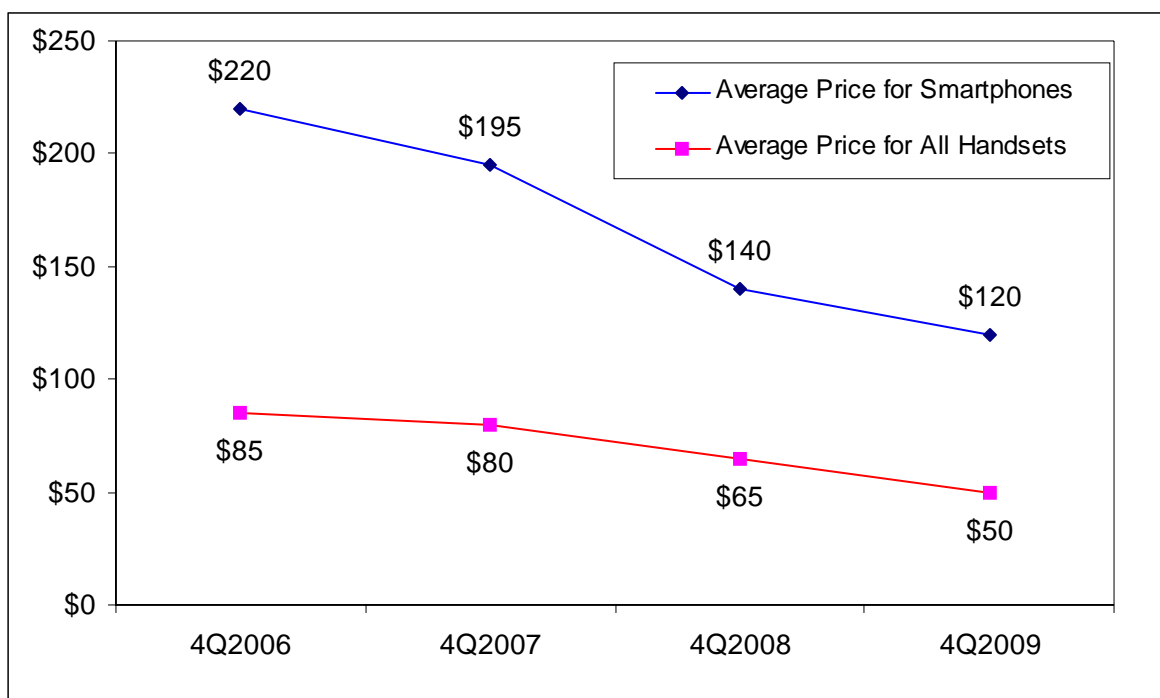
⁸²⁷ *Finding Value in Smartphones*, at 6.

⁸²⁸ *Smartphone Adoption Steadily Rising*, at 3.

⁸²⁹ *Wireless Service & Handset Pricing – Tick Tock*, at 8.

⁸³⁰ *Id.* at 7.

Chart 45
Average Price After Discount for PDAs/Smartphones and All Handsets⁸³¹



b. Key Factors Affecting Mobile Wireless Competition

311. Competition among the mobile wireless handset manufacturers (discussed above) affects competitive outcomes in the mobile wireless service market through price and non-price competition by handset manufacturers and it is also shaped by the provider-as-retailer model of handset distribution. Bundling contracts and exclusive handset arrangements are firm conduct that occurs frequently in the provider-as-retailer model of handset distribution.⁸³² Bundling is discussed first, then exclusive handset arrangements.

(i) Bundling of Wireless Service Subscriptions with the Purchase of Handsets

312. In a bundling contract a provider conditions the sale of a handset upon the consumer's agreement to purchase a multi-month wireless service subscription, typically for a minimum of one or two years.⁸³³ In a bundling contract, the wireless handset and wireless service plan are effectively sold as a single bundled product, with the price distributed over the length of the subscription. Service providers typically enforce these contracts by "locking" subsidized devices, so that they cannot be easily ported to a competitor's network, and by charging early termination fees for subscribers who break the contract early.

313. These bundles have both disadvantages and advantages for consumers. Some of the disadvantages of buying a handset-service subscription bundle are "buyer's remorse" at having entered a

⁸³¹ *Wireless Service & Handset Pricing – Tick Tock*, at 8.

⁸³² See FTC, *An FTC Guide to Dealings in the Supply Chain*, <http://www.ftc.gov/bc/antitrust/factsheets/antitrustlawsguide.pdf>, at 17-22 (FTC).

⁸³³ See *Antitrust Law and Economics*, at 326 ("Under a tying arrangement, the seller of a product conditions the sale of one product upon the buyer's agreement to purchase a second product"). In particular, the sale of the handset is conditioned on the subsequent purchase of the multi-month wireless service subscription.

multiyear contract after the commitment was made, opaqueness surrounding how the handset price and the monthly subscription price are aggregated to obtain the price of the bundle, and monthly subscription prices that are seemingly independent of how long the customer has been paying off the initial discount on the handset price.⁸³⁴ Some of the advantages of buying a handset-service subscription bundle are the conveniences of one-stop shopping, access to better technical support for handsets supported by the provider vis-à-vis handsets that are not in the provider's handset portfolio, obtaining a discount on the price of the handset, and distributing the price of expensive handsets over the course of the subscription.

314. Wireless service plans are generally available without bundled contracts, but most postpaid plans consumers have strong incentives to buy a subsidized device. Most providers allow customers to use a compatible unlocked handset with a postpaid network service plan.⁸³⁵ Unlocked devices, while not widely distributed through the major retail channels, are available in some specialty stores and through some manufacturer websites (e.g., Motorola and Nokia).⁸³⁶ However, when customers bring an unlocked device to a postpaid plan, they generally do not receive a device subsidy from the provider nor do they typically receive a lower-priced service plan that would reflect the fact that the provider does not have to recoup the cost of the subsidy. Therefore, most customers have incentives to purchase subsidized devices from the provider and, indeed, this is the overwhelming U.S. industry practice.

315. For pre-paid and pay-as-you-go service plans, the incentives are slightly different, and indeed, at least one provider (T-Mobile) has begun to emphasize this fact. Prepaid plans also typically involve handset subsidies, although they may be smaller since providers expect prepaid plans to have higher churn than postpaid plans. In 2009, T-Mobile introduced its "Even More Plus" plan that offers a lower monthly service price for customers that use unsubsidized handsets.⁸³⁷ This appears to be the first attempt by a national provider to change the incentives associated with device subsidies and service plan rates in a way to encourage mass market customers to use an unsubsidized device.

(ii) Exclusive Handset Arrangements

316. An exclusive handset arrangement (EHA) is an arrangement in which a handset manufacturer or vendor agrees to sell a particular handset model to only one wireless service provider, usually for a specified period of time. EHAs fall within a class of contractual arrangements known as territorial restraints or exclusive territory agreements.⁸³⁸ EHAs may also involve sharing financial commitments and sharing market risks, with the manufacturer typically assuming some research and development commitments and the provider typically assuming some marketing and minimum volume commitments. Territorial restraints between manufacturers and their distributors are not per se illegal,⁸³⁹ although they raise competitive issues.

⁸³⁴ See, e.g., David Pogue, *The Irsome Cell Phone Industry*, THE NEW YORK TIMES, July 22, 2009, at B1.

⁸³⁵ T-Mobile, for example, offers SIM cards that can be inserted into any unlocked GSM phone, a common practice in Europe.

⁸³⁶ See, e.g., the online stores of handset manufacturers Motorola and Nokia at <http://www.motorola.com/Consumers/US-EN/Home> and <http://www.nokiausa.com/>, respectively. The unbundled model of handset manufacturers distributing unlocked handsets has not yet been widely embraced by U.S. consumers even though some handset manufacturers directly sell unlocked handsets in their Internet shops and through non-provider retailers.

⁸³⁷ See T-Mobile, *Plans*, http://www.t-mobile.com/shop/plans/Cell-Phone-Plans-Overview.aspx?WT.z_HP=shop_plans_DL (visited Feb. 22, 1010).

⁸³⁸ *Territorial restraints* involve manufacture-dealer relationships. They are distinct from *exclusive dealing* where the manufacturer requires the distributor not to distribute products of competing manufacturers. See *Antitrust Law and Economics*, at 308, 345. See *FTC* at 17. See also, *Competition Policy*, at 301.

⁸³⁹ See *FTC* at 17.

317. There is some data available on the prevalence and duration of EHAs, although confidentiality clauses in EHAs have restricted the availability of certain data. First, EHAs are often employed in the market launch of innovative handsets that are on the technological frontier, *e.g.*, smartphones. Second, the duration of EHAs, although typically private contractual information, appears to have ranged from six months or less⁸⁴⁰ to a few years or more.⁸⁴¹ Third, many handset manufacturers use EHAs to distribute some, but not all, of their smartphones. EHAs apply to particular handset models; they do not prevent a manufacturer or vendor from selling other handset models to other providers, and they do not block a provider from selling handsets made by other manufacturers or vendors.⁸⁴² For instance, inspection of providers' online stores reveals that many handset manufacturers and vendors – including RIM, HTC, LG, Palm, Samsung, Motorola, and Nokia – sell many of the same smartphone models, or variants, to multiple U.S. service providers, including non-nationwide service providers.⁸⁴³ In contrast, Apple and Garmin, both relatively recent entrants to the handset business, distribute their handsets at present only through AT&T (and its affiliates).⁸⁴⁴ Fourth, handset manufacturers generally employ EHAs with providers that have larger customer bases and extensive network penetration. For instance, all nationwide providers have some EHAs, while non-nationwide service providers typically do not have EHAs. Table C-5 in Appendix C lists 67 selected smartphone launches that occurred in 2008 and 2009. Of the 67 smartphones listed, 32 were subject to EHAs at launch, including some of the most popular (*e.g.*, Apple iPhone, Motorola DROID, Palm Pre), while 35 were not subject to EHAs.

2. Mobile Applications

318. A range of different communication functionalities is now available to mobile wireless consumers, depending on the capabilities of the device they use and the network to which they connect. These functionalities include both voice and data services, with devices increasingly being used for data services. Morgan Stanley estimates that, in 2008, the average mobile wireless subscriber spent 70 percent of his/her time on a mobile device making voice calls and 30 percent using a data application, with half of

⁸⁴⁰ See Verizon Wireless, Written Ex Parte Presentation, RM-11497, July 17, 2009 (stating that, applicable to small wireless carriers (those with 500,000 customers or less), any new exclusivity arrangement it enters with handset makers will last no longer than six months – for all manufacturers and all devices). See also T-Mobile Reply Comments, RM-11497, Feb. 20, 2009, at 6-7 (stating that most of T-Mobile's exclusive agreements last less than a year and some are as short as 90 days). In October 2008, the Commission sought comment on a petition for rulemaking, filed by the Rural Cellular Association, regarding exclusivity arrangements between commercial wireless service providers and handset manufacturers. See "Wireless Telecommunications Bureau Seeks Comment on Petition for Rulemaking Regarding Exclusivity Arrangements Between Commercial Wireless Carriers and Handset Manufacturers," RM-11497, *Public Notice*, 23 FCC Rcd 14873 (WTB 2008).

⁸⁴¹ The original iPhone was released in June 2007. See Apple Inc., SEC Form 10-K, for fiscal year 2008, filed Nov. 5, 2008, at 5. The third generation iPhone, called iPhone 3GS, was released in June 2009. Apple reports that the iPhone 3GS is sold in the United States through an exclusive arrangement. See Apple Inc., SEC Form 10-K, for fiscal year 2009, filed Oct. 27, 2009, at 4, 20.

⁸⁴² Hence, EHAs do not involve exclusive dealing where the distributor is prohibited from carrying products of competing manufacturers.

⁸⁴³ For example, on February 5, 2010, the HTC Touch smartphone (or a variant with similar capabilities) was carried by at least Cellular One, Cellular 29 Plus (Chatmobility), Cellular South, T-Mobile, Copper Valley Wireless, Golden State Cellular, Verizon Wireless, Cellcom, Illinois Valley Cellular, Alaska Digitel, Inland Cellular, AT&T, Iowa Wireless Services, Nex-Tech Wireless, North Eastern Pennsylvania Wireless, Northwest Missouri Cellular, Sprint Nextel, Appalachian Wireless, Carolina West Wireless (HTC Hero arriving soon), Panhandle Telecommunications Systems, Alaska Communications Systems, Leaco, Nemont Telephone Cooperative (Sagebrush Cellular), US Cellular, Bluegrass Cellular, Strata Wireless, Thumb Cellular, United Wireless, and West Central Wireless. This data was collected directly from the websites of these providers.

⁸⁴⁴ See Apple, *Apple Store – iPhone 3G*, http://store.apple.com/us/browse/home/shop_iphone?mco=OTY2ODQyMQ (visited May 14, 2010); Garmin, *Garminfone*, <https://buy.garmin.com/shop/shop.do?cID=138&pID=30018> (visited May 14, 2010).

the data time spent on text messaging and the remaining time on a combination of e-mail, Internet access, games, music, and other applications.⁸⁴⁵ Data use is higher among the growing segment of smartphone users in general and iPhone users in particular. In 2008, the estimated usage pattern of the average iPhone subscriber was 45 percent voice and 55 percent data.⁸⁴⁶

319. Mobile data functionalities include text and multimedia messaging, which typically do not require a highly sophisticated device or high mobile network speed, as well as e-mail access, web browsing, and mobile applications, which typically require a smartphone device and a mobile broadband network connection. Thousands of different mobile applications – software programs that can be used on a mobile device⁸⁴⁷ – are now available to consumers through various channels. They may be accessed through web browsers, operating system application stores, or service provider-branded platforms.⁸⁴⁸ In addition, certain applications may be native to, or pre-loaded on, a device, or may be side-loaded from a PC.

320. Both the number of mobile applications launched and the number of applications downloaded by consumers has grown significantly over the past two years. For example, there were over 100,000 applications available from the Apple App Store as of December 2009, and the number of applications downloaded from Apple's App Store grew from 100,000 in 2008 to over 2 billion in 2009.⁸⁴⁹ In addition, Morgan Stanley has estimated that, as of December 2009, the Android Market had 15,000 available applications and 40 million downloads; and the Nokia Ovi Store had 6,000 available applications and 50 million downloads.⁸⁵⁰

321. Many different types of mobile applications, developed by a range of different third-party developers, are available through mobile application stores and web browsers. The major categories of applications include: web searching, news and information, e-mail and messaging, games, social networking, location-based services, photo sharing, music and video streaming, and VoIP. Thousands of niche applications, each serving a unique purpose, have been designed for specific uses, hobbies, interests, and industries by various third-party application developers.

322. Certain applications require a mobile Internet connection in order to be downloaded on a mobile device, but then may not rely on an Internet connection when used thereafter on the device. One example of such an application would be a non-networked game that is played only by the individual user on his or her device. Many other applications require a mobile Internet connection in order to function on a device. These would include applications related to specific web sites or web-based content, such as news and information content, mapping and location-based applications, and social networking sites. Moreover, certain applications – such as VoIP and video conferencing applications – may require a low-latency Internet connection in order to function properly.

323. In order to provide an overview of the structure of the mobile applications segment, we provide below data on the adoption and usage of different types of mobile applications across the entire

⁸⁴⁵ *Morgan Stanley Mobile Internet Report*, at 92. Morgan Stanley estimated the percentage of time spent each day on a mobile device on each type of activity. The estimates are based on data from CTIA, which estimated that the average voice call time per day is 27 minutes, and iSuppli, which estimated the total time spent on a mobile handset each day is 40 minutes. *Id.*

⁸⁴⁶ *Id.*

⁸⁴⁷ *Id.* at 134.

⁸⁴⁸ CTIA NOI Comments at 28.

⁸⁴⁹ *Morgan Stanley Mobile Internet Report*, at 134, 136.

⁸⁵⁰ *Id.* at 157. CTIA reports that in the year following the launch of the Apple App Store, more than 100,000 applications were made available through the six different application download platforms from Apple, Google, Pocketgear, Blackberry, Palm, Samsung, and Sony Ericsson. CTIA NOI Comments at 25-27.

U.S. market, regardless of the device or operating system used. In addition, because certain devices are designed to facilitate the use of mobile applications, we provide data on mobile application use and adoption by type of device as well.

324. Adoption rates for mobile data services vary significantly by type of application. According to comScore, 63.1 percent of U.S. mobile subscribers used text messaging on their mobile devices in December 2009 (see Table 36).⁸⁵¹ In contrast, browsers were used by only 27.5 percent of U.S. mobile subscribers, while 21.6 percent of subscribers played mobile games and 15.9 percent accessed a social networking site or blog.⁸⁵² Nielsen Mobile estimates that, in May 2008, 40.4 million Americans had used the mobile Internet at least once in the past month, up from 22.4 million in July 2006.⁸⁵³

Table 36
Mobile Content Adoption Rates by Type of Application⁸⁵⁴

	Share (%) of U.S. Mobile Subscribers	
	September 2009	December 2009
Sent text message to another phone	61.0%	63.1%
Used browser	26.0%	27.5%
Played games	21.4%	21.6%
Used downloaded apps	16.7%	17.8%
Accessed social networking site or blog	13.8%	15.9%
Listened to music on mobile phone	11.7%	12.1%

325. Survey research also shows that mobile Internet usage is growing and that accessing the Internet via a mobile device is becoming a more frequent activity for many subscribers. According to comScore, the number of mobile subscribers who used their mobile devices to access news and information on the Internet rose to nearly 63.2 million in January 2009, up 71 percent from January 2008.⁸⁵⁵ In addition, among those subscribers who accessed news and information via their mobile devices in January 2009, comScore estimates that nearly 22.4 million, or 35 percent, did so daily, more than double the number of daily users in January 2008.⁸⁵⁶

326. ComScore found that the use of mobile search applications grew 68 percent in the United States between the second quarter of 2007 and the second quarter of 2008, from 5.8 percent to 9.2 percent

⁸⁵¹ *comScore Reports December 2009 U.S. Mobile Subscriber Market Share*, Press Release, comScore, Feb. 8, 2010.

⁸⁵² *Id.*

⁸⁵³ *Critical Mass: the Worldwide State of the Mobile Web*, Nielsen Mobile, July 2008, available at <http://www.nielsenmobile.com/documents/CriticalMass.pdf>; CTIA PN Comments, Attach. A, at 16.

⁸⁵⁴ *comScore Reports December 2009 U.S. Mobile Subscriber Market Share*, Press Release, comScore, Feb. 8, 2010.

⁸⁵⁵ *comScore: Mobile Internet Becoming a Daily Activity For Many*, Press Release, comScore, Mar. 16, 2009. See also, CTIA NOI Comments at 59.

⁸⁵⁶ *comScore: Mobile Internet Becoming a Daily Activity For Many*, Press Release, comScore, Mar. 16, 2009.

of all mobile wireless subscribers.⁸⁵⁷ And, according to comScore, 6.5 million Americans, or approximately two percent of all mobile wireless subscribers, watched video on a mobile device during August 2008. On-demand video was the most popular form of video content, with 3.6 million viewers.⁸⁵⁸

327. Analysts believe that one of the major applications driving mobile data usage is social networking.⁸⁵⁹ Social networking saw the largest growth rate from August 2007 to August 2008 in comScore's survey, growing 8.8 percent to 14.9 million users, or 6.6 percent of all mobile wireless subscribers, during this period. The major social networking sites include Facebook, MySpace, Twitter, LinkedIn, and Foursquare. Facebook is the segment leader with 430 million users worldwide as of October 2009, compared to 110 million for MySpace and 58 million for Twitter.⁸⁶⁰ Facebook and MySpace are popular on the mobile Internet as well as on the wired Internet. Facebook and MySpace rank #4 and #9, respectively, among top web domains accessed on desktop computers in the United States, but rank #2 and #4, respectively, among top web domains accessed on mobile devices.⁸⁶¹ Foursquare is a social networking site and that combines GPS and location functionalities, allowing users to see where their friends are located at any time.⁸⁶²

328. Certain mobile applications are available for download through mobile web browsers and/or through one or multiple mobile application stores, such as the Apple App Store, the Android Market, or the Blackberry App World. Users can access these application stores on mobile devices that run the operating system that supports them. The application stores are specific to particular operating systems, and, in many cases, the application stores may be available only on devices running a certain, more recent version of an operating system or on devices with certain hardware features. For instance, the Blackberry App World is available on Blackberry smartphones running BlackBerry Device Software v4.2 or higher with a trackball, trackpad, or touch screen.⁸⁶³

329. Mobile data application usage varies among iPhone users, smartphone users, and average mobile wireless subscribers, with iPhone user adoption rates leading average smartphone user adoption rates in every category.⁸⁶⁴ The most popular paid applications downloaded from the Apple App store are games, while the most popular free applications are social networking applications.⁸⁶⁵

⁸⁵⁷ comScore M:Metrics Reports Mobile Search Grew 68 Percent in the U.S. and 38 Percent in Western Europe During Past Year, Press Release, comScore, Sept. 15, 2008.

⁸⁵⁸ comScore Reports 6.5 Million Americans Watched Mobile Video in August, Press Release, comScore, Oct. 31, 2008.

⁸⁵⁹ Morgan Stanley Mobile Internet Report, at 185-221.

⁸⁶⁰ *Id.* at 188.

⁸⁶¹ *Id.* at 212.

⁸⁶² *Id.* at 204.

⁸⁶³ BlackBerry, BlackBerry App World Vendor Support - Frequently Asked Questions, <http://na.blackberry.com/eng/developers/appworld/faq.jsp> (visited Mar. 1, 2010).

⁸⁶⁴ Morgan Stanley Mobile Internet Report, at 92.

⁸⁶⁵ *Id.* at 136.

Table 37
Mobile Application Adoption Rates by Device

	iPhone	Smartphone	Average Mobile User
Music	65%	35%	12%
Games	61%	48%	21%
Social Networking	58%	43%	14%
Web Search	52%	40%	12%
Instant Messaging	48%	42%	15%
News	40%	31%	9%
Video	23%	16%	4%
Personal Banking	22%	16%	4%
Restaurant Guides	18%	14%	4%
Online Shopping	14%	9%	2%

Source: Morgan Stanley Mobile Internet Report

330. In order to provide an application through an application store, third-party application developers must design their products in accordance with the specifications of a particular application store and operating system, and must abide by the conditions of the operating system and, in some cases, the mobile wireless service provider. As discussed below, the conditions set by the operating system developers and their level of control over the applications available through their application stores vary from provider to provider.

331. Aside from the parameters placed on third-party applications by operating system developers, the emergence of mobile web browsers and a handful of mobile operating systems in recent years has brought greater efficiency and standardization to the mobile application segment, to the benefit of both third-party developers and consumers. Under the typical mobile application distribution model of previous years, an application developer seeking to provide a product to mobile consumers often had to design an application differently for each handset on each mobile network, and the launch of an application required the approval of the wireless service provider, which acted as a gatekeeper for its “walled garden” content. As discussed above, mobile wireless service providers have to some degree opened their networks to smartphone devices with web browsers and application stores.⁸⁶⁶ With the emergence of applications stores, developers can design their products for each application store, rather than each device. While the application development system has become more accessible and less fragmented than in previous years,⁸⁶⁷ some mobile wireless service providers and application stores act as gatekeepers, deciding which applications are allowed to run on particular devices or networks, and approval processes are not always transparent or predictable.⁸⁶⁸

332. Mobile applications are a downstream segment within the mobile wireless ecosystem.

⁸⁶⁶ The Commission recently opened a proceeding to explore whether certain core principles could be applied to ensure greater openness that would allow for broadband innovation. That proceeding includes an examination of devices, applications and network management practices of wireless broadband Internet access providers. *See Preserving the Open Internet*, GN Docket No. 09-191, *Broadband Industry Practices*, WC Docket No. 07-52, Notice of Proposed Rulemaking, 24 FCC Rcd 13064 (2009).

⁸⁶⁷ *Morgan Stanley Mobile Internet Report*, at 135.

⁸⁶⁸ *See, e.g.*, Jeffrey Glueck, Perspective of a Mobile Application Developer & Entrepreneur, Presentation at FCC Workshop on Innovation, Investment and the Open Internet, Jan. 13, 2010), at 4-6, *available at* <http://www.openinternet.gov/workshops/innovation-investment-and-the-open-internet.html> (discussing the challenges that service provider and/or application store gatekeepers present to mobile application developers); *iPhone Facebook App Developer Quits over Apple Process*, Daily Tech, Nov. 12, 2009, *available at* <http://www.dailytech.com/IPhone+Facebook+App+Developer+Quits+Over+Apple+Policies/article16805.htm>.

Factors influencing the development of mobile applications – such as the ways in which consumers can access applications, technological innovations, and the barriers to entry faced by application developers – are, for the most part, common across all applications. However, the entire mobile application segment is also fragmented into many different types of applications, and the applications themselves may be part of separate product markets. For instance, mobile mapping applications may compete with GPS devices and even printed maps in the larger market for road navigation. And mobile gaming applications may compete with portable and fixed gaming platforms as part of the larger gaming market.

3. Mobile Commerce

333. Mobile commerce refers to commercial transactions made using a mobile wireless device. It can include online banking and shopping via the mobile web, applications designed to enable mobile commerce, mobile advertising, mobile coupons, and using a mobile device to make payments as a substitute for credit cards and cash.

334. With consumers using mobile devices to browse the web and access application stores, rather than only for simpler functionalities such as texting, there is a greater potential for these devices to be used for mobile commerce.⁸⁶⁹ Mobile commerce is just emerging but is expected to grow quickly. Estimates of mobile commerce spending in 2009 range from \$500 million to \$1.3 billion in 2009 to \$12 billion in 2013.⁸⁷⁰ Data from comScore shows that 10 percent of smartphones and 12 percent of iPhones have been used to access online retail sites, as compared to only one percent of traditional handsets.⁸⁷¹ According to Morgan Stanley, mobile devices have distinct attributes that will enable them to expand electronic commerce beyond fixed devices.⁸⁷² For example, mobile devices can be used for location-based services which enable real-time physical retail and service opportunities.⁸⁷³ Certain mobile applications provide better, more transparent information on pricing by, for example, allowing consumers to compare instantly local and online prices.⁸⁷⁴ Mobile devices can also offer instant gratification with immediate digital product and content delivery regardless of where a consumer is located.⁸⁷⁵ Finally, mobile devices allow consumers to take advantage of time-based selective Internet sales more easily.⁸⁷⁶

335. Certain applications available from mobile browsers or mobile application stores are designed to enable various mobile commerce functionalities, including making online purchases from a mobile device, providing transparent pricing information, coupons, and mobile banking. For example, eBay offers an application for the iPhone which allows consumers to buy and sell products through its website and which generated \$380 million in gross merchandise value during the first nine months of 2009.⁸⁷⁷ ShopSavvy and Amazon.com offer applications that allow users to scan a bar code using their device cameras and compare the price of a product in the physical store with its price online.⁸⁷⁸ The Coupon Sherpa application allows consumers to scan a barcode with a smartphone camera and receive a

⁸⁶⁹ *Finding Value in Smartphones*, at 30.

⁸⁷⁰ *Id.* at 33.

⁸⁷¹ *Id.* at 30.

⁸⁷² *Morgan Stanley Mobile Internet Report*, at 218.

⁸⁷³ *Id.*

⁸⁷⁴ *Id.*

⁸⁷⁵ *Id.*

⁸⁷⁶ *Id.*

⁸⁷⁷ *Finding Value in Smartphones*, at 31-32.

⁸⁷⁸ *Morgan Stanley Mobile Internet Report*, at 218; Amazon, *Amazon App for Android*, <http://www.amazon.com/gp/anywhere/sms/android> (visited Apr. 28, 2010).

discount at checkout.⁸⁷⁹ In addition, Bank of America and Wells Fargo both offer banking applications for the iPhone.⁸⁸⁰

336. Using mobile wireless handsets and devices to replace credit cards or cash, by making on-the-spot, contactless payments via a short-range wireless link from the device, is another functionality that is emerging, largely in Japan and South Korea, although not yet widely available in the United States.⁸⁸¹ In order for mobile payment applications to be successful, analysts argue that they must offer greater functionality than simple credit card replacement.⁸⁸² According to a study by the Information Technology & Innovation Foundation (ITIF), mobile payment applications could be used to pay for taxis, movie tickets, parking meters, parking garages, vending machines, and subway rides.⁸⁸³ They could also potentially be used for hotel and airport check-in, taking attendance at school, and entry into health clubs or apartment buildings.⁸⁸⁴

337. The widespread use of mobile payment applications requires investment, buy-in, and coordination from several stakeholders – including mobile wireless service providers, device manufacturers, third-party application developers, financial institutions, merchants, public transit authorities, government agencies, and consumers – in order to deploy both devices that are capable of making contactless mobile payments and terminals that can accept such payments.⁸⁸⁵

338. Over 500,000 contactless credit card terminals have been deployed in the United States by 140,000 merchants, and contactless credit cards have been issued to more than 100 million Americans. MasterCard has begun running pilot programs that allow mobile devices, linked to a customer's account, to make contactless mobile payments at MasterCard's PayPass terminals.⁸⁸⁶

⁸⁷⁹ *Id.*

⁸⁸⁰ *Finding Value in Smartphones*, at 45.

⁸⁸¹ In Japan, 73 percent of mobile phones have a mobile payment capability, and 17 million people make contactless mobile payments from their mobile phones. In South Korea, 12 million mobile phones have mobile payment capability, and 4 million people use their mobile phones to make payments. A limited number of mobile payment trials have been conducted in a few U.S. cities. Stephen Ezell, *Contactless Mobile Payments*, The Information Technology & Innovation Foundation, Nov. 2009, at 2-3, 26.

⁸⁸² Stephen Ezell, *Contactless Mobile Payments*, The Information Technology & Innovation Foundation, November 2009, at 2.

⁸⁸³ *Id.* at 11.

⁸⁸⁴ *Id.*

⁸⁸⁵ *Id.*, at 2.

⁸⁸⁶ *Finding Value in Smartphones*, at 45-46.

VIII. INTERMODAL COMPETITION

A. Voice Services

339. The number of adults who rely exclusively on mobile wireless for voice service has increased significantly in recent years. According to the 2009 National Health Interview Survey (NHIS), 21.1 percent of adults, or one out of every 5, lived in households with only wireless phones in the first half of 2009, up from 16.1 percent in the first half of 2008, 12.6 percent in the first half of 2007, and 9.6 percent in the first half of 2006. The results of this survey, which are shown in Chart 46, reveal that the proportion of wireless-only adults aged 30 years and older has steadily increased in recent years.⁸⁸⁷ In the first half of 2009, the majority of wireless-only adults (57.2 percent) were aged 30 and over, up from 48.4 percent three years earlier. More than one-third of adults aged 18-24 years (37.6 percent) and nearly half of adults aged 25-29 years (45.8 percent) lived in households with only wireless telephones. Approximately one-third of adults aged 30-34 years (33.5 percent) also lived in households with only wireless telephones. However, as age increases above 35 years, the survey found that the percentage of adults living in households with only wireless telephones decreases: 21.5 percent for adults aged 35-44; 12.8 percent for adults aged 45-64; and 5.4 percent for adults aged 65 years and over. Nevertheless, the percentage of wireless-only adults within each age group has increased over time.

340. In the first half of 2009, according to the NHIS survey, 22.7 percent of households, or more than one out of every five, were wireless-only, up from 17.5 percent in the first half of 2008, 13.6 percent in the first half of 2007, and 10.5 percent in the first half of 2006.⁸⁸⁸ A recent Nielsen Company survey shows a similar rising trend in households who have “cut the cord.”⁸⁸⁹ In the second quarter of 2009, according to the Nielsen survey, 21 percent of households, or over one in five, reported they are wireless cellular only, a 16 percent increase from 18 percent of households in 2008, and up from 15 percent of households in both 2006 and 2007.⁸⁹⁰

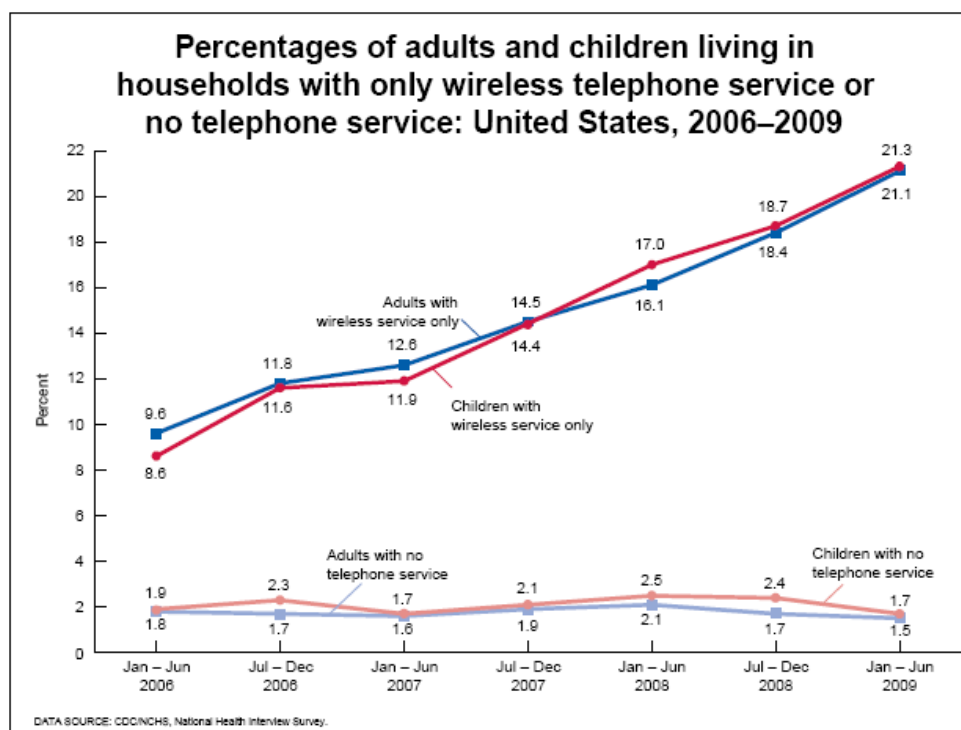
⁸⁸⁷ Stephen J. Blumberg and Julian V. Luke, *Wireless Substitution: Early Release of Estimates From The Data from the National Health Interview Survey, January – June 2009*, National Center for Health Statistics, Centers for Disease Control, Dec. 16, 2009, available at <http://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless200912.pdf>.

⁸⁸⁸ *Id.*

⁸⁸⁹ *Study: More Cellular-only Homes as Americans Expand Mobile Media Usage*, NIELSEN WIRE, Dec. 21, 2009.

⁸⁹⁰ *Id.* According to the Nielsen Company, the increase comes from the two-thirds of households who have dropped their landlines as well as from young adults who started new households with just a wireless phone service.

Chart 46
Wireless-Only Households⁸⁹¹



B. Broadband Services

341. As noted previously in this *Report*, the Commission estimates that there were approximately 25 million terrestrial mobile wireless high-speed Internet access connections in use at the end of 2008.⁸⁹² Mobile wireless connections represented nearly 25 percent of the more than 102 million high-speed connections in the United States in December 2008.⁸⁹³ In addition, at the end of 2008, there were approximately 86 million mobile devices in use capable of sending or receiving information at speeds exceeding 200 kbps in at least one direction.⁸⁹⁴

342. It is not yet clear whether mobile wireless Internet access services can substitute completely for fixed wireline Internet access technologies such as cable modem, DSL, or fiber.⁸⁹⁵ The extent to which mobile wireless services can impose some competitive discipline on wireline providers will depend on how technology, costs, and consumer preferences evolve, and on the business strategies of

⁸⁹¹ Stephen J. Blumberg and Julian V. Luke, *Wireless Substitution: Early Release of Estimates From The Data from the National Health Interview Survey, January – June 2009*, National Center for Health Statistics, Centers for Disease Control, Dec. 16, 2009, available at <http://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless200912.pdf>.

⁸⁹² See Section V.A.1, Mobile Wireless Subscribers by Type of Service, *supra*. High-speed connections include lines or wireless channels that connect residential or business customers to the Internet at speeds exceeding 200 kbps in at least one direction. *High-Speed Services for Internet Access: Status as of December 31, 2008*, Industry Analysis and Technology Division, Wireline Competition Bureau, FCC, Feb. 2010, at 9, available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-296239A1.pdf.

⁸⁹³ *Id.* at 5.

⁸⁹⁴ See Section V.A.1, Mobile Wireless Subscribers by Type of Service, *supra*.

⁸⁹⁵ *National Broadband Plan*, at 42-44; U.S. Department of Justice *Ex Parte*, GN Docket No. 09-51 (filed Jan. 4, 2010), at 8, 10.

providers that offer both wireless and wireline Internet access services.⁸⁹⁶ Mobile wireless Internet access service could provide an attractive alternative to wireline offerings for consumers who are willing to trade off speed for mobility, and also consumers who are relatively indifferent with regard to the attributes, performance, and pricing of mobile and fixed platforms.⁸⁹⁷ Moreover, while mobile wireless service currently is not competitive with wireline for those consumers who value high speeds over other attributes, advances in wireless technologies, coupled with increases in the supply of spectrum, have the potential to make mobile wireless service a more viable competitor at higher data speeds at some future date.⁸⁹⁸

C. Wireless Local Area Networks and Wireless-Wireline Convergence

343. Using both unlicensed and licensed spectrum, wireless providers employ technologies, such as wireless local area networks (WLANs) and femtocells, which converge wireless and wireline networks and play an increasingly important role as a competitor and supplement to the services offered by the CMRS industry. WLANs, which are widely deployed and operate on an unlicensed basis, enable consumers to obtain high-speed wireless Internet connections within a range of 150 to 250 feet from a wireless access point.⁸⁹⁹ The most prevalent WLAN technology is equipment manufactured in accordance with the IEEE 802.11 family of standards, commonly known as “Wi-Fi,” short for wireless fidelity. Peak WLAN data transfer rates range from speeds of up to 11 Mbps for 802.11b, up to 54 Mbps for 802.11a and 802.11g, and up to 600 Mbps for 802.11n.

344. With off-the-shelf, “plug-and-play” equipment widely available, WLANs have proliferated in homes and businesses.⁹⁰⁰ In addition, WLAN users can access high-speed Internet connections at so-called “hot spots,” including locations such as restaurants, coffee shops, hotels, airports, convention centers, and city parks.⁹⁰¹ Estimates of the number of public Wi-Fi hot spots in the United States vary considerably, and there are a number of Wi-Fi directories available on-line for consumers to find public Wi-Fi hot spots.⁹⁰² According to one study, there continues to be significant growth in Wi-Fi hot spots globally, with an estimated 47 percent increase in hot spot usage for 2009, bringing the total number of global hot spot connects to approximately 1.2 billion.⁹⁰³

345. Several mobile wireless providers have entered the hot spot operation business through

⁸⁹⁶ *National Broadband Plan*, at 42; *National Broadband Plan*, at 42-44; U.S. Department of Justice *Ex Parte*, GN Docket No. 09-51 (filed Jan. 4, 2010), at 8, 10, 11.

⁸⁹⁷ *National Broadband Plan*, at 43 and 64, note 3; *National Broadband Plan*, at 42-44; U.S. Department of Justice *Ex Parte*, GN Docket No. 09-51 (filed Jan. 4, 2010), at 8.

⁸⁹⁸ *National Broadband Plan*, at 43.

⁸⁹⁹ Services provided over WLANs are not CMRS services. See 47 C.F.R. §§ 20.3, 20.9 for a discussion of commercial mobile radio services. WLANs are permitted to operate on an unlicensed basis under Part 15 of the Commission’s rules. See 47 C.F.R. §15, et seq.

⁹⁰⁰ Off-the-shelf, “plug-and-play” WLAN network equipment sold by companies such as Linksys and Netgear has allowed consumers to easily extend the reach of their wireline broadband connections and enabled portability within and around the home.

⁹⁰¹ See *Seventh Report*, 17 FCC Rcd at 13062-13063. Hot spots typically rely on high-speed landline technologies, such as T-1 lines, DSL, or cable modems, to connect to the Internet.

⁹⁰² See Hotspotr, *WiFi Cafes and Hotspots*, available at <http://hotspotr.com/wifi> (16,813 hot spots) (visited Jan. 13, 2010); Jiwire, *Global Wi-Fi Finder*, available at http://www.jiwire.com/hot-spot-directory-browse-by-state.htm?country_id=1&provider_id=0 (visited Jan. 13, 2010) (69,730 hot spots in the U.S.).

⁹⁰³ *Hotspot Usage Is Increasingly Shifting Away From Notebooks and Laptops and Toward Handhelds*, Press Release, In-Stat, Dec. 23, 2009.

acquisitions, partnerships, or independent deployments.⁹⁰⁴ For instance, AT&T, Verizon Wireless, and T-Mobile each currently offer Wi-Fi access at thousands of hot spot locations throughout the United States.⁹⁰⁵ Furthermore, according to one estimate, AT&T has experienced 500 percent growth in hot spot usage from 2008 to 2009.⁹⁰⁶ Whereas Verizon Wireless' hot spot access requires a monthly broadband plan, both AT&T and T-Mobile offer hot spot access to consumers without a term contract.⁹⁰⁷ In addition, both AT&T and Verizon Wireless provide hot spot access to select customers without additional charge, while T-Mobile offers the service to its existing customers at a discounted price of \$9.99 per month.⁹⁰⁸ While the mobile wireless providers' hot spots are fixed wireless networks, they offer service that complements mobile broadband data services and could function as a competitive constraint on competing mobile broadband networks.

346. As discussed in the *Thirteenth Report*, many retailers now offer Wi-Fi hot spot access in their stores as a way to attract customers.⁹⁰⁹ For instance, through agreements with AT&T, national chains such as Starbucks, McDonald's, and Barnes & Noble offer Wi-Fi access in their establishments.⁹¹⁰ Starbucks offers complimentary two-hours per day of Wi-Fi access for Starbucks' customers when they

⁹⁰⁴ *Ninth Report*, 19 FCC Rcd at 20687, ¶ 221.

⁹⁰⁵ See AT&T, *AT&T Wi-Fi: At a Glance*, http://www.att.com/Common/about_us/files/pdf/wifi/Wi-Fi_at_a_Glance.pdf (visited Jan. 25, 2010) (advertising the nation's largest Wi-Fi network, with more than 20,000 locations in all fifty states); Verizon Wireless, *Hit the Hotspots with Verizon Wi-Fi*, <https://www.verizonwireless.com/b2c/mobilebroadband/?page=wifiaccess> (visited Jan. 25, 2010) (advertising "thousands of Verizon Wi-Fi hotspots across the U.S., Canada and Mexico"); T-Mobile, *T-Mobile HotSpot Locations*, <https://selfcare.hotspot.t-mobile.com/locations/viewLocationMap.do> (visited Jan. 25, 2010) (advertising over 10,000 locations in the United States). See generally AT&T, *AT&T Wi-Fi*, <http://www.att.com/gen/general?pid=5949> (visited Jan. 25, 2010); T-Mobile, *Wireless Internet Access – T-Mobile HotSpots*, <https://content.hotspot.t-mobile.com/AssetProcess.asp?asset=com.default.main.001> (visited Jan. 25, 2010).

⁹⁰⁶ *Wi-Fi Hotspots: Cellular Handsets and Portable Devices Drive a Market Renaissance*, In-Stat, Nov. 2009.

⁹⁰⁷ See Verizon Wireless, *Hit the Hotspots with Verizon Wi-Fi*, available at <https://www.verizonwireless.com/b2c/mobilebroadband/?page=wifiaccess> (visited Jan. 25, 2010); AT&T, *AT&T Wi-Fi: At a Glance*, http://www.att.com/Common/about_us/files/pdf/wifi/Wi-Fi_at_a_Glance.pdf (visited Jan. 25, 2010) (stating that "[o]ne-time hot spot connections are available for as low as \$2.95 for two hours"); T-Mobile, *T-Mobile Hotspot – Service Plans*, available at https://selfcare.hotspot.t-mobile.com/services_plans.do (visited Jan. 25, 2010) (advertising "DayPass" and "Pay As You Go" plans with no term commitment).

⁹⁰⁸ See AT&T, *AT&T Wi-Fi: At a Glance*, http://www.att.com/Common/about_us/files/pdf/wifi/Wi-Fi_at_a_Glance.pdf (visited Jan. 25, 2010) (stating that "[u]nlimited access to AT&T Wi-Fi hotspots in the U.S. is included for millions of residential, small business and enterprise customers with select AT&T High Speed Internet, LaptopConnect, and smartphone plans"); Verizon Wireless, *Hit the Hotspots with Verizon Wi-Fi*, <https://www.verizonwireless.com/b2c/mobilebroadband/?page=wifiaccess> (visited Jan. 25, 2010) (stating that Verizon Wi-Fi is "included for our Mobile Broadband customers."); T-Mobile, *T-Mobile Hotspot – Service Plans*, https://selfcare.hotspot.t-mobile.com/services_plans.do (visited Jan. 25, 2010) (advertising \$9.99 per month as a "discount for qualifying T-Mobile voice plan customers only").

⁹⁰⁹ See *Wi-Fi Hotspots Stay Hot In 2008*, CELLULAR-NEWS.COM, July 17, 2008. ABI Research Vice President and Research Director, Stan Schatt stated, "Starbucks' decision to go to a virtually free Wi-Fi hotspot model is having a profound impact. Hotspot owners are beginning to see Wi-Fi as a cost of doing business and an operation expense, rather than as a profit center." *Id.*

⁹¹⁰ See Starbucks, *High-speed Internet Access at Starbucks*, <http://www.starbucks.com/retail/wireless.asp> (visited Jan. 13, 2010) (*High-speed Internet Access at Starbucks*); McDonald's, *McDonald's Wireless Connectivity*, http://www.mcdonalds.com/wireless/general_info.html (visited Jan. 13, 2010) (advertising Wi-Fi hot spot access at more than 9,500 locations in the United States); Barnes & Noble, *Now at Barnes & Noble, Complimentary Wi-Fi*, <http://www.barnesandnoble.com/u/Wi-fi-at-Barnes-and-Noble/379001240/?cids2Pid=27242&linkid=1508869> (visited Jan. 25, 2010).

register a Starbucks' Card and use it once a month.⁹¹¹ Additionally, AT&T's Wi-Fi customers have complimentary access to the Starbucks' hot spots, as do T-Mobile's Wi-Fi customers through a roaming agreement between AT&T and T-Mobile.⁹¹² Barnes & Noble and McDonald's also both offer complimentary Wi-Fi access.⁹¹³ In addition, Borders recently signed an agreement with Verizon for Verizon to provide free Wi-Fi access in more than 500 of Borders' stores nationwide.⁹¹⁴

347. While fixed wireless hot spot usage continues to grow, several mobile wireless providers have also introduced mobile hot spot devices capable of creating a personal, portable Wi-Fi hot spot that can connect multiple Wi-Fi enabled devices to the provider's mobile broadband network. For instance, the Sprint Personal Hotspot PHS300S tethers to Sprint Nextel USB modems to provide Wi-Fi access anywhere within Sprint Nextel's mobile broadband coverage.⁹¹⁵ The Novatel Wireless MiFi 2200, available to both Verizon Wireless and Sprint Nextel customers, is "about the size of eight stacked credit cards" and supports up to five Wi-Fi enabled devices.⁹¹⁶ Additionally, Sprint Nextel has introduced the Overdrive 3G/4G Mobile Hotspot by Sierra Wireless, which functions similarly to the MiFi 2200 but also includes access to 4G data speeds.⁹¹⁷ In July of 2009, Novatel Wireless unveiled the MiFi 2372 HSPA, a newer version of its Intelligent Mobile Hotspot with multi-mode operation, including HSPA, UMTS, EDGE and GPRS.⁹¹⁸

348. A number of mobile wireless providers now offer dual-mode handsets that operate on

⁹¹¹ *High-speed Internet Access at Starbucks*. By registering for complimentary Wi-Fi access, customers also agree to receive up to four e-mails per year from AT&T. *Id.*

⁹¹² *High-speed Internet Access at Starbucks*. For all other customers, Starbucks offers two consecutive hours of Wi-Fi service for \$3.99. *Id.*

⁹¹³ Barnes & Noble, *Now at Barnes & Noble, Complimentary Wi-Fi*, <http://www.barnesandnoble.com/u/Wi-fi-at-Barnes-and-Noble/379001240/?cds2Pid=27242&linkid=1508869> (visited Jan. 25, 2010); McDonald's, *Free Wi-Fi @ McDonald's*, http://www.mcdonalds.com/us/en/services/free_wifi.html (visited May 18, 2010). Prior to January 2010, McDonald's offered two hours of Wi-Fi Internet access for \$2.95. *See McDonald's Plans to Offer Free Wi-Fi*, CHICAGO TRIBUNE, Dec. 16, 2009, available at <http://www.chicagotribune.com/business/chi-wed-mcdonalds-1216-dec16.0,1641922.story>.

⁹¹⁴ *Borders Signs Agreement with Verizon to Offer Free Wi-Fi*, PR NEWswire, Sept. 29, 2009, available at <http://www.prnewswire.com/news-releases/borders-signs-agreement-with-verizon-to-offer-free-wi-fi-62675172.html> (visited Jan. 25, 2010).

⁹¹⁵ Sprint Nextel, *Sprint – All Accessories*, http://nextelonline.nextel.com/NASApp/onlinestore/en/Action/OSBrowseAccessoriesDetail?PHONE_ID=FW300DOWMX&catRefName=Data+%26+Memory&selectedAccessoryID=MNX3517Q (visited Jan. 25, 2010). The Sprint Personal Hotspot PHS300S currently sells for \$159.99. *Id.*

⁹¹⁶ Verizon Wireless, *Verizon Wireless – Mobile Broadband – Products*, http://www.verizonwireless.com/b2c/mobilebroadband/?page=products_mifi (visited Jan. 25, 2010); Sprint Nextel, *MiFi™ 2200 by Novatel Wireless*, http://nextelonline.nextel.com/NASApp/onlinestore/en/Action/DisplaySelPhoneDetail?phoneSKU=Nv2200WFD0&id16=iSearch_MA_060109_MiFi&id16=mifi (visited Jan. 25, 2010).

⁹¹⁷ *See Sprint Nextel, Overdrive™ 3G/4G Mobile Hotspot by Sierra Wireless*, <http://nextelonline.nextel.com/NASApp/onlinestore/en/Action/DisplayPhones?phoneSKU=SWW8013G4G&id16=overdrive> (visited Jan. 25, 2010).

⁹¹⁸ *Novatel Wireless Announces MiFi 2372 Intelligent Mobile Hotspot Optimized for North American HSPA Broadband Networks*, BUSINESS WIRE, July 28, 2009, available at http://www.businesswire.com/portal/site/home/permalink/?ndmViewId=news_view&newsId=20090728005338&newsLang=en (visited Jan. 25, 2010).

both cellular and Wi-Fi networks.⁹¹⁹ According to CTIA, consumers in the United States have access to 29 different Wi-Fi enabled handsets,⁹²⁰ and 20 percent of new devices are now equipped with Wi-Fi capability.⁹²¹ As one example, the Apple iPhone runs on AT&T's EDGE and UMTS/HSDPA networks but can use a Wi-Fi connection when one is available.⁹²² With the increasing prevalence of Wi-Fi enabled handsets, such as the iPhone, hotspot usage by handsets has increased significantly as well.⁹²³ According to one study, handsets accounted for 35 percent of all hot spot connects in 2009, up from 20 percent in 2008, and are projected to account for half of all hot spot connects by 2011.⁹²⁴ Furthermore, with the recent growth of wireless data traffic, Wi-Fi provides a means for providers to offload some data traffic from their wireless networks. For example, studies suggest that about 40 percent of iPhone traffic in the United States is transmitted over a Wi-Fi connection.⁹²⁵

349. In addition to using Wi-Fi as a means of data access, certain mobile providers use

⁹¹⁹ *Wi-Fi in Mobile Phones: Dual Mode Becomes the Thing*, In-Stat, Nov. 2009. See, e.g., AT&T, *Cell Phones & Devices – Wireless from AT&T*, <http://www.wireless.att.com/cell-phone-service/cell-phones/cell-phones.jsp?feacondition=allphones&feapaytype=standard&startFilter=false&allTypes=on&feawifiCapable=wifiCapable&allManus=on> (visited Jan. 25, 2010) (listing 24 Wi-Fi capable phones or devices from AT&T); T-Mobile, *HotSpot Phones: Talk Away!*, http://www.t-mobile.com/templates/ListAllPhones.aspx/?features=4ce9c948-6b53-4b76-a3f7-9116f33bd25b&WT.mc_n=TMHSDDevice_WiFiLP&WT.mc_t=Offsite (visited Jan. 25, 2010) (listing 11 handsets available to use with T-Mobile's Unlimited HotSpot Calling service, which allows for unlimited nationwide calls over Wi-Fi); US Cellular, *US Cellular – Phones*, <http://www.uscellular.com/uscellular/zipCode.jsp?type=phones&call=0> (visited Jan. 25, 2010) (Wi-Fi capable handsets from US Cellular can be found by entering a zip code for a valid service area and applying the filter for “Wi-Fi” to the list of available handsets); Cincinnati Bell Wireless, *Cincinnati Bell Wireless Phones and Devices*, http://www.cincinnati-bell.com/consumer/wireless/phones_and_devices/?view=fusionwifi (visited Jan. 25, 2010) (listing five handsets available for use with Cincinnati Bell Wireless' Fusion WiFi service).

⁹²⁰ Letter from Christopher Guttman-McCabe, CTIA, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 09-51 (filed May 12, 2009).

⁹²¹ CTIA NOI Reply at 11. In addition, Sprint Nextel has announced that it will be “embracing WiFi in all its major devices going forward.” Mike Dano, *Sprint's Blackberry Tour to Sprout WiFi Next Year*, FIERCEWIRELESS, July 9, 2009, at <http://www.fiercewireless.com/story/sprints-blackberry-tour-sprout-wifi-next-year/2009-07-09> (visited Feb. 2, 2010).

⁹²² See Walter S. Mossberg and Katherine Boehret, *Testing Out the iPhone*, WALL STREET JOURNAL, June 27, 2007, at D1. The first iPhone model was able to seamlessly switch from an EDGE to a Wi-Fi connection, and automatically displayed a list of new Wi-Fi networks in range as the user moves to a new location. Later models of the iPhone – the iPhone 3G and iPhone 3G S – have added 3G UMTS/HSDPA capability and similarly offer Wi-Fi connectivity. See Walter S. Mossberg, *Newer, Faster, Cheaper iPhone 3G*, WALL STREET JOURNAL, July 8, 2008, at D1; Walter S. Mossberg, *Apple iPhone 3G S Is Better Model – Or Just Get OS 3.0*, WALL STREET JOURNAL, June 18, 2009, at D1.

⁹²³ See AdMob Mobile Metrics Report (Nov. 2009), available at <http://metrics.admob.com/wp-content/uploads/2009/12/AdMob-Mobile-Metrics-Nov-09.pdf> (visited Feb. 10, 2010). According to the study, the percentage of mobile advertising requests from devices with Wi-Fi capability increased from 19 percent to 55 percent between November 2008 and November 2009. In addition, the percentage of requests over a Wi-Fi network in the United States tripled – from 8 percent to 24 percent – during the same period. *Id.* at 3.

⁹²⁴ *Hotspot Usage Is Increasingly Shifting Away From Notebooks and Laptops and Toward Handhelds*, Press Release, In-Stat, Dec. 23, 2009.

⁹²⁵ See AdMob Mobile Metrics Report (Nov. 2009), available at <http://metrics.admob.com/wp-content/uploads/2009/12/AdMob-Mobile-Metrics-Nov-09.pdf> (visited Feb. 10, 2010) at 3 (stating that 36 percent of U.S. iPhone traffic is transmitted via Wi-Fi); see also AdMob Mobile Metrics Report (Nov. 2008), available at http://www.admob.com/marketing/pdf/mobile_metrics_nov_08.pdf at 2 (stating that 42 percent of iPhone traffic was transported over Wi-Fi).

WLANs to augment their CMRS-based voice services with voice connections at Wi-Fi hot spots. T-Mobile and Cincinnati Bell Wireless offer Wi-Fi-based services – “T-Mobile @Home” and “Fusion WiFi,” respectively – featuring dual-mode mobile handsets that offer seamless voice connections on both Wi-Fi and the operators’ GSM cellular networks for about \$10 per month.⁹²⁶ These services offer improved, in-building coverage and unlimited calling through a specified home or office Wi-Fi router or at provider-branded hot spot locations. Through these services, consumers can avoid using their GSM voice minutes from their monthly service plans when they use service through a Wi-Fi hot spot.⁹²⁷

350. Several other providers also supplement their network coverage with services similar to the Wi-Fi router services discussed above. However, instead of connecting calls through a home Wi-Fi router operating over unlicensed spectrum, these other providers rely on femtocell devices. A femtocell is a miniature base station that transmits in the licensed spectrum of the wireless provider offering the device and provides improved coverage within a subscriber’s home. It uses the subscriber’s home broadband connection for backhaul. Sprint Nextel’s femtocell service, called Airave™, allows subscribers to make unlimited wireless calls from their homes for a monthly service fee.⁹²⁸ Sprint Nextel began offering its Airave™ service nationwide on August 17, 2008.⁹²⁹ In 2009, both Verizon Wireless and AT&T introduced their own femtocell products. The Verizon Wireless Network Extender was unveiled in January of 2009 and allows customers to place calls using their current phones and calling plans.⁹³⁰ In late 2009, AT&T conducted a public trial of its femtocell product – the AT&T 3G MicroCell – in Charlotte, North Carolina.⁹³¹ According to one study, approximately 350,000 femtocells were shipped in 2009, although the study also notes that the pace of adoption for femtocells has been slower

⁹²⁶ See T-Mobile, *T-Mobile @Home*, http://www.t-mobile.com/shop/addons/services/information.aspx?PAsset=TMobileAtHome&tp=Svc_Sub_TMobilAtHomeOvw (visited Jan. 13, 2010); Cincinnati Bell Wireless, *Cincinnati Bell Wireless – Fusion WiFi*, http://www.cincinnati-bell.com/consumer/wireless/fusion_wifi/ (visited Jan. 25, 2010).

⁹²⁷ *Id.* Unlicensed Mobile Access (UMA) technology enables the seamless mobility afforded by these services, in which calls are automatically switched or handed off from a Wi-Fi to a cellular network, or vice versa, without interruption as a subscriber moves from one location to another. Glenn Fleishman, *T-Mobile Might Make Home VoIP Play on Top of Converged Calling*, WI-FI NET NEWS, Aug. 10, 2007.

⁹²⁸ Sprint Nextel, *Sprint Airave*, <http://www.nextel.com/en/services/airave/index.shtml> (visited Jan. 13, 2010). Customers pay \$99.99 to purchase the Airave base station plus a \$4.99 per month enhanced coverage charge as well as an optional monthly fee of \$10 per line for unlimited calling. *Id.* See also Sprint Nextel, *Airave Frequently Asked Questions*, at 3, http://www.nextel.com/assets/pdfs/en/services/sprint_airave_faqs.pdf (visited Jan. 13, 2010). The Airave includes voice, not data, services. *Id.* at 3.

⁹²⁹ *Sprint Customers Nationwide Can Soon Get Enhanced Coverage, Unlimited Calling in Homes, Offices With The Award-Winning Sprint AIRAVE By Samsung*, Press Release, Sprint Nextel, July 30, 2008.

⁹³⁰ See Verizon Wireless “Network Extender” Enhances In-Home Call Capabilities, Press Release, Verizon Wireless, Jan. 26, 2009. See also Verizon Wireless, *Verizon Wireless Network Extender*, <http://www.verizonwireless.com/b2c/store/accessory?action=gotoFeatures> (visited Jan. 13, 2010). Customers pay \$249.99 for the Network Extender base station but pay no additional monthly access fee. *Id.* See also Verizon Wireless, *Answers to FAQs*, http://support.vzw.com/faqs/Equipment/network_extender.html (visited Jan. 25, 2010). The Network Extender does not support EVDO data speeds. *Id.*

⁹³¹ See Prince McLean, *AT&T MicroCell to Cost \$150, Require No Monthly Fee*, AppleInsider, Sept. 21, 2009, at http://www.appleinsider.com/articles/09/09/21/att_3g_microcell_to_cost_150_require_no_monthly_fees.html. Under AT&T’s trial pricing, AT&T wireless customers pay \$20 per month for unlimited calling with the 3G Microcell, while AT&T landline phone or Internet customers pay \$10 per month, and customers with all three services can use the device for free. *Id.* See also AT&T, *AT&T 3G MicroCell*, <http://www.wireless.att.com/learn/why/3gmicrocell/> (visited Jan. 13, 2010). The AT&T 3G MicroCell supports 3G data speeds and is currently available for purchase and use in select markets. *Id.*

than previously expected.⁹³²

⁹³² 2009 Femtocell Shipment Numbers Cut by 55%, Press Release, ABI Research, Nov. 12, 2009.

IX. URBAN-RURAL COMPARISONS

351. Since the release of the *Sixth Report*,⁹³³ the Commission has attempted to obtain a better understanding of the state of competition below the national level, and particularly in rural areas. The Communications Act does not include a statutory definition of what constitutes a rural area.⁹³⁴ The Commission used Rural Services Areas (RSAs) as a proxy for rural areas for certain purposes, such as the former cellular cross-interest rule and the former CMRS spectrum cap, stating that “other market designations used by the Commission for CMRS, such as [EAs], combine urbanized and rural areas, while MSAs and RSAs are defined expressly to distinguish between rural and urban areas.”⁹³⁵ Since its 2004 *Report and Order* concerning deployment of wireless services in rural areas, however, the Commission has adopted a “baseline” definition of rural as a county with a population density of 100 persons or fewer per square mile.⁹³⁶ For this reason, we adopt this same definition to analyze service availability in rural areas in this *Report*.

352. By this definition, roughly 61 million people, or 21 percent of the U.S. population,⁹³⁷ live in rural counties. These counties comprise 3.1 million square miles, or 86 percent of the geographic area of the United States.⁹³⁸ The distribution of rural counties across the United States can be seen in Map 3 below. Approximately 79 percent of the U.S. population lives on 14 percent of the land, while 21 percent live on the remaining 86 percent of the land.

⁹³³ *Sixth Report*, 16 FCC Rcd at 13350.

⁹³⁴ The federal government has multiple ways of defining rural, reflecting the multiple purposes for which the definitions are used. *Eighth Report*, 18 FCC Rcd at 14834; Facilitating the Provision of Spectrum-Based Service to Rural Areas and Promoting Opportunities for Rural Telephone Companies to Provide Spectrum-Based Services, *Notice of Proposed Rulemaking*, 18 FCC Rcd 20802, 20808-11 (2003).

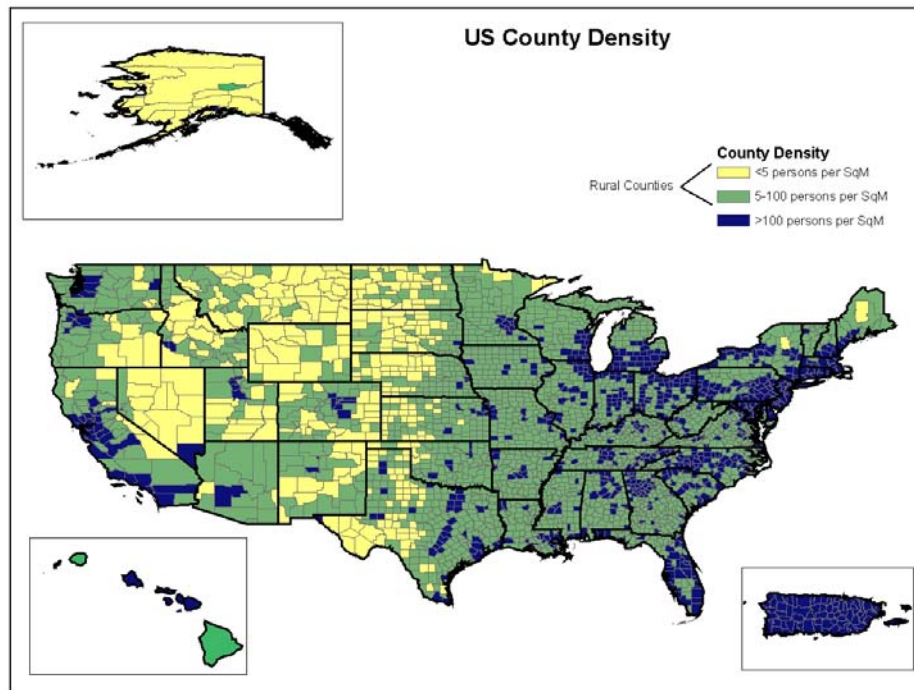
⁹³⁵ 1998 Biennial Regulatory Review, Spectrum Aggregation Limits for Wireless Telecommunications Carriers, *Report and Order*, 15 FCC Rcd 9219, 9256 ¶ 84, n.203 (1999).

⁹³⁶ Facilitating the Provision of Spectrum-Based Services to Rural Areas and Promoting Opportunities for Rural Telephone Companies To Provide Spectrum-Based Services, *Report and Order*, 19 FCC Rcd. 19078, 19087-88 (2004) (“We recognize, however, that the application of a single, comprehensive definition for ‘rural area’ may not be appropriate for all purposes. . . . Rather than establish the 100 persons per square mile or less designation as a uniform definition to be applied in all cases, we instead believe that it is more appropriate to treat this definition as a presumption that will apply for current or future Commission wireless radio service rules, policies and analyses for which the term ‘rural area’ has not been expressly defined. By doing so, we maintain continuity with respect to existing definitions of ‘rural’ that have been tailored to apply to specific policies, while also providing a practical guideline”).

⁹³⁷ Including the populations of Puerto Rico and the Virgin Islands.

⁹³⁸ Including the populations of Puerto Rico and the Virgin Islands.

Map 3
U.S. County Density⁹³⁹



353. Using coverage maps provided by American Roamer, we find that 98.5 percent of the U.S. rural population, based on census blocks, has coverage by at least one mobile wireless voice provider.⁹⁴⁰ This is only slightly lower than the percentage of the entire U.S. population, 99.6 percent, with coverage by at least one mobile voice provider. As shown in Table 38 and Chart 47 below, the percentage of the rural population with coverage by one or more providers (98.5 percent), or two or more providers (94.5 percent) is comparable to coverage for entire U.S. population.⁹⁴¹ Just over 900,000 people in rural areas have no mobile wireless coverage, and approximately 2.5 million have coverage by only one provider, down from approximately 2.6 million in July 2008. In addition, there is a disparity in the percentage of rural and total U.S. population covered by three or more, four or more, five or more, and six or more mobile voice providers. The largest gap is with five or more providers: 73 percent of the total U.S. population is covered by five or more mobile voice providers, while just 39 percent of the rural population is covered by five or more mobile voice providers.⁹⁴²

⁹³⁹ A larger version of this map may be found in Appendix D.

⁹⁴⁰ As discussed above in Section III.C.1, Number of Competitors, *supra*, there are 8 million census blocks in the United States, and a census block is the smallest geographic area for which population data is available. However, we note that we consider a census block to be covered even when only a portion of the block has mobile wireless coverage. In addition, different service providers may provide coverage in different areas within a census block. Any over counting of coverage may be accentuated in rural areas where census blocks are larger. See RTG PN Comments, at 6.

⁹⁴¹ See Table 6 in Section III.C.1, Number of Competitors, for the nationwide analog of Table 38.

⁹⁴² Commission analysis, using American Roamer database, Oct. 2009, and Census 2000 population figures.

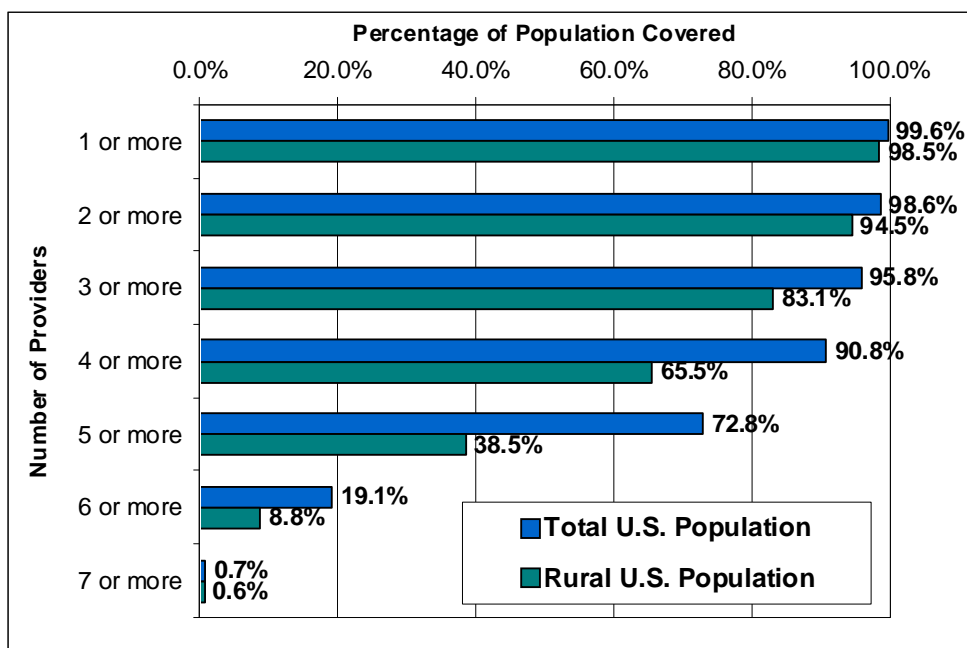
Table 38
Estimated Mobile Voice Providers in Rural Areas by Census Block

Total Number of Providers in a block	Number of Rural Census Blocks	POPs Contained in Rural Census Blocks	% of Total U.S. POPs	Square Miles Contained in Those Blocks	% of Total U.S. Square Miles
Total for Rural U.S.	4,169,790	60,836,650	21.3%	3,367,687	88.6%
			% of Total Rural US POPs		% of Total Rural US Square Miles
1 or More	3,937,968	59,907,519	98.5%	2,310,870	68.6%
2 or More	3,575,744	57,469,158	94.5%	1,759,319	52.2%
3 or More	2,831,795	50,527,557	83.1%	1,131,548	33.6%
4 or More	1,978,475	39,828,360	65.5%	641,065	19.0%
5 or More	979,198	23,413,805	38.5%	257,068	7.6%
6 or More	220,472	5,327,376	8.8%	50,192	1.5%
7 or More	17,056	369,429	0.6%	3,918	0.1%

Source: Commission estimates based on data supplied by American Roamer, Oct. 2009.

Notes: POPs are from the 2000 Census, and the square miles include the United States and Puerto Rico. There are approximately 8 million census blocks and 300 million people in the entire United States.

Chart 47
Mobile Voice Providers in Rural Areas



354. The figures on the percentage of the U.S. rural population covered by a certain number of providers are similar to those in the *Thirteenth Report*.⁹⁴³ In that *Report*, the Commission estimated, based on July 2007 American Roamer coverage maps, that 94.2 percent of the rural population had a

⁹⁴³ See *Thirteenth Report*, 24 FCC Rcd at 6239, ¶ 104.

choice of at least two providers, compared to 94.5 percent in October 2009. In addition, 82.1 percent of the rural population had a choice of at least three providers in July 2007, compared to 83.1 percent in October 2009; and 65.2 percent had a choice of at least four providers in July 2007, compared to 65.5 percent in October 2009.

355. Looking at mobile broadband service, Table 39 and Chart 48 below show that 92 percent of the U.S. rural population, based on a census block analysis of American Roamer data, has coverage by at least one mobile wireless broadband provider, compared 98 percent of the entire U.S. population.⁹⁴⁴ The U.S. population in rural areas is not served by as many providers as other areas of the country. While 76 percent of the total U.S. population lives in census blocks with three or more mobile broadband providers, only 30 percent of the rural population is served by at least three broadband providers. In addition, 58 percent of the total U.S. population lives in census blocks with four or more mobile broadband providers; in rural areas, only ten percent of the population is served by four or more providers.⁹⁴⁵

Table 39
Estimated Mobile Broadband Providers in Rural Areas by Census Block

Total Number of Providers in a Block	Number of Blocks	POPs Contained in Those Blocks	% of Rural U.S. POPs	Square Miles Contained in Those Blocks	% of Rural U.S. Square Miles
1 or More	3,422,482	55,990,890	92.0%	1,688,928	50.2%
2 or More	1,889,535	37,592,392	61.8%	706,670	21.0%
3 or More	635,043	18,032,174	29.6%	142,609	4.2%
4 or More	160,703	6,350,563	10.4%	24,500	0.7%

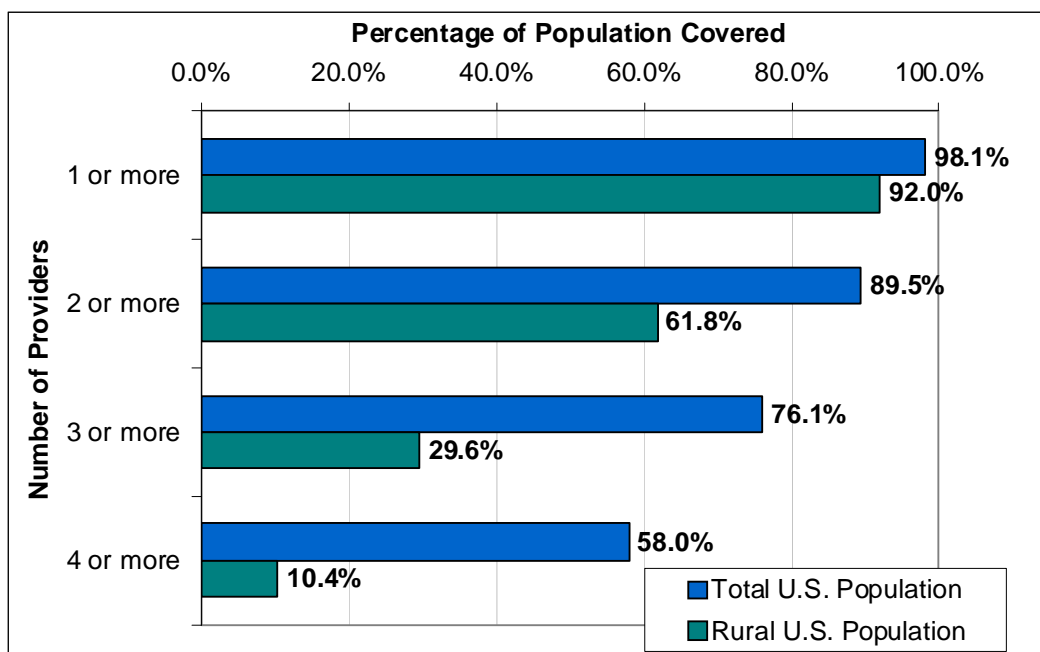
Source: Commission estimates based on data supplied by American Roamer, Nov. 2009 (EV-DO/HSDPA/WiMAX Coverage).

Notes: POPs are from the 2000 Census, and the square miles include the United States and Puerto Rico.

⁹⁴⁴ Commission analysis, using American Roamer database, Nov. 2009, and Census 2000 population figures.

⁹⁴⁵ See Table 7 in Section III.C.1, Number of Competitors, *supra*.

Chart 48
Mobile Broadband Providers in Rural Areas



356. In the fall of 2008, the National Telecommunications Cooperative Association (NTCA) surveyed its members regarding their provision of wireless services.⁹⁴⁶ Population density in most NTCA member service areas is extremely rural, between one and five persons per square mile.⁹⁴⁷ According to the survey report, 59 percent of survey respondents are offering wireless service to their customers.⁹⁴⁸ Among those respondents, 78 percent indicated that “competition from national carriers” was a major concern, and the average respondent indicated that their company competes with between one and four other providers, down from two to five other providers in the 2007 report.⁹⁴⁹ In addition, the percentage of respondents who claim that obtaining financing is “very difficult” or “virtually impossible” rose from 13 percent in 2007 to 34 percent in 2008.⁹⁵⁰

357. When looking at the features and services offered to wireless customers, a large percentage of the NTCA survey respondents that provide mobile wireless service offer family plans (92 percent), text messaging (83 percent), and unlimited local calling (75 percent).⁹⁵¹ A smaller, though still significant, percentage offer Internet access (67 percent), e-mail (58 percent), prepaid service (58 percent), and games by subscription (42 percent).⁹⁵² RTG claims that many rural service providers

⁹⁴⁶ See NTCA, *NTCA 2008 Wireless Survey Report*, Jan. 2009, at 3 (Jan. 2008), available at <http://www.ntca.org/images/stories/Documents/Advocacy/SurveyReports/2008ntcawirelessurveyreport.pdf> (2008 NTCA Wireless Survey).

⁹⁴⁷ 2008 NTCA Wireless Survey, at 4.

⁹⁴⁸ 2008 NTCA Wireless Survey, at 6; NTCA PN Comments at 2.

⁹⁴⁹ 2008 NTCA Wireless Survey, at 9.

⁹⁵⁰ 2008 NTCA Wireless Survey, at 8.

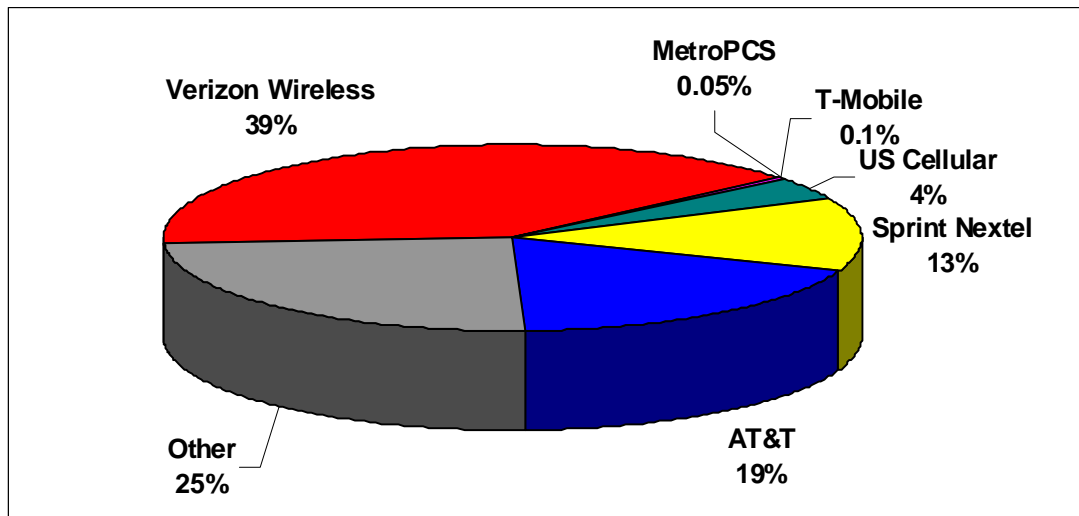
⁹⁵¹ 2008 NTCA Wireless Survey, at 10.

⁹⁵² 2008 NTCA Wireless Survey, at 10.

continue to offer regional rate plans, a practice nearly abandoned by nationwide providers.⁹⁵³ RTG also argues that mobile consumers in rural areas do not have the same choices that are available to consumers in urban and suburban areas, especially with respect to mobile broadband services.⁹⁵⁴

358. As discussed above, key inputs for the provision of mobile wireless services include spectrum, infrastructure, and backhaul, and such access to such inputs can affect entry into the mobile wireless services market in both urban and rural areas.⁹⁵⁵ Areas with low population density, such as rural areas, tend to have fewer facilities-based competitors than areas with higher population densities because the market may not be large enough for a potential entrant to recoup its network deployment costs over time from service revenues.⁹⁵⁶ Spectrum below 1 GHz can be crucial for the deployment of mobile wireless service in rural areas because its excellent propagation characteristics allow providers to cover a relatively large geographic area with a relatively small number of cell sites.⁹⁵⁷ Therefore, we have examined the current spectrum holdings of service providers in rural areas in the frequency bands both above and below 1 GHz. Chart 49 below shows that 58 percent of the MHz-POPs in the spectrum below 1 GHz in rural areas are held by the two largest service providers, Verizon Wireless and AT&T.⁹⁵⁸ The spectrum holdings above 1 GHz, on the other hand, are less concentrated and held by a range of different service providers. As shown in Chart 50, the two largest providers hold only 23 percent of the MHz-POPs in the frequencies above 1 GHz.

Chart 49
MHz-POP Shares in Rural Areas: Below 1 GHz⁹⁵⁹



⁹⁵³ RTG NOI Comments at 7.

⁹⁵⁴ RTG NOI Comments at 8.

⁹⁵⁵ See Sections III.D, Entry and Exit Conditions, and VII.A, Input Segments, *supra*.

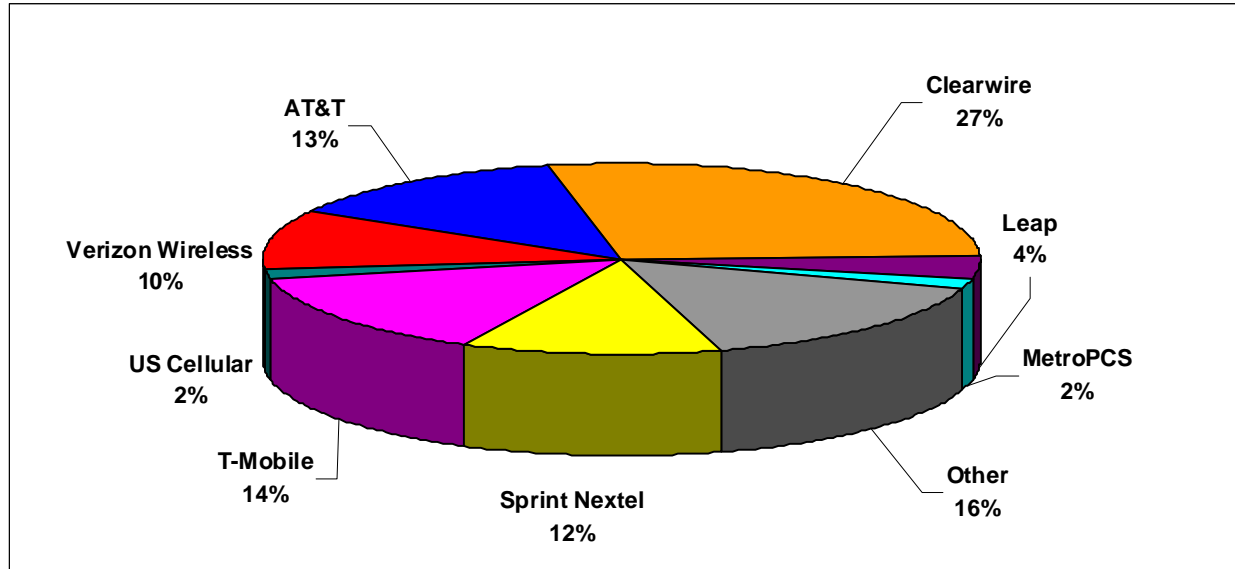
⁹⁵⁶ See Section III.D.2, Non-Regulatory Entry and Exit Conditions, *supra*.

⁹⁵⁷ See Section VII.A.1, Spectrum, *supra*.

⁹⁵⁸ Although the chart reflects Verizon's acquisition of Alltel, it does not reflect the divestiture of certain markets to other providers. See also, Table 25, Chart 41, and Chart 42 in Section VII.A.1, Spectrum, *supra*.

⁹⁵⁹ Commission estimates.

Chart 50
MHz-POP Shares in Rural Areas: Above 1 GHz⁹⁶⁰



⁹⁶⁰ Commission estimates.

X. INTERNATIONAL COMPARISONS

359. This section compares mobile market structure and performance in the United States, Western Europe and Asia-Pacific countries of comparable income levels.⁹⁶¹ To ensure that a consistent methodology is used to compile the data for different countries, the comparison is based on international cross-section data compiled by Bank of America Merrill Lynch.⁹⁶² Consequently, the estimates of mobile penetration, MOUs, average RPM, and concentration (as measured by HHI) for the U.S. mobile market cited in this section differ somewhat from estimates provided in previous sections of the *Report* because they come from different sources.⁹⁶³ In general, the comparison shows the following: (1) market structure is converging to three or four national competitors per market in many countries; (2) the calling party pays system used in most other countries tends to result in lower average voice usage (MOUs) and higher revenue per minute of voice service (RPM) than the receiving party pays system used in the United States;⁹⁶⁴ (3) the average monthly subscriber bill in the United States is much higher than the average bill in Western Europe, although Japan has a higher average monthly bill than either the United States or Western Europe; and (4) international differences in regulatory policy and business environment have produced a wide variety of successful models for the mobile sector, with no one model dominating on all dimensions of market performance.

⁹⁶¹ In accordance with established practice in using international benchmarking to assess effective competition in mobile markets, the comparison of mobile market performance is restricted to Western Europe and parts of the Asia-Pacific in order to ensure that the countries being compared are roughly similar to the United States with regard to their level of economic and telecommunications infrastructure development. *See, for example*, UK regulator Oftel's review of effective competition in the mobile market: *Effective Competition Review: Mobile*, Office of Telecommunications, Feb. 2001, at 7.

⁹⁶² *See* Glen Campbell *et al.*, *Global Wireless Matrix 4Q08*, Bank of America/Merrill Lynch, Global Equity Research, Apr. 13, 2009 (*Global Wireless Matrix 4Q08*). The Merrill Lynch HHI calculations are used in this Report only for the purposes of the international comparison. The HHI calculation for the United States in Section III.C.2, Concentration Measures, *supra*, differs from the Merrill Lynch estimate discussed in Section X.E, Concentration, *infra*.

⁹⁶³ In addition, Merrill Lynch has noted that these data have certain limitations for comparing countries that use calling party pays (CPP) versus mobile party pays (also known as receiving party pays). For reasons explained below, the figures for minutes of use may be somewhat understated, and the revenue figures used to calculate average revenue per minute may be somewhat overstated, in markets where CPP is used relative to non-CPP markets.

⁹⁶⁴ *See Thirteenth Report*, 24 FCC Rcd at 6290, ¶ 223.

Table 40
Mobile Market Performance in Selected Countries⁹⁶⁵

Country	Penetration (% of Pops)	Prepaid (% of Subs)	MOUs	Revenue per Minute (\$)	ARPU (\$)	Data (% of ARPU)
Receiving Party Pays						
USA	88.9	17.1	829	0.05	51.54	25.5
Canada	64.8	21.2	444	0.09	49.24	17.8
Hong Kong	147.6	44.9	447	0.04	20.40	26.7
Singapore	135.8	48.6	377	0.06	32.08	27.3
Calling Party Pays						
UK	125.5	62.0	192	0.12	35.35	27.8
Germany	130.6	56.6	102	0.16	20.59	25.3
Italy	152.7	88.3	131	0.16	26.87	24.7
Sweden	123.6	35.0	206	0.10	28.05	20.9
France	91.9	34.2	246	0.14	44.37	18.3
Finland	127.5	12.7	244	0.12	33.91	18.9
Japan	85.7	1.4	139	0.26	56.82	41.0
South Korea	93.9	3.0	320	0.08	30.34	17.0
Australia	109.9	44.9	218	0.11	34.57	32.4

A. ARPU

360. The average monthly subscriber bill (ARPU) in the United States, at \$51.54, is much higher than the Western European average of \$33.45.⁹⁶⁶ As explained below, however, although U.S. subscribers on average spend more per month for mobile services than their European counterparts, they also consume more mobile service, on average, compared to Europe. We note that Japan has a higher ARPU than either the United States or Western Europe. As indicated below and in the Table 42 above, the relatively high average monthly subscriber bill in Japan reflects two key factors – a relative high price per minute of voice service and relatively higher monthly spending per subscriber on data services.

B. Average Revenue Per Minute

361. As noted above, some analysts regard RPM as a good proxy for mobile pricing.⁹⁶⁷ RPM in Western Europe averaged about \$0.16 in the fourth quarter of 2008, and ranged from a low of \$0.10 in Sweden to a high of \$0.29 in Switzerland.⁹⁶⁸ At \$0.05, RPM in the United States during the same period

⁹⁶⁵ *Global Wireless Matrix 4Q08*.

⁹⁶⁶ *Global Wireless Matrix 4Q08*, at 2.

⁹⁶⁷ See Section V.E.1, Price Indicators, *supra*. Average RPM is calculated by dividing monthly voice-only ARPU by MOUs. Service revenues included in ARPU reflect the fees mobile operators collect from other network operators for terminating incoming calls on their networks as well as monthly service charges and usage fees paid by mobile subscribers. As noted above, MOUs figures may be somewhat understated in CPP markets relative to non-CPP markets (due to the aforementioned double-counting of on-net mobile-to-mobile minutes in non-CPP markets), and the revenue figures used to calculate ARPU may be somewhat overstated in CPP markets relative to non-CPP markets (due to double-counting of mobile termination revenues for off-net mobile-to-mobile calls in CPP markets). Consequently, the RPM figures (ARPU divided by MOUs) probably overstate the difference between RPM in the United States and CPP markets. The potential for service revenues to be somewhat overstated in CPP markets was brought to the Commission's attention by Professor Stephen Littlechild, and confirmed by Merrill Lynch through e-mail correspondence.

⁹⁶⁸ *Global Wireless Matrix 4Q08*, at 2.

remained less than one-third of the European average.⁹⁶⁹ Revenue per minute in Japan, at \$0.26, was more than five times the U.S. figure at the end of 2008.⁹⁷⁰

C. Usage

362. Bank of America Merrill Lynch estimates that U.S. mobile subscribers talked an average of 829 minutes per month on their mobile phones in the fourth quarter of 2008.⁹⁷¹ This compares with 139 MOUs in Japan and an average across Western Europe of 158 MOUs, with estimated MOUs in individual European countries ranging from a low of 102 in Germany to a high of 246 in France.⁹⁷²

D. Penetration Rates

363. According to Bank of America Merrill Lynch, mobile penetration in the United States was almost 89 percent in the fourth quarter of 2008.⁹⁷³ In comparison, Japan finished 2008 with mobile penetration nearing 86 percent, while mobile penetration averaged an estimated 127.7 percent in Western Europe at the end of 2008 and ranged from 92 percent in France to nearly 202 percent in Greece.⁹⁷⁴ In most West European countries, estimated mobile penetration exceeded 100 percent at the end of 2008, due in part to a high percentage of prepaid subscribers and ownership of multiple devices or subscriber identity module (SIM) cards.⁹⁷⁵

E. Concentration

364. Bank of America/Merrill Lynch's *Global Wireless Matrix* provides a cross-country

⁹⁶⁹ *Global Wireless Matrix 4Q08*, at 2. In e-mail correspondence, Merrill Lynch has indicated that RPM figures may overstate the difference between RPM in CPP and non-CPP markets by about 15 percent due to the two factors mentioned above. See also, AT&T PN Comments at 16.

⁹⁷⁰ *Global Wireless Matrix 4Q08*, at 2.

⁹⁷¹ *Global Wireless Matrix 4Q08*, at 2. This is higher than the 708 average monthly MOUs estimated by CTIA for the second half of 2008. See Section V.D, Output and Usage Levels, *supra*. For purposes of comparing metrics in different countries, average MOUs include both incoming and outgoing minutes, and usually exclude traffic related to mobile data services. Figures for MOUs are potentially somewhat understated in markets that employ CPP as compared to the U.S. mobile market and other non-CPP markets due to double-counting of same-network ("on-net") mobile-to-mobile minutes under the mobile party pays system used in the United States and other non-CPP markets. The double counting occurs because each minute of an on-net call is billed to both the caller and the receiver under the mobile party pays system, whereas under CPP each on-net minute is billed only to the calling party, and therefore counted only once. See *Tenth Report*, 20 FCC Rcd at 15976, n.457.

⁹⁷² *Global Wireless Matrix 4Q08*, at 2.

⁹⁷³ *Global Wireless Matrix 4Q08*, at 2.

⁹⁷⁴ *Global Wireless Matrix 4Q08*, at 2.

⁹⁷⁵ *Global Wireless Matrix 4Q08*, at 2. Reported mobile subscriber figures and penetration may be overstated in some countries, particularly those with a high percentage of prepaid subscribers, due in part to a combination of factors: (1) slow clearing out of inactive users (for example, subscribers who have switched service providers) from their former provider's subscriber base; (2) multiple device ownership (for example, users of a Blackberry plus a mobile phone); and (3) multiple SIM card ownership (for example, users who switch between operators in order to take advantage of different tariffs at different times of the day or week). See Jeff Kvaal *et al.*, *Wireless Equipment Industry Update: Strong Net Adds Drive Higher Phone Units*, Lehman Brothers, Equity Research, Jan. 16, 2007, at 4. As noted in previous reports, carriers have widely different policies to determine when to cut off inactive subscribers and to remove them from their reported subscriber base. In addition, it is becoming more prevalent for people to subscribe to multiple mobile service providers. See, e.g., *Eleventh Report*, 21 FCC Rcd at 11021, ¶ 190 n.506; *Tenth Report*, 20 FCC Rcd at 15976, n.452; *Seventh Report*, 17 FCC Rcd at 13033, and *Sixth Report*, 16 FCC Rcd at 13391.

comparison of HHIs calculated at national level.⁹⁷⁶ For the United States, the HHI at the national level is calculated by summing the squares of the subscriber market shares of the four nationwide operators and the residual subscriber market share of all remaining regional and local operators combined. Overall, this methodology understates concentration in industries, such as mobile wireless service, where the relevant geographic market is sub-national, and where the choice of competing providers is not relatively uniform throughout the country.⁹⁷⁷ The U.S. mobile market, for instance, is characterized by significant regional variation in choice of competing providers.

365. The Bank of America/Merrill Lynch study estimated that the U.S. mobile market had an HHI of 2220 at the end of 2008, the lowest among comparable countries in Western Europe and the Asia Pacific region, as shown in Table 41.⁹⁷⁸ As discussed above, we estimated an average HHI for the United States of 2848 at the end of 2008, based on EA subscriber market shares.⁹⁷⁹

Table 41
Mobile Market Structure in Selected Countries (Merrill Lynch Calculation)⁹⁸⁰

Country	Nationwide HHI	Number of Competitors ⁹⁸¹	Top 2 Share (%)
USA	2220	4	55.2%
UK	2240	5	50.6%
Germany	2920	4	70.2%
Italy	3020	4	71.7%
Canada	3110	3	67.4%
Australia	3120	4	73.3%
Sweden	3370	4	75.9%
France	3390	3	78.1%
Finland	3490	3	77.0%
Japan	3590	3	77.6%

366. The relatively low level of concentration in the UK mobile market reflects the presence of five national operators and the roughly equal market shares of the top four operators.⁹⁸² However, in

⁹⁷⁶ See *Global Wireless Matrix 4Q08*, at 2. This section discusses HHI measures for different countries but does not discuss or account for any regulatory measures taken in other countries that are designed to protect consumers from potential anti-competitive provider conduct in a concentrated market.

⁹⁷⁷ This methodology essentially treats all regional and local operators as if they comprised a single fifth competing nationwide operator. Since a certain percentage of the U.S. population lives in areas with more than five competing operators and a certain percentage lives in areas with less than five, the Merrill Lynch estimate of HHI at the national level overstates concentration in some local geographic markets, while understating concentration in others.

⁹⁷⁸ *Global Wireless Matrix 4Q08*, at 2. See also, AT&T PN Comments at 16 (Compared to the 26 industrialized countries tracked by the OECD, the United States is the least concentrated.)

⁹⁷⁹ See Section III.C, Horizontal Concentration, *supra*.

⁹⁸⁰ *Global Wireless Matrix 4Q08*. As noted above, HHI is calculated based on national market share. The average HHI in the U.S. is 2848 as described in Section III.C, Horizontal Concentration, *supra*.

⁹⁸¹ While there are four nationwide mobile providers in the United States, the HHI for the United States, as described above, is calculated by summing the squares of the subscriber market shares of the four nationwide operators and the residual subscriber market share of all remaining regional and local operators combined, treating all regional and local operators as if they comprised a single fifth competing operator. For countries other than the United States, the HHI generally is calculated by summing the squares of all of the mobile operators, regardless of whether the operator's network covers a nationwide footprint. If this same methodology were used for the United States, the U.S. HHI would be considerably lower, given the large number of regional and local mobile operators in the United States with sub-national footprints.

⁹⁸² *Id.*, at 184.

September 2009, Deutsche Telekom and France Telecom announced a deal to merge their UK subsidiaries, third and fourth largest mobile operators in the UK – T-Mobile UK and Orange UK – to form the country’s largest mobile wireless operator, with a combined subscriber market share of roughly 38 percent.⁹⁸³ The European Commission approved the transaction, with conditions, on Mar. 1, 2010.⁹⁸⁴ This merger will likely result in a significant increase in the national HHI for the UK mobile market.

367. The higher levels of concentration in the other Western European countries and Japan reflect two factors. One is the smaller number of competitors per market, with four national operators in Germany, Italy and Sweden and three national operators in France, Finland and Japan. Second, each market tends to be dominated by the top two competitors, which have a combined market share ranging from approximately 70-72 percent in Germany and Italy to approximately 77-78 percent in France, Finland and Japan.⁹⁸⁵

⁹⁸³ Kathy Sandler and Geraldine Amiel, *U.K. Mobile Deal Unveiled*, WALL STREET JOURNAL, Sept. 9, 2009.

⁹⁸⁴ *Mergers: Commission Approves Proposed Merger Between UK Subsidiaries France Telecom and Deutsche Telekom, Subject to Conditions*, Press Release, European Commission, Mar. 1, 2010. The merger approval was conditioned upon the amendment of a network sharing agreement with Hutchison 3G UK and the divestiture of a quarter of the combined spectrum of the merging parties in the 1800 MHz Band. *Id.*

⁹⁸⁵ *Global Wireless Matrix 4Q08*.

XI. CONCLUSION

368. In the *Thirteenth Report*, the Commission found effective competition in the CMRS market based on a variety of metrics, including the number of providers, subscribers, usage, and prices. Since the period covered by the *Thirteenth Report*, CMRS competition has grown stronger by some of the measures previously considered, but weaker by others. To better comply with Congress's mandate to assess market conditions, this *Report* looks beyond the metrics considered in the *Thirteenth Report* and undertakes a more expansive and detailed analysis of the mobile wireless industry than past reports. This *Report* concludes that CMRS is now one class of services that are part of the larger mobile wireless services industry. For instance, many providers of CMRS also offer a variety of mobile data services, including mobile broadband Internet access service, which is not classified as a "commercial mobile radio service." Therefore, this *Report* integrates the analysis of CMRS competition into a more comprehensive analysis of competition across all mobile wireless services, including voice, messaging, and broadband services. This *Report* is also more expansive in terms of the scope of its competitive analysis. As with past reports, this *Report* examines the structure of the mobile wireless industry, the conduct of service providers, industry performance metrics, and consumer responses to mobile wireless service offerings. For the first time, the *Fourteenth Report* analyzes competition throughout the entire mobile wireless ecosystem, expanding its analysis to include key mobile wireless service inputs – such as spectrum and backhaul facilities – as well as downstream products, such as handsets/devices and mobile applications. Key findings of this *Report* are discussed in Section I, Executive Summary.

XII. PROCEDURAL MATTERS

369. This *Fourteenth 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. § 332(c)(1)(C).

370. It is ORDERED that copies of this *Report* be sent to the appropriate committees and subcommittees of the United States House of Representatives and the United States Senate.

371. It is FURTHER ORDERED that the proceeding in the WT Docket No. 09-66 IS TERMINATED.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

APPENDIX A

Spectrum Bands Available for Mobile Wireless Service

1. Currently, mobile telephone operators primarily use market based spectrum licenses to provide mobile voice and, in most cases, mobile data services. These licenses are issued by a competitive bidding process for a range of predefined spectrum blocks (*e.g.*, 10 megahertz, 20 megahertz or some other amount) over a defined geographic area (*e.g.*, a Major Economic Area as outlined in section 27.6 of the Rules). Initially, the Commission authorized up to eight different mobile telephone licenses (two cellular in the 800 MHz band and six broadband PCS in the 2 GHz band) in every geographical area of the country.¹ However, over the years, additional services have been created that allow similar operations in different bands – including 700 MHz, AWS-1, BRS/EBS, WCS, and 1670-1675 MHz, – that are licensed under the Commission’s flexible Part 90, Part 27 or Part 24 rules and can be used to provide CMRS services.² Under Commission rules, licensees may lease spectrum resources to a third party for a period of time; or may disaggregate (divide the spectrum into smaller amounts of bandwidth) and/or partition (divide the license into smaller geographical areas) their licenses to other entities.³ Many licensees hold more than one license in a particular market.⁴ We discuss in more detail below spectrum bands potentially available for terrestrial CMRS. Band plan diagrams for each spectrum band depict where the frequencies are located. Spectrum described in this section may be used for a variety of CMRS products including mobile telephony, broadband data and mobile video services. In addition to the terrestrial spectrum described in this section, there is an additional 157.7 megahertz of mobile satellite spectrum available for CMRS voice and data services.

A. Cellular

2. The Commission began licensing commercial cellular providers in 1982 and completed licensing the majority of operators by 1991. The Commission divided the United States and its possessions into 734 cellular market areas (CMAs), including 305 Metropolitan Statistical Areas (MSAs), 428 Rural Service Areas (RSAs), and a market for the Gulf of Mexico.⁵ Two cellular systems were

¹ As a result of partitioning and disaggregation, there often are more than eight cellular and broadband PCS licenses in a market. However, in a few areas, there may be fewer than eight active licenses because certain auction winners or licensees have defaulted on payments to the Commission, because some licensees did not meet their buildout requirements, some licensees returned their licenses, or some licenses remained unsold in an auction.

² The discussion in this *Report* is to be distinguished from the identification of the relevant spectrum input markets in the context of Commission review of individual wireless license transfers and assignments. For example, in wireless transactions, the Commission includes, in its evaluation of potential competitive harm, spectrum in particular bands that is “suitable” for the provision of services in a relevant product market. See *Applications of AT&T Inc. and Dobson Communications Corporation, Memorandum Opinion and Sprint Nextel/Clearwire Order*, FCC 07-19608-259, at 17 ¶ 26 (rel. Nov. 19, 2007) ¶ 53; *Verizon Wireless/Alltel Order*, FCC 08-258, at ¶ 53 (“[S]uitability is determined by whether the spectrum is capable of supporting mobile service given its physical properties and the state of equipment technology, whether the spectrum is licensed with a mobile allocation and corresponding service rules, and whether the spectrum is committed to another use that effectively precludes its uses for mobile telephony/broadband service.”)

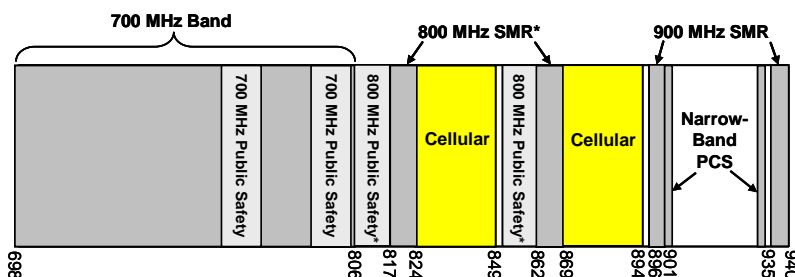
³ See 47 C.F.R. §§ 1.948(e), (f), 22.948, 24.104, 27.15, 24.714, 27.904, 90.813, 90.911.

⁴ While no longer in operation, at one time the Commission’s CMRS spectrum cap restricted the distribution of certain spectrum licenses. Recently, licensees have requested that the Commission take measures to restrict the ability of current major 700 MHz license holders to acquire additional 700 MHz spectrum rights.

⁵ Under the original cellular licensing rules, one of the two cellular channel blocks in each market (the B block) was awarded to a local wireline carrier, while the other block (the A block) was awarded competitively to a carrier other than a local wireline incumbent. After awarding the first 30 MSA licenses pursuant to comparative hearing rules, the Commission adopted rules in 1984 and 1986 to award the remaining cellular MSA and RSA licenses through (continued....)

licensed in each market area. The Commission designated 50 megahertz of spectrum in the 800 MHz frequency band for the two competing cellular systems in each market (25 megahertz for each system). Initially, cellular systems offered service using analog technology, but today cellular systems use digital modulation technologies for increased capacity and service options.

698-940 MHz: Cellular Spectrum



B. Broadband PCS

3. The Broadband PCS was established in the mid 1990s to expand spectrum options and the competitive marketplace for mobile services beyond the cellular service. Broadband PCS systems operate in different spectrum bands and have been designed from the beginning to use a digital format. Broadband PCS licenses have been assigned through auction, beginning in 1995.⁶ The Commission has set aside the spectrum between 1850 MHz and 1990 MHz for broadband PCS. While this spectrum (120 megahertz total) originally accommodated telephony and limited messaging services, many licensees have evolved their networks to now provide third generation mobile services, which include broadband applications such as internet access and media applications. This spectrum was divided originally into three blocks of 30 megahertz each (blocks A, B, and C) and three blocks of 10 megahertz each (blocks D, E, and F).⁷ Two of the 30 megahertz blocks (A and B blocks) are assigned on the basis of 51 Major Trading Areas (MTAs).⁸ One of the 30 megahertz blocks (C block)⁹ and all three of the 10 megahertz

(Continued from previous page) —————
lotteries. By 1991, lotteries had been held for every MSA and RSA, and licenses were awarded to the lottery winners in most instances. In some RSA markets, however, the initial lottery winner was disqualified from receiving the license because of a successful petition to deny or other Commission action. Implementation of Competitive Bidding Rules to License Certain Rural Service Areas, *Report and Order*, 17 FCC Rcd 1960, 1961-62 (2002). In 1997, the Commission auctioned cellular spectrum in areas unbuilt by the original cellular licensees. See FCC, *Auction 12: Cellular Unserved*, <http://wireless.fcc.gov/auctions/12> (visited Mar. 16, 2010). In 2002, the Commission auctioned three RSA licenses where the initial lottery winner had been disqualified. See FCC, *Auction 45: Cellular RSA*, <http://wireless.fcc.gov/auctions/45> (visited Mar. 16, 2010). In 2008, the Commission held a closed auction for unserved cellular spectrum that was the subject of two groups of pending mutually exclusive long-form applications. See FCC, *Auction 77: Closed Cellular Unserved*, <http://wireless.fcc.gov/auctions/477> (visited Mar. 16, 2010).

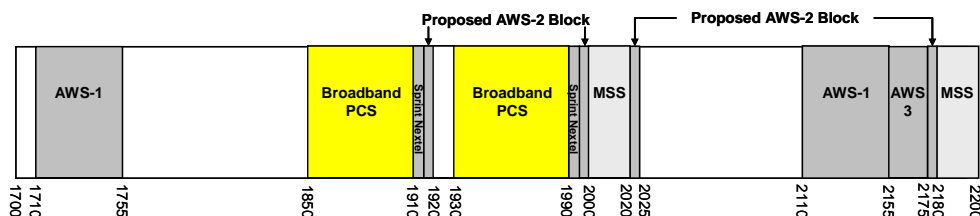
⁶ The first auction was for two license blocks of 30 megahertz each in 51 Major Trading Areas (MTAs). FCC Grants 99 Licenses for Broadband Personal Communications Services in Major Trading Areas, *News Release*, FCC, June 23, 1995. However, in New York, Washington/Baltimore, and Los Angeles/San Diego, only one license block was auctioned, because one license in each market was awarded as part of a pioneer preference program in 1994. Three Pioneer Preference PCS Applications Granted, *News Release*, FCC, Dec. 14, 1994. The Commission has since had numerous additional broadband PCS auctions. See FCC, *Auctions Home*, <http://wireless.fcc.gov/auctions/> (visited Mar. 16, 2010).

⁷ Initially, the Commission's broadband PCS allocation included 20 megahertz of spectrum at 1910 MHz - 1930 MHz for unlicensed broadband PCS. Ten megahertz has since been allocated on a nationwide basis to Sprint Nextel. See Improving Public Safety Communications in the 800 MHz Band, *Report and Order, Fifth Report and Order, Fourth Memorandum Opinion and Order*, 19 FCC Rcd 14969, 15083 (2004).

⁸ Major Trading Areas are Material Copyright (c) 1992 Rand McNally & Company. Rights granted pursuant to a license from Rand McNally & Company through an arrangement with the FCC. Rand McNally's MTA (continued....)

blocks are assigned on the basis of 493 Basic Trading Areas (BTAs).¹⁰

1700-2200 MHz: Broadband PCS Spectrum



C. SMR

4. The Commission first established SMR in 1979 to provide for land mobile communications on a commercial basis. The Commission initially licensed spectrum in the 800 and 900 MHz bands for this service, in non-contiguous bands, on a site-by-site basis.¹¹ The Commission has since licensed additional SMR spectrum through auctions.¹² In total, the Commission has licensed 19 megahertz of SMR spectrum, plus an additional 7.5 megahertz of spectrum that is available for SMR as well as other services.¹³ While Commission policy permits flexible use of this spectrum, including the

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specification contains 47 geographic areas covering the 50 states and the District of Columbia. For its spectrum auctions, the Commission has added three MTA-like areas: Guam and the Northern Mariana Islands, Puerto Rico and the U.S. Virgin Islands, and American Samoa. In addition, Alaska was separated from the Seattle MTA into its own MTA-like area. MTAs are combinations of two or more Basic Trading Areas.

⁹ The Commission also has reconfigured returned C block licenses. See *Tenth Report*, 20 FCC Rcd at 15935, ¶ 71, n.150.

¹⁰ Basic Trading Areas (BTAs) are Material Copyright (c) 1992 Rand McNally & Company. Rights granted pursuant to a license from Rand McNally & Company through an agreement with the FCC. BTAs are geographic areas drawn based on the counties in which residents of a given BTA make the bulk of their shopping goods purchases. Rand McNally's BTA specification contains 487 geographic areas covering the 50 states and the District of Columbia. For its spectrum auctions, the Commission added additional BTA-like areas for: American Samoa; Guam; Northern Mariana Islands; San Juan, Puerto Rico; Mayagüez/Aguadilla-Ponce, Puerto Rico; and the U.S. Virgin Islands.

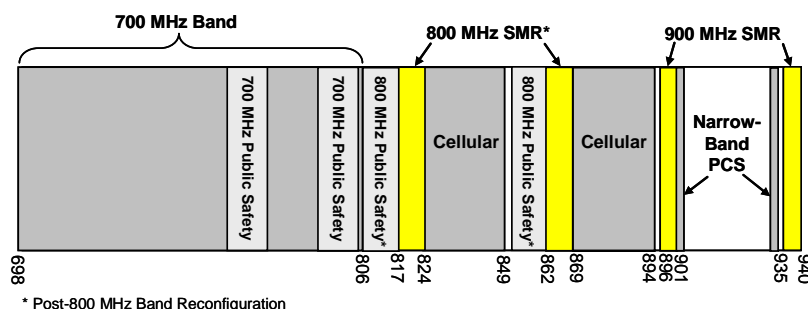
¹¹ The "900 MHz" SMR band refers to spectrum allocated in the 896-901 and 935-940 MHz bands; the "800 MHz" band refers to spectrum allocated in the 806-824 and 851-869 MHz bands. See 47 C.F.R. § 90.603; see also 47 C.F.R. § 90.7 (defining "specialized mobile radio system").

¹² The Commission has held multiple auctions for SMR licenses. See FCC, *Auctions Home*, <http://wireless.fcc.gov/auctions/> (visited Mar. 16, 2010).

¹³ There are five megahertz in the 900 MHz band (200 paired channels x 12.5 kHz/channel). See 47 C.F.R. § 90.617, Table 4B. There are 21.5 megahertz in the 800 MHz band: 14 megahertz in the 800 SMR Service (280 paired channels x 25 kHz/channel) and 7.5 megahertz in the 800 MHz General Category (150 paired channels x 25 kHz/channel). See 47 C.F.R. § 90.615, Table 1 (SMR General Category) and 47 C.F.R. § 90.617, Table 4A (SMR Service). In 2000, the Commission amended its rules to allow Business and Industrial/Land Transportation licensees in the 800 MHz band to use their spectrum for CMRS operations under certain conditions. Implementation of Sections 309(j) and 337 of the Communications Act of 1934 as Amended Promotion of Spectrum Efficient Technologies on Certain Part 90 Frequencies; Establishment of Public Service Radio Pool in the Private Mobile Frequencies Below 800 MHz; Petition for Rule Making of The American Mobile Telecommunications Association, *Report and Order and Further Notice of Proposed Rule Making*, 15 FCC Rcd 22709, 22760-61 (2000). This could make up to five megahertz of additional spectrum available for digital SMR providers: 2.5 megahertz in the Industrial/Land Transportation Category (50 paired channels x 25 kHz/channel) and 2.5 megahertz in the Business Category (50 paired channels x 25 kHz/channel). See 47 C.F.R. § 90.617, Tables 2A and 3A. As discussed in Section I.A.1.a(iii)(a), 800 MHz Band Reconfiguration and 1.9 GHz Spectrum Exchange, *infra*, the configuration of the 800 MHz band is changing as a result of a new band plan adopted by the Commission.

provision of paging, dispatch, mobile voice, mobile data, facsimile, or combinations of these services,¹⁴ the primary use for SMR traditionally was dispatch services.¹⁵ With the development of digital technologies that increased spectral efficiency, SMR providers such as Sprint Nextel (on its iDEN network) and SouthernLINC Wireless, a unit of the energy firm Southern Company, became more significant competitors in mobile telephony, while also maintaining dispatch functionality as a part of their service offerings. Furthermore, in apparent response to the dispatch functionality of SMR services, many cellular and broadband PCS providers now offer push-to-talk (PTT) functionality on their networks, including Verizon Wireless and AT&T. SMR spectrum is also used for certain data-only networks.

698-940 MHz: SMR Spectrum



1. 800 MHz Band Reconfiguration and 1.9 GHz Spectrum Exchange

5. On July 8, 2004, the Commission adopted a new band plan for the 800 MHz band to resolve the problem of interference to public safety radio systems operating in the band from CMRS providers operating systems on channels in close proximity to those utilized by public safety entities.¹⁶ The new band plan addresses the root cause of the interference problem by separating generally incompatible technologies, with the costs of relocating 800 MHz incumbents to be paid by Sprint Nextel. To accomplish the reconfiguration, the Commission required Sprint Nextel to give up rights to certain of its licenses in the 800 MHz band and all of its licenses in the 700 MHz band. In exchange, the Commission modified Sprint Nextel's licenses to provide the right to operate on two five-megahertz blocks in the 1.9 GHz band – specifically 1910-1915 MHz and 1990-1995 MHz – conditioned on Sprint Nextel fulfilling certain obligations specified in the Commission's decision. As a new entrant in the 1.9 GHz band, Sprint Nextel is also obligated to fund the transition of incumbent users to comparable facilities. The Commission determined that the overall value of the 1.9 GHz spectrum is \$4.8 billion, less the cost of relocating incumbent users. In addition, the Commission decided to credit to Sprint Nextel the value of the spectrum rights that Sprint Nextel is relinquishing and the actual costs Sprint Nextel incurs to relocate all incumbents in the 800 MHz and 1.9 GHz bands. To the extent that the total of these combined credits is less than the assessed value of the 1.9 GHz spectrum rights, Sprint Nextel will make an anti-windfall payment equal to the difference to the United States Department of the Treasury at the conclusion of the relocation process.

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

¹⁵ Dispatch services allow two-way, real-time, voice communications between fixed units and mobile units (e.g., between a taxicab dispatch office and a taxi) or between two or more mobile units (e.g., between a car and a truck). See *Fifth Report*, 15 FCC Rcd at 17727-28, for a detailed discussion. Dispatch and SMR are often used interchangeably, although SMR refers to specific spectrum ranges.

¹⁶ FCC Adopts Solution to Interference Problem Faced by 800 MHz Public Safety Radio Systems, *News Release*, FCC, July 8, 2004.

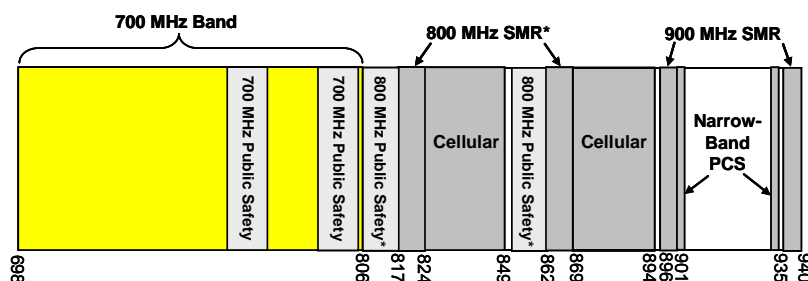
6. Significant progress has been made reconfiguring licensees to the new 800 MHz band plan in non-border regions of the country. In addition, the Public Safety and Homeland Security Bureau released an order, on May 9, 2008, establishing a reconfigured 800 MHz band plan for U.S. licensees along the U.S. – Canada border.¹⁷ Furthermore, the Commission, in conjunction with the State Department, is continuing to discuss a modified 800 MHz band plan with Mexico for U.S. licensees operating along the U.S.-Mexico border.

D. 700 MHz Band

7. The 698-806 MHz band (the “700 MHz band”) was reclaimed from use by broadcast services in connection with the transition of the analog television service to digital television (DTV).¹⁸ The Digital Television Transition and Public Safety Act of 2005 (DTV Act)¹⁹ set a deadline of February 17, 2009 for the 700 MHz band spectrum to be cleared of analog transmissions and made available for public safety and commercial services as part of the DTV transition. This deadline subsequently was extended to June 12, 2009.²⁰ This spectrum is being made available for wireless services, including public safety and commercial services.²¹

8. The DTV Act also established two specific statutory deadlines for the auction of licenses for recovered spectrum in the 700 MHz band: (1) the auction was required to begin no later than January 28, 2008; and (2) the auction proceeds were required to be deposited in the Digital Television Transition and Public Safety Fund by June 30, 2008.²² The Commission met both of these statutory deadlines.

698-940 MHz: 700 MHz Band Spectrum



9. Prior to holding the auction, the Commission revisited the rules governing the 700 MHz band in light of the DTV Act, recent developments in the market for commercial wireless communications, and the evolving needs of the public safety community for advanced broadband communications.²³ Specifically, in the *700 MHz Second Report and Order*, the Commission adopted a

¹⁷ See generally *Improving Public Safety Communications in the 800 MHz Band; New 800 MHz Band Plan for U.S. – Canada Border Regions*, *Second Report and Order*, 23 FCC Rcd 7605 (2008).

¹⁸ See *700 MHz Second R&O*, 22 FCC Rcd at 15291, ¶ 1.

¹⁹ Deficit Reduction Act of 2005, Pub. L. No. 109-171, 120 Stat. 4 (2006) (DRA). Title III of the DRA is the DTV Act.

²⁰ DTV Delay Act, S. 328, 111th Cong. (2009), amending 47 U.S.C. §§ 309, 337(3)(1).

²¹ See *700 MHz Second R&O*, 22 FCC Rcd at 15291, ¶ 1 & 15295-96, ¶ 14.

²² See DRA. Congress also extended the Commission’s auction authority to September 30, 2011. DTV Act § 3003(b).

²³ See *Service Rules for the 698-746, 747-762 and 777-792 MHz Bands; Revision of the Commission’s Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems; and Section 68.4(a) of the Commission’s Rules Governing Hearing Aid-Compatible Telephones*, *Notice of Proposed Rule Making, Fourth Further Notice of Proposed Rule Making, and Second Further Notice of Proposed Rule Making*, 21 FCC Rcd 9345 (2006).

new band plan and revised certain of the service rules relating to both the commercial and public safety spectrum in the 700 MHz band.²⁴ The new band plan provided a balanced mix of geographic service area licenses and spectrum blocks sizes for the commercial spectrum to be auctioned.²⁵ Among other service rules, the Commission provided that licensees for one of the commercial blocks of spectrum in the 700 MHz band, the Upper 700 MHz C Block would be subject to an “Open Platform” condition.²⁶ Accordingly, licensees must “allow customers, device manufacturers, third-party application developers, and others to use or develop the devices and applications of their choosing in C Block networks, so long as they meet all applicable regulatory requirements and comply with reasonable conditions related to management of the wireless network (*i.e.*, do not cause harm to the network).”²⁷ In addition, C Block licensees “may not block, degrade, or interfere with the ability of end users to download and utilize applications of their choosing on the licensee’s C Block network, subject to reasonable network management.”²⁸ The Commission also took two steps to promote the rapid construction and deployment of a nationwide, interoperable broadband public safety network. First, in the public safety spectrum, the band plan established a spectrum block designated for broadband communications, the public safety broadband spectrum, and provided that the spectrum would be licensed on a nationwide basis to a non-profit entity (the Public Safety Broadband Licensee) representative of the public safety community in accordance with a specific selection process.²⁹ Second, the Commission established a block in the commercial spectrum, the Upper 700 MHz D Block (D Block), to be licensed on a nationwide basis to a single entity, and required the winning bidder for the D Block to enter into a public/private partnership with the Public Safety Broadband Licensee to enable the construction of a nationwide network operating over the spectrum associated with both licenses and providing broadband services to both commercial and public safety users.³⁰

10. The auction of the 700 MHz Band licenses, designated Auction 73, closed on March 18, 2008.³¹ The auction concluded with provisionally winning bids covering 1091 licenses. While the bids for licenses associated with four of the five Upper 700 MHz Band blocks (the A, B, C, and E Blocks) exceeded the applicable reserve prices, bids for the fifth block (the D Block) license did not meet the reserve price and thus, there was no winning bid in Auction 73 for that license. Accordingly, the Auction 73 winning bids totaled \$19,120,378,000 and the net winning bids (reflecting bidders’ claimed bidding credit eligibility) totaled \$18,957,582,150.³²

²⁴ See *700 MHz Second R&O*, 22 FCC Rcd at 15291-95, ¶¶ 1-13; Service Rules for the 698-746, 747-762 and 777-792 MHz Bands, *Report and Order and Further Notice of Proposed Rulemaking*, 22 FCC Rcd 8064 (2007) (*700 MHz Report and Order*).

²⁵ The Commission changed the location of existing 700 MHz Guard Band licenses, provided for a 1-megahertz shift of the other commercial blocks in the Upper 700 MHz band and in the spectrum allocated to public safety, and reduced the size of the Guard Band B Block to make two additional megahertz of commercial spectrum available for auction. *700 MHz Second Report and Order*, 22 FCC Rcd at 15292-93, ¶ 3. In addition, the Commission afforded all Guard Band A Block licensees the same technical rules that apply to the adjacent commercial spectrum and the ability to deploy cellular architectures. *Id.* at 15294, ¶ 9.

²⁶ See *700 MHz Second R&O*, 22 FCC Rcd at 15361, ¶ 195.

²⁷ See *id.* at 15360, ¶ 206.

²⁸ *Id.*

²⁹ See Service Rules for the 698-746, 747-762 and 777-792 Bands; Implementing a Nationwide, Broadband, Interoperable Public Safety Network in the 700 MHz Band, *Second Further Notice of Proposed Rulemaking*, 23 FCC Rcd 8047, 8052 ¶ 8 (2008) (*700 MHz Second Further Notice*).

³⁰ See *700 MHz Second Report and Order*, 22 FCC Rcd at 15295, ¶ 13.

³¹ FCC, *Auction 73*, <http://wireless.fcc.gov/auctions/73> (visited Sept. 18, 2008).

³² “Auction of 700 MHz Band Licenses Closes,” *Public Notice*, 23 FCC Rcd 4572, 4572-73 ¶ 2 (2008).

11. The total 84 megahertz of commercial spectrum in the 700 MHz band will generally be available for a broad range of flexible uses.³³ This spectrum has many permissible uses: new licensees may use the spectrum for fixed, mobile (including mobile wireless commercial services), and broadcast services.³⁴ In addition, the Commission optimized the power rules in the remaining paired spectrum specifically for mobile use.³⁵ The Commission expects that many of the new technologies to be developed and deployed in this band will support advanced wireless applications.³⁶

12. Because the auction of the D Block did not result in a winning bid, on May 14, 2008, the Commission issued the *700 MHz Second Further Notice*, revisiting the rules governing the D Block licensee, the mandatory public/private partnership, and the Public Safety Broadband Licensee.³⁷ The Commission sought comment broadly on how it might modify those rules to achieve the goal of a nationwide, interoperable public safety network, whether it should continue to mandate a public/private partnership between the D Block licensee and Public Safety Broadband Licensee, and if so, under what terms and conditions.³⁸

13. On September 25, 2008, the Commission adopted the *700 MHz Third Further Notice* that proposed licensing the D Block spectrum as part of a revised 700 MHz Public/Private Partnership, with modifications to the rules governing both the D Block and the Public Safety Broadband Licensee, in order to maximize the public safety and commercial benefits of a nationwide, interoperable broadband network in the 700 MHz band.³⁹ Although the D Block proceeding still is pending, in its recent National Broadband Plan report to Congress, the Commission contended that the D Block should be auctioned for commercial use with limited technical requirements that would ensure technical compatibility between the D Block and the adjacent public safety broadband spectrum block. The Commission also contended that the commercial D Block should enable, but not obligate, the licensee to enter into a spectrum-sharing partnership with the neighboring Public Safety Broadband Licensee.⁴⁰

³³ See *Lower 700 MHz Report and Order*; Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission's Rules, *Third Report and Order*, 16 FCC Rcd 2703 (2001); Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission's Rules, *Second Memorandum Opinion and Order*, 16 FCC Rcd 1239 (2001); Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission's Rules, *Memorandum Opinion and Order and Further Notice of Proposed Rulemaking*, 15 FCC Rcd 20845 (2000); Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission's Rules, *Second Report and Order*, 15 FCC Rcd 5299 (2000) (*Upper 700 MHz Second Report and Order*); *700 MHz Second R&O*; *700 MHz Report and Order*. The 82 megahertz of spectrum does not include the reconfigured Guard Band B Block spectrum at 775-776/805-806 MHz. See *700 MHz Second R&O*, 22 FCC Rcd at 15294 ¶ 9, 15388-89 ¶¶ 266-69.

³⁴ See generally *id.* In addition, in February 2010, the Commission sought comment on a petition for rulemaking requesting that the Commission require that all mobile units for the 700 MHz band be capable of operating over all frequencies in the band. "Wireless Telecommunications Bureau Seeks Comment on Petition for Rulemaking Regarding 700 MHz Band Mobile Equipment Design and Procurement Practices," RM-11592, *Public Notice*, 25 FCC Rcd 1464 (WTB 2010).

³⁵ See *700 MHz Report and Order*, 22 FCC Rcd at 8067-68, ¶ 6.

³⁶ See, e.g., *Lower 700 MHz Report and Order*, 17 FCC Rcd at 1032, ¶ 20.

³⁷ See *700 MHz Second Further Notice*, 23 FCC Rcd at 8047..

³⁸ *Id.* The Commission also indicated that, prior to adopting final rules, it would present for public comment a detailed proposal regarding specific proposed rules to address these issues. *Id.* at 8052, ¶ 7.

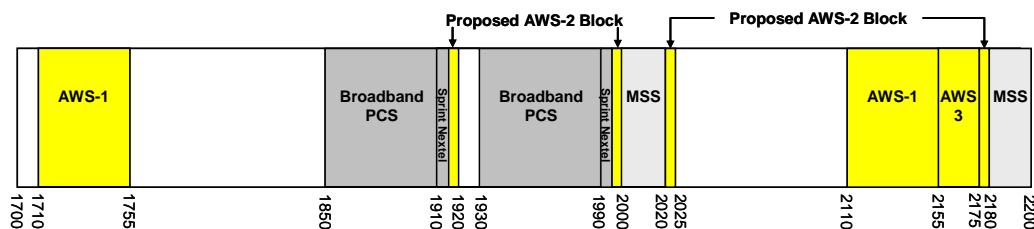
³⁹ See generally Service Rules for the 698-746, 747-762 and 777-792 MHz Bands, WT Docket No. 06-150, Implementing a Nationwide, Broadband, Interoperable Public Safety Network in the 700 MHz Band, PS Docket No. 06-229, *Third Further Notice of Proposed Rulemaking*, 23 FCC Rcd 14301 (2008).

⁴⁰ See *National Broadband Plan*, at 86, 315-316.

E. 1710 – 2180: Advanced Wireless Services

14. To further the goal of promoting the deployment of advanced services, the Commission has made efforts to allocate and license additional spectrum suitable for offering AWS.⁴¹ As noted in the *Eleventh Report*, in 2002 the Commission, together with the National Telecommunications and Information Administration (“NTIA”), allocated 90 megahertz of spectrum in the 1710-1755 MHz and 2110-2155 MHz (“AWS-1”) bands that can be used to offer advanced wireless services, including 3G services.⁴²

1700-2200 MHz: Advanced Wireless Services Spectrum



15. Subsequently, the Commission completed the process of establishing service rules for the 1710-1755 MHz and 2110-2155 MHz bands. This included a the spectrum could be used for any wireless service that is consistent with the spectrum’s fixed and mobile allocations and would be licensed under the Commission’s flexible, market-oriented Part 27 rules,⁴³ and also a band plan that provided for a significant amount of the spectrum to be licensed on a small geographic basis to encourage the participation of small and rural providers in the AWS auction.⁴⁴

16. The Commission held Auction 66 in 2006.⁴⁵ Of the 1,122 licenses offered, 104 winning bidders won 1,087 licenses, with net bids of more than \$13.7 billion,⁴⁶ and all 1,087 licenses were awarded in 2007. In August 2008 the Commission’s Auction 78 included the 35 AWS-1 licenses for which no winning bids were submitted in Auction 66.⁴⁷ Winning bids were submitted for all 35 AWS-1 licenses, with net winning bids for those licenses of \$13,372,850.⁴⁸ As of early March 2010, the Commission has granted licenses to 9 out of 14 AWS applicants.

17. The Commission also has taken significant steps toward licensing other bands of

⁴¹ 47 C.F.R. § 24.3. Advanced Wireless Services (AWS) is the collective term we use for new and innovative fixed and mobile terrestrial wireless applications using bandwidth that is sufficient for the provision of a variety of applications, including those using voice and data (such as Internet browsing, message services, and full-motion video) content.

⁴² *Eleventh Report*, 21 FCC Rcd at 10977, ¶ 73. The Commercial Spectrum Enhancement Act, signed into law on December 23, 2004, establishes a Spectrum Relocation Fund to reimburse federal agencies operating on certain frequencies that have been reallocated to non-federal use, including the 1710-1755 MHz band, for the cost of relocating their operations. See Commercial Spectrum Enhancement Act, Pub. L. No. 108-494, 118 Stat. 3986, Title II (2004).

⁴³ *Eleventh Report*, 21 FCC Rcd at 10977-10978, ¶ 74; 47 C.F.R. Part 27.

⁴⁴ *Eleventh Report*, 21 FCC Rcd at 10978, ¶ 74.

⁴⁵ See “Auction of Advanced Wireless Services Closes: Winning Bidders Announced for Auction 66,” Report AUC-06-66-F, *Public Notice*, 21 FCC Rcd 10521 (2006).

⁴⁶ *Id.*

⁴⁷ See “Auction of AWS-1 and Broadband PCS Licenses Rescheduled for August 13, 2008,” *Public Notice*, 23 FCC Rcd 7496 (2008).

⁴⁸ See “Auction of AWS-1 and Broadband PCS Licenses Closes,” *Public Notice*, 23 FCC Rcd 12749 (2008).

spectrum for use by AWS. In 2004, the Commission allocated an additional twenty megahertz of spectrum in the 1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz and 2175-2180 MHz bands (“AWS-2”).⁴⁹ The Commission additionally released the *AWS-2 Service Rules NPRM*, which sought comment on appropriate service rules for the 1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz and 2175-2180 MHz bands, and also offered some tentative conclusions consistent with existing AWS service rules, such as allowing flexible use of this spectrum and licensing this spectrum under Part 27 of the Commission’s rules.

18. In 2005, the Commission designated yet another 20 MHz of spectrum for AWS, specifically the 2155-2175 MHz band (“AWS-3”), thus establishing 70 MHz of contiguous AWS spectrum in the 2.1 GHz band (from 2110 to 2180 MHz).⁵⁰ On September 19, 2007, the Commission released a Notice of Proposed Rulemaking (NPRM), seeking comment on service rules for the AWS-3 spectrum.⁵¹ On June 20, 2008, the Commission released a Further Notice of Proposed Rulemaking (FNPRM), seeking comment on the Commission’s proposed AWS-3 rules, which include adding 5 megahertz of spectrum (2175-80 MHz) to the proposed AWS-3 band (2155-75 MHz). The FNPRM proposes to require licensees of that spectrum to provide – using up to 25 percent of its wireless network capacity – free, two-way broadband Internet service at engineered data rates of at least 768 kbps downstream.⁵² In October 2008, the Commission’s Office of Engineering and Technology released the *Advanced Wireless Service Interference Tests Results and Analysis*, which analyzed data from earlier laboratory bench tests performed by FCC staff together with interested parties.⁵³

F. Broadband Radio Service

19. The Commission has transformed the 2496-2690 MHz band by providing licensees with greater flexibility and establishing a more functional band plan.⁵⁴

⁴⁹ Amendment of Part 2 of the Commission’s Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, Including Third Generation Wireless Systems, *Sixth Report and Order, Third Memorandum Opinion and Order and Fifth Memorandum Opinion and Order*, 19 FCC Rcd 20720 (2004); Service Rules for Advanced Wireless Services in the 1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz and 2175-2180 MHz Bands; Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands, *Notice of Proposed Rulemaking*, 19 FCC Rcd 19263 (2004).

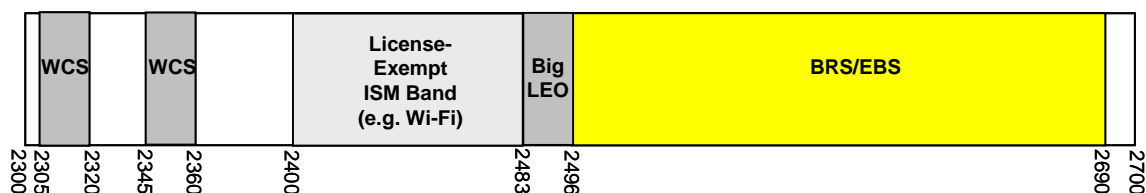
⁵⁰ See Amendment of Part 2 of the Commissions Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, Including Third Generation Wireless Systems, *Eighth Report and Order, Fifth Notice of Proposed Rule Making and Order*, 20 FCC Rcd 15866 (2005).

⁵¹ Service Rules for Advanced Wireless Services in the 2155-2175 MHz Band, *Notice of Proposed Rulemaking*, 22 FCC Rcd 17035 (2007).

⁵² Service Rules for Advanced Wireless Services in the 2155-2175 MHz Band; and Service Rules for Advanced Wireless Services in the 1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz and 2175-2180 MHz Bands, *Further Notice of Proposed Rulemaking*, 23 FCC Rcd 9859 (2008).

⁵³ See *Advanced Wireless Service Interference Tests Results and Analysis*, October 10, 2008 (WT Docket Nos. 07-195 and 04-356). See also “The FCC’s Office of Engineering and Technology Releases Analysis of AWS-3 Interference Tests,” WT Docket Nos. 07-195 and 04-356, *Public Notice*, 23 FCC Rcd 14669 (OET 2008).

⁵⁴ Amendment of Parts 1, 21, 73, 74, and 101 of the Commission’s Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational, and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands, *Report and Order and Further Notice of Proposed Rulemaking*, 19 FCC Rcd 14165 (2004). The rules for this band were initially established in 1963 but have evolved significantly since that time.

2300-2700 MHz: BRS/EBS Spectrum

The Commission has taken several steps to restructure the BRS/EBS band and facilitate more efficient use of the spectrum. First, the Commission created a new BRS/EBS band plan for the 2496-2690 MHz band that eliminated the use of interleaved channels and created distinct band segments for high power operations, such as one-way video transmission, and low power operations, such as two-way fixed and mobile broadband applications. By grouping high and low power users into separate portions of the band, the new band plan reduces the likelihood of interference caused by incompatible uses. The new band plan also creates incentives for the development of low-power, cellularized broadband operations, which were inhibited by the prior band plan.

20. In addition, the Commission provided licensees with the flexibility to employ the technologies of their choice in the band and to lease spectrum under the Commission's secondary market spectrum leasing policies and procedures. The Commission also implemented geographic area licensing for all licensees in the band, which will allow increased flexibility while reducing administrative burdens on both licensees and the Commission.

21. In April 2006, the Commission continued its transformation of the rules governing BRS and EBS by revising the mechanism for transition from the existing band configuration to the new band plan.⁵⁵ BRS and EBS licensees have largely completed the process of transitioning the 2.5 GHz band to the new band plan. As of March 8, 2010, the transition has been completed in 438 out of 493 BTAs.⁵⁶ In the remaining BTAs, virtually all other licensees are subject to a pending transition plan or have filed self-transition plans.

22. The Commission has continued to revise the rules relating to the 2.5 GHz band in 2008 and 2009 by clarifying its policies concerning leasing of EBS stations, setting forth auction rules for unassigned BRS spectrum, seeking further comment on how to license the available and unassigned "white spaces" in the EBS spectrum band, issuing a Declaratory Ruling clarifying the "splitting-the-football" methodology that licensees should use to divide overlapping geographic service areas for licenses that expired and are later reinstated, and proposing to give new BRS licensees four years from the date of initial license grant to demonstrate substantial service.⁵⁷ The Commission held Auction 86, the auction of available BRS licenses, in the fourth quarter of 2009.⁵⁸ Of the 78 licenses offered in Auction

⁵⁵ Amendment of Parts 1, 21, 73, 74, and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational, and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands, *Order on Reconsideration and Fifth Memorandum Opinion and Order and Third Memorandum Opinion and Order and Second Report and Order*, 21 FCC Rcd 5606 (2006).

⁵⁶ See WT Docket No. 06-136.

⁵⁷ Amendment of Parts 1, 21, 73, 74 and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands, *Third Order on Reconsideration and Sixth Memorandum Opinion and Order and Fourth Memorandum Opinion and Order and Second Further Notice of Proposed Rulemaking and Declaratory Ruling*, 23 FCC Rcd 5992 (2008); *Fifth Memorandum Opinion and Order and Third Further Notice of Proposed Rulemaking and Declaratory Ruling*, 24 FCC Rcd 12558 (2009).

⁵⁸ The auction started on October 27, 2009 and closed on October 30, 2009. See "Auction of Broadband Radio Service Licenses Closes; Winning Bidders Announced for Auction No. 86," *Public Notice*, 24 FCC Rcd 13572 (WTB 2009).

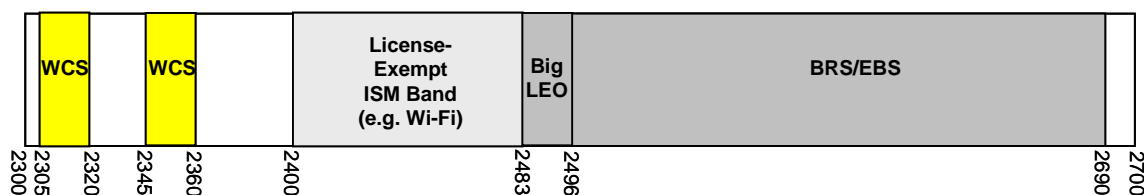
86, ten winning bidders won 61 licenses, with net bids of \$19,426,600.⁵⁹

23. The changes made to the 2496-2690 MHz band, together with technological and business developments, is facilitating the development of a nationwide WiMAX network by Clearwire that has the potential to compete with cable and DSL broadband providers. The 2496-2690 MHz band can speed the arrival of a wireless broadband pipe that will increase competition and consumer choice, make possible new services, and promote the availability of broadband for all Americans. This band also can play an important role in extending broadband service to rural and underserved areas. Moreover, the changes to this band have enabled BRS/EBS providers to use this spectrum in a more technologically and economically efficient manner.

G. Wireless Communications Service (WCS)

24. The Commission has licensed 30 megahertz of spectrum in the 2.3 GHz band, at 2305-2320 MHz and 2345-2360 MHz, for the Wireless Communications Service (“WCS”). While the service rules governing WCS allow for both fixed and mobile applications, the technical limits imposed to protect adjacent Satellite Radio operations have not permitted the development of mobile equipment for the band, but these rules are the subject of a rulemaking proceeding before the Commission.

2300-2700 MHz: WCS Spectrum



25. The WCS spectrum was auctioned in 1997 and licensed on a Major Economic Area (“MEA”) and Regional Economic Area Grouping (“REAG”) basis. The WCS spectrum is adjacent to and separated by the spectrum band for the Satellite Digital Audio Radio Service (“SDARS”), which is used by Sirius XM Radio Inc. to provide satellite radio service. On December 18, 2007, the Commission released a Notice of Proposed Rulemaking and Second Further Notice of Proposed Rulemaking seeking comment on appropriate rules and policies for licensing SDARS digital repeaters and considering changes to the technical rules governing WCS licenses.¹¹ In particular, the Commission sought to consider what changes may be necessary to facilitate the coexistence of SDARS and WCS licensees in such a way that will enable the continued provision of high-quality satellite radio service as well as the deployment of new broadband services to the public.

H. 1.4 GHz Bands

26. The Commission completed the auction of licenses in the paired 1392-1395 MHz and 1432-1435 MHz bands and in the unpaired 1390-1392 MHz band.⁶⁰ The paired spectrum was offered as two 3-megahertz blocks in the six REAGs.⁶¹ The unpaired spectrum was auctioned as one 2-megahertz block in each MEA.⁶² Like other spectrum bands under Part 27 of the Commission’s rules, the service rules for the 1.4 GHz band are flexible. In the auction, two winning bidders won a total of 64 licenses,

⁵⁹ *Id.*

⁶⁰ See “Auction of 1.4 GHz Band Licenses Closes,” *Public Notice*, 22 FCC Rcd 4714 (2007).

⁶¹ See “Auction of 1.4 GHz Bands Licenses Scheduled for February 7, 2007,” *Public Notice*, 21 FCC Rcd 9494 (2006).

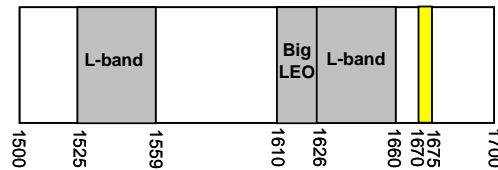
⁶² *Id.*

raising a total of \$123,599,000.⁶³

I. 1670-1675 MHz

27. In April 2003, the FCC auctioned five megahertz of unpaired spectrum in the 1670-1675 MHz band as a single, nationwide license. As with the other spectrum bands licensed under Part 27 of the Commission's rules, such as AWS and WCS, the service rules for the 1670-1675 MHz band are flexible, and licensees can use the spectrum to deploy a variety of fixed or mobile wireless services. The license was won at auction by Crown Castle. In July 2007, Crown Castle entered into a long-term agreement to lease the spectrum to a wholly-owned subsidiary of TVCC Holding Company, LLC ("TVCC Holding").⁶⁴ In late 2008, control of TVCC Holding was transferred, so that 13.13 percent was held by a company wholly owned by Rajendra Singh and the Singh family; 11.86 percent by Columbia Capital IV, LLC, subsidiaries; and 75 percent by Harbinger-related entities.⁶⁵

1500-1700 MHz: 1670-1675 MHz Spectrum



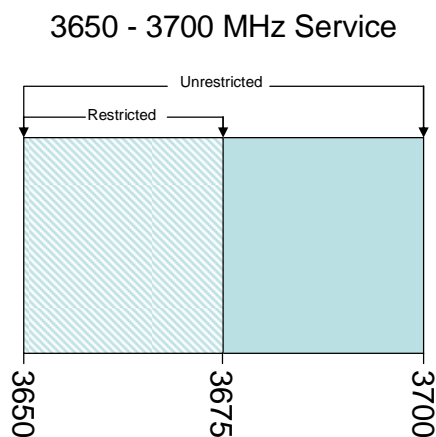
⁶³ See "Auction of 1.4 GHz Band Licenses Closes," *Public Notice*, 22 FCC Rcd 4714 (2007).

⁶⁴ Long-Term *De Facto* Transfer Lease Application, File No. 0003108073 (filed July 17, 2008). *Crown Castle Announces Long-Term Modeo Spectrum Lease*, Press Release, Crown Castle, July 23, 2007; ULS Lease ID L000002305.

⁶⁵ Transfer of Control of a Lessee Application, File No. 0003573463 (filed Sept. 10, 2008); TVCC Holding Company, LLC, Form 602, File No. 0003635816 (filed Nov. 3, 2008).

J. 3650-3700 MHz

28. The Commission adopted service rules for the 3650 – 3700 MHz band in June 2007⁶⁶ and began accepting applications licenses in the service in November 2007.⁶⁷ Terrestrial operations in the band are licensed on a nationwide, non-exclusive basis, with all licensees registering their fixed and base stations in a common data base (ULS) prior to operation. Licensees are subject to restrictions on their operations in geographic areas occupied by grandfathered Fixed Satellite Service (FSS) and Federal Government stations. The rules also provide that terrestrial licensees have the mutual obligation to cooperate and avoid harmful interference to one another, and are required to use one of two types of “contention-based” technologies (restricted or unrestricted) that accommodate shared use of the band by multiple users. Equipment using “restricted” contention-based protocols (i.e., equipment capable of avoiding interference only to other devices using the same protocol) is allowed to operate only on the lower 25 megahertz portion of the band (3650 – 3675 MHz). Unrestricted equipment (i.e., equipment capable of avoiding interference to other devices, even those that use a different protocol) is allowed to operate within the entire 50 megahertz of the band. Mobile stations are required to positively receive and decode an enabling signal transmitted by a base station. Devices certified by the FCC as mobiles or portables do not require a separate license or registration.⁶⁸



⁶⁶ See Wireless Operations in the 3650-3700 MHz Band, ET Docket No. 04-151, Rules for Wireless Broadband Services in the 3650-3700 MHz Band, WT Docket No. 05-96, *Report and Order*, 20 FCC Rcd 6502 (2005) (3650 MHz Order), *recon. granted in part, Memorandum Opinion and Order*, 22 FCC Rcd 10421 (2007).

⁶⁷ See “Wireless Telecommunications Bureau Announces Start State for Licensing and Registration Process for the 3650 – 3700 MHz Band,” *Public Notice*, 22 FCC Rcd 19802 (WTB 2007).

⁶⁸ See 47 C.F.R. § 90.1307. Mobile and portable stations that operate with a peak EIRP of 1 Watt/25 megahertz and receive and decode an enabling signal from a base station are not required to be registered even if used in a fixed mode. See 3650 MHz Order, 20 FCC Rcd at 6513, ¶ 31, n.54; 47 C.F.R. § 90.1333.

APPENDIX B

Mobile Wireless Network Technologies

1. Cellular, PCS, and digital SMR networks use the same basic design. All use a series of low-power transmitters to serve relatively small areas (“cells”), and reuse spectrum to maximize efficiency.¹ In the past, cellular and SMR networks have used both analog and digital cellular technologies, while PCS and AWS networks were designed from the start to use a digital format. Digital technology provides better sound quality and increased spectral efficiency than analog technology. From a customer’s perspective, digital service in the cellular band or SMR bands is virtually identical to digital service in the PCS and AWS bands. After the sunset of analog cellular service in February 2008, only digital cellular technologies are used in the mobile wireless industry.

2. The two main digital technologies used in the United States are Code Division Multiple Access (“CDMA”) and Global System for Mobile Communications (GSM). In addition, there are two other, less-widely used (by subscribers), technologies: integrated Digital Enhanced Network (“iDEN”) and the once-common Time Division Multiple Access (TDMA). These four technologies are commonly referred to as Second Generation, or 2G, because they succeeded the first generation of analog cellular technology, Advanced Mobile Phone Systems (AMPS).² U.S. carriers have been phasing out TDMA service over the past several years.³

3. Beyond the 2G digital technologies, mobile telephone providers have been deploying next-generation, or 2.5G and 3G, network technologies⁴ that allow them to offer mobile data services at higher data transfer speeds and, in some cases, to increase voice capacity.⁵ For GSM/TDMA providers, the first step in the migration to next-generation network technologies is General Packet Radio Service (GPRS), a packet-based data-only network upgrade that allows for faster data rates by aggregating up to

¹ PCS, digital SMR, and cellular networks are all “cellular” systems since all divide service regions into many small areas called “cells.” Cells can be as small as an individual building or as large as 20 miles across. Each cell serves as a base station for mobile users to obtain connection to the fixed network and is equipped with its own radio transmitters/receivers and associated antennas. Service regions are divided into cells so that individual radio frequencies may be reused in different cells (“frequency reuse”), in order to enhance frequency efficiency. When a person makes a call on a wireless phone, the connection is made to the nearest base station, which connects with the local wireline phone network or another wireless operator. When a person is using a wireless phone and approaches the boundary of one cell, the wireless network senses that the signal is becoming weak and automatically hands off the call to the base station in the next cell. *See Sixth Report*, 16 FCC Rcd at 13361, n.55.

² *See infra* note 307 for a discussion of the cellular analog requirement and its sunset.

³ AT&T, for example, discontinued TDMA service on February 18, 2008, and on Mar. 1, 2008 TDMA service was discontinued on the former Dobson TDMA network. AT&T, *Answer Center*, <http://wireless.att.com/answer-center> (visited Sept. 19, 2008). Cincinnati Bell Wireless discontinued its TDMA service in June 2006. Cincinnati Bell, Inc., SEC Form 10-K, filed Mar. 1, 2007, at 5.

⁴ For purposes of this *Report*, all of the network technologies beyond 2G that carriers have deployed, as well as those that they plan to deploy in the future, are generally referred to as “next-generation network technologies.” The International Telecommunication Union (ITU) has defined 3G network technologies as those that can offer maximum data transfer speeds of 2 Mbps from a fixed location, 384 kbps at pedestrian speeds, and 144 kbps at traveling speeds of 100 kilometers per hour. *See Fifth Report*, 15 FCC Rcd at 17695. There is ambiguity among other industry players, however, as to which network technologies constitute 3G and which constitute interim technologies, often labeled “2.5G.” *See Seventh Report*, 17 FCC Rcd at 12990 and 13038. Therefore, this *Report* uses a more general label to describe all of the technologies beyond 2G.

⁵ *See* Section IV.B.1, Network Coverage and Technology Upgrades, *supra*.

eight 14.4 kbps channels.⁶ Beyond GPRS, many U.S. GSM/TDMA providers deployed Enhanced Data Rates for GSM Evolution (EDGE) technology, which offers average data speeds of 100-130 kbps. Wideband CDMA (WCDMA, also known as Universal Mobile Telecommunications System, or UMTS) is the next migration step for GSM providers beyond EDGE and allows maximum data transfer speeds of up to 2 Mbps and average user speeds of 220-320 kbps.⁷ Finally, deployment of WCDMA with HSPA (High Speed Packet Access, which includes both High Speed Downlink Packet Access, HSDPA, and High Speed Uplink Packet Access, HSUPA) technology allows average download speeds of 400-700 kbps with burst rates of up to several Mbps,⁸ average upload speeds of 500-800 kbps, when HSUPA technology is deployed.⁹ Some service providers have deployed, or announced plans to deploy, additional HSPA upgrades that allow for faster peak and average data transfer speeds, such as HSPA 7.2 Mbps and HSPA+, which allows a peak download speed of 21 Mbps.¹⁰

4. Many CDMA providers have upgraded their networks to CDMA2000 1xRTT (also referred to as CDMA2000 1X or 1xRTT), CDMA2000 EV-DO (evolution-data optimized, EV-DO) Revision 0, and EV-DO Revision A (Rev. A) technologies. 1xRTT doubles voice capacity and delivers peak data rates of 307 kbps in mobile environments and typical speeds of 40-70 kbps.¹¹ EV-DO allows maximum data throughput speeds of 2.4 Mbps, while EV-DO Rev. A increases maximum data throughput speeds to 3.1 Mbps.¹² Typical, user-experienced download speeds with EV-DO range from 400 to 800 kbps, while upload speeds average 50-70 kbps.¹³ The EV-DO Rev. A network upgrade increases average download speeds to 600 kbps to 1.4 Mbps and significantly improves average upload speeds to 350-800 kbps.¹⁴ Whereas WCDMA and WCDMA/HSDPA are incompatible with earlier technologies on the GSM migration path, the more advanced technologies on the CDMA migration path are backwards compatible.¹⁵ Deployment of these various technologies by service providers is discussed above. Maps showing CDMA and GSM network coverage, as well as mobile broadband coverage, can be found in Appendix D.

⁶ See *Seventh Report*, 17 FCC Rcd at 12990. This upgrade is also labeled GSM/GPRS because many GSM/TDMA carriers are upgrading their TDMA markets with GSM and GPRS simultaneously.

⁷ *Tenth Report*, 20 FCC Rcd at 15951, ¶ 111. Although WCDMA and WCDMA/HSPA are not backwards compatible with GPRS/EDGE, wireless modem cards that are compatible with both WCDMA/HSPA and GPRS/EDGE, and enable handoff between the two types of networks, are available for use with laptop computers. See, e.g., Novatel Wireless, *Products: Merlin U730 Wireless PC Modem Card*, available at www.novatelwireless.com (visited Oct. 8, 2008).

⁸ *Tenth Report*, 20 FCC Rcd at 15951, ¶ 111.

⁹ *AT&T Nears Completion of 3G Wireless Technology Deployment that Delivers Broadband Wireless Speeds – For Downloads and Uploads*, Press Release, AT&T, May 21, 2008.

¹⁰ See Section IV.B.1, Network Coverage and Technology Upgrades, *supra*.

¹¹ See *Seventh Report*, at 12990; *Ninth Report*, 19 FCC Rcd at 20650, ¶ 129.

¹² *Id.* See also, CDMA Development Group NOI Comments at 3-4.

¹³ *Sprint Powers Up Faster Mobile Broadband Network in 10 More Markets, Upgraded Coverage Reaches 60 Million People*, News Release, Sprint Nextel, Dec. 12, 2006; 3G Americas, *3G Technologies*, available at http://www.3gamericas.com/English/PDFs/3G_technology_comparison.pdf (visited Dec. 15, 2008), (*3G Technology Comparison*). The maximum peak download speed for EV-DO is 2.4 Mbps. *Id.*

¹⁴ *America's Largest and Fastest Mobile Broadband Network Just Got Even Larger – Sprint Customers Can Do More, In More Places, And At Fast Speeds*, News Release, Sprint Nextel, June 19, 2007; *Verizon Wireless: 100 Percent of Wireless Broadband Network Now Enhanced with Faster Speeds*, News Release, Verizon Wireless, June 29, 2007. The maximum peak download speed for EV-DO Rev A is 3.1 Mbps. *3G Technology Comparison*.

¹⁵ *Standards in Wireless Telephone Networks*, at 328.

5. Beyond WCDMA/HSDPA/HSUPA and EV-DO, there are two main competing technologies for next-generation wireless broadband networks: Long Term Evolution (LTE) and WiMAX. Both of these technologies, which are often referred to as fourth-generation (4G) technologies, are generally based on the Orthogonal Frequency Division Multiple Access (OFDMA) modulation technology.¹⁶ LTE can support up to 58 Mbps for upper link transmission and 173 Mbps for downlink transmission with 20 MHz spectrum and a 2x2 Multiple Input Multiple Output (MIMO) antenna structure.¹⁷ The Mobile WiMAX technology can support peak downlink data rates up to 63 Mbps and peak upper link data rates up to 28 Mbps in a 10 MHz channel.¹⁸

¹⁶ See *EDGE, HSPA and LTE—The Mobile Broadband Advantage*, Rysavy Research and 3G Americas, Sept. 2007, at 16, available at http://www.3gamericas.com/pdfs/2007_Rysavy_091007.pdf. Because OFDM allows signals to pass through buildings and trees, providers can use the technology to offer wireless broadband services without a direct line-of-sight between the transmitter and the end user's receiver. *Eleventh Report*, 21 FCC Rcd at 10995, ¶ 119.

¹⁷ See *EDGE, HSPA and LTE—The Mobile Broadband Advantage*, Rysavy Research and 3G Americas, Sept. 2007, at 81, available at http://www.3gamericas.com/pdfs/2007_Rysavy_091007.pdf.

¹⁸ See *Mobile WiMAX – Part I: A Technical Overview and Performance Evaluation*, Mobile WiMAX Forum, August 2006, at 10, available at http://www.wimaxforum.org/documents/downloads/Mobile_WiMAX_Part1_Overview_and_Performance.pdf.

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Table C-1: CTIA's Semi-Annual Mobile Wireless Industry Survey

Date	Estimated Total Subscribers	Year End over Year End Subscriber Increase	12-Month Total Service Revenues (in \$000s)	12-Month Roamer Services Revenues (in \$000s)	Cell Sites	Direct Service Provider Employees	Average Local Monthly Bill (Dec. Survey Periods)
1985	340,213	248,613	\$482,428	N/A	913	2,727	N/A
1986	681,825	341,612	\$823,052	N/A	1,531	4,334	N/A
1987	1,230,855	549,030	\$1,151,519	N/A	2,305	7,147	\$96.83
1988	2,069,441	838,586	\$1,959,548	N/A	3,209	11,400	\$98.02
1989	3,508,944	1,439,503	\$3,340,595	\$294,567	4,169	15,927	\$83.94
1990	5,283,055	1,774,111	\$4,548,820	\$456,010	5,616	21,382	\$80.90
1991	7,557,148	2,274,093	\$5,708,522	\$703,651	7,847	26,327	\$72.74
1992	11,032,753	3,475,605	\$7,822,726	\$973,871	10,307	34,348	\$68.68
1993	16,009,461	4,976,708	\$10,892,175	\$1,361,613	12,805	39,775	\$61.48
1994	24,134,421	8,124,960	\$14,229,922	\$1,830,782	17,920	53,902	\$56.21
1995	33,785,661	9,651,240	\$19,081,239	\$2,542,570	22,663	68,165	\$51.00
1996	44,042,992	10,257,331	\$23,634,971	\$2,780,935	30,045	84,161	\$47.70
1997	55,312,293	11,269,301	\$27,485,633	\$2,974,205	51,600	109,387	\$42.78
1998	69,209,321	13,897,028	\$33,133,175	\$3,500,469	65,887	134,754	\$39.43
1999	86,047,003	16,837,682	\$40,018,489	\$4,085,417	81,698	155,817	\$41.24
2000	109,478,031	23,431,028	\$52,466,020	\$3,882,981	104,288	184,449	\$45.27
2001	128,374,512	18,896,481	\$65,316,235	\$3,752,826	127,540	203,580	\$47.37
2002	140,766,842	12,392,330	\$76,508,187	\$3,895,512	139,338	192,410	\$48.40
2003	158,721,981	17,955,139	\$87,624,093	\$3,766,267	162,986	205,629	\$49.91
2004	182,140,362	23,418,381	\$102,121,210	\$4,210,331	175,725	226,016	\$50.64
2005	207,896,198	25,755,836	\$113,538,221	\$3,786,331	183,689	233,067	\$49.98
2006	233,040,781	25,144,583	\$125,456,825	\$3,494,294	195,613	253,793	\$50.56
2007	255,395,599	22,354,818	\$138,869,304	\$3,742,014	213,299	266,782	\$49.79
2008	270,333,881	14,938,282	\$148,084,170	\$3,739,274	242,130	268,528	\$50.07

Source: CTIA, *Background on CTIA's Semi-Annual Wireless Industry Survey*

<http://files.ctia.org/pdf/CTIA_Survey_Year-End_2008_Graphics.pdf> (Annualized Wireless Industry Survey Results – December 1985 To December 2008: Reflecting Domestic U.S. Commercially-Operational Cellular, ESMR and PCS Providers).

**Table C-2: FCC's Semi-Annual Local Telephone Competition Survey:
Mobile Telephone Subscribership**

State	Jun 2008		Subscribers								
	Carriers ¹	Percent Resold ²	2001	2002	2003	2004	2005	2006	2007		2008
			Jun	Jun	Jun	Jun	Jun	Jun	Jun	Jun	Dec
Alabama	12	6 %	1,930,631	2,027,845	2,100,557	2,301,847	2,874,367	3,275,933	3,605,490	3,765,194	3,887,016
Alaska	7	11	218,424	242,133	*	307,323	340,507	397,429	431,653	459,703	480,069
American Samoa	*	*	0	0	0	*	*	*	*	*	*
Arizona	9	9	2,018,410	2,412,998	2,643,952	3,079,657	3,542,844	4,153,491	4,637,471	4,799,648	4,935,640
Arkansas	6	9	891,275	1,130,302	1,351,291	1,376,564	1,680,975	1,924,313	2,149,312	2,288,049	2,446,414
California	12	6	14,184,625	16,007,376	18,892,619	21,575,797	24,572,034	27,496,682	30,203,842	32,247,015	31,946,342
Colorado	9	10	1,983,405	2,247,166	2,426,929	2,727,910	3,040,589	3,428,381	3,756,215	3,967,902	4,065,993
Connecticut	4	6	1,418,367	1,577,873	1,791,944	2,064,204	2,328,966	2,582,367	2,786,594	2,883,780	2,958,633
Delaware	4	8	389,284	433,059	503,353	593,452	585,113	650,328	724,342	750,793	774,709
Dist. of Columbia	4	8	382,457	415,399	520,182	555,958	752,548	878,846	965,816	955,808	1,047,428
Florida	9	7	7,536,670	8,607,715	10,252,348	11,916,615	12,619,929	14,176,756	15,255,433	15,604,856	15,809,443
Georgia	10	5	4,076,119	4,300,831	4,709,288	5,332,517	6,001,411	6,865,466	7,598,387	7,940,514	8,142,364
Guam	*	*	*	*	*	*	*	*	*	*	*
Hawaii	4	4	543,283	640,247	732,262	819,262	934,405	1,010,341	1,066,608	1,096,181	1,115,274
Idaho	16	8	398,781	500,693	572,406	653,779	773,893	901,455	1,018,617	1,085,776	1,125,104
Illinois	10	7	5,621,044	5,409,370	6,834,217	7,529,966	8,227,185	9,147,657	9,949,126	10,330,274	10,633,730
Indiana	11	11	1,781,247	2,032,290	2,456,509	2,844,568	3,442,612	3,972,560	4,448,186	4,675,372	4,823,650
Iowa	61	9	861,382	1,157,580	1,250,305	1,445,711	1,633,697	1,867,015	2,058,022	2,165,772	2,244,649
Kansas	11	11	901,225	1,061,171	1,195,230	1,345,160	1,659,662	1,905,342	2,133,399	2,261,455	2,326,444
Kentucky	11	10	1,176,756	1,505,982	1,595,290	2,000,459	2,507,816	2,820,938	3,101,267	3,291,480	3,342,867
Louisiana	8	7	1,677,292	2,187,811	2,365,224	2,547,153	2,942,463	3,355,503	3,611,553	3,764,592	3,895,938
Maine	6	16	399,616	457,835	524,246	610,533	710,985	786,811	882,039	940,914	972,323
Maryland	5	7	2,446,818	2,684,441	3,108,086	3,575,747	3,967,969	4,470,542	4,818,275	5,023,573	5,124,208
Massachusetts	5	7	2,753,685	3,289,934	3,506,039	3,919,139	4,487,601	4,916,500	5,289,432	5,469,503	5,624,292
Michigan	11	8	4,071,091	4,758,538	4,889,269	5,430,637	6,229,949	6,862,582	7,333,242	7,608,420	7,820,609
Minnesota	8	10	2,014,317	2,254,895	2,564,783	2,823,079	3,132,453	3,542,865	3,833,826	4,048,413	4,164,322
Mississippi	10	7	993,781	1,106,700	1,232,750	1,411,277	1,631,331	1,923,365	2,069,897	2,196,392	2,252,244
Missouri	11	9	1,937,684	2,246,430	2,515,325	2,859,953	3,595,157	4,067,585	4,480,384	4,673,889	4,835,115
Montana	7	7	*	291,429	343,160	*	466,022	575,034	650,381	693,507	723,081
Nebraska	10	5	712,685	838,568	900,744	984,355	1,070,550	1,198,714	1,325,131	1,387,022	1,451,007
Nevada	9	8	766,581	895,586	1,077,380	1,319,684	1,604,713	1,883,273	2,092,872	2,166,680	2,249,231
New Hampshire	6	10	445,181	529,795	598,504	686,746	790,639	896,661	973,105	1,022,406	1,044,808
New Jersey	4	5	3,896,778	4,531,457	5,392,240	6,326,459	6,233,984	6,953,528	7,419,289	7,654,173	7,834,401
New Mexico	9	10	619,582	735,107	828,869	939,091	1,024,852	1,252,770	1,415,726	1,489,120	1,555,122
New York	8	8	6,749,096	7,915,526	8,829,070	9,939,759	12,995,534	14,573,548	15,901,378	16,395,371	17,259,751
North Carolina	11	8	3,377,331	4,610,120	4,305,521	4,875,916	5,503,202	6,209,483	6,961,656	7,305,964	7,427,570
North Dakota	7	6	*	*	*	*	367,850	456,806	492,101	513,238	541,042
Northern Mariana Isl.	*	*	*	*	*	*	*	*	*	*	*
Ohio	10	9	4,255,934	4,887,376	5,659,459	6,188,081	6,993,803	7,939,126	8,722,523	9,098,920	9,357,119
Oklahoma	15	8	1,200,234	1,366,475	1,574,588	1,724,505	2,001,835	2,317,197	2,571,878	2,722,901	2,807,607
Oregon	10	9	1,268,909	1,473,883	1,682,036	1,894,285	2,055,890	2,484,176	2,781,196	2,922,609	3,006,636
Pennsylvania	9	10	4,378,216	4,987,067	5,681,653	6,420,037	7,397,397	8,348,713	9,200,793	9,615,349	9,894,870
Puerto Rico	5	11	1,374,747	1,136,619	1,401,599	1,698,702	2,002,851	2,170,540	2,322,737	2,410,503	2,074,854
Rhode Island	4	8	401,805	463,636	527,366	615,398	689,209	765,355	828,969	848,249	873,565
South Carolina	12	8	1,502,345	1,830,516	2,041,541	2,337,367	2,606,827	3,000,861	3,339,733	3,500,297	3,572,588
South Dakota	8	6	*	292,210	344,825	382,906	433,927	513,850	569,513	596,470	610,945
Tennessee	10	7	2,251,208	2,660,068	2,800,735	3,171,487	4,065,964	4,730,704	4,970,756	5,245,513	5,790,638
Texas	25	6	8,294,338	9,650,715	10,776,234	12,091,134	14,424,253	16,927,880	18,792,225	19,677,302	20,389,774
Utah	11	8	833,492	970,854	1,094,563	1,229,029	1,413,756	1,649,265	1,874,345	1,970,501	2,045,870
Vermont	4	16	*	*	*	*	294,984	333,551	374,984	402,173	421,399
Virgin Islands	*	*	*	*	*	*	*	*	*	*	*
Virginia	8	8	3,059,420	3,429,450	3,879,582	4,392,319	4,851,206	5,325,173	6,148,261	6,415,881	6,242,155
Washington	12	10	2,493,214	2,849,043	3,102,750	3,567,896	4,062,372	4,494,964	5,034,885	5,292,298	5,460,640
West Virginia	9	16	452,036	549,722	579,983	713,657	820,838	964,649	1,095,038	1,172,699	1,235,610
Wisconsin	10	9	2,008,679	2,523,956	2,533,215	2,831,645	3,200,301	3,517,283	3,641,432	3,841,745	3,966,445
Wyoming	10	8	173,939	168,232	276,344	277,658	315,347	358,668	410,464	441,161	457,201
Nationwide	170	8 %	114,028,928	130,751,459	147,623,734	167,313,001	192,053,067	217,418,404	238,315,850	249,331,701	255,301,307

* Data withheld to maintain firm confidentiality. Some data for December 2007 have been revised.

¹ For data through December 2004, only facilities-based wireless carriers with at least 10,000 mobile telephony subscribers per state were required to report data, and they were instructed to use billing addresses to determine subscriber counts by state. Starting with the June 2005 data, all facilities-based wireless carriers are required to report, and to use the area codes of telephone numbers provided to subscribers to determine subscriber counts by state.

² Percentage of mobile wireless subscribers receiving their service from a mobile wireless reseller.

Source: Local Telephone Competition: Status as of June 30, 2008, Federal Communications Commission, August 2009 (Table 14: Mobile Wireless Telephone Subscribers).

Table C-3: Economic Area Penetration Rates

EA	EA Name	Subscribers	2008 Estimated EA Population	2008 Penetration Rate	2008 HHI	2007 HHI	EA Density
57	Detroit-Ann Arbor-Flint, MI	7,279,508	6,949,314	105%	2971	2822	364.07
78	Birmingham, AL	1,750,967	1,661,353	105%	2542	2714	137.13
155	Farmington, NM-CO	224,144	213,552	105%	3877	3817	16.04
13	Washington-Baltimore, DC-MD-VA-WV-PA	9,567,739	9,215,733	104%	2731	2734	402.76
82	Biloxi-Gulfport-Pascagoula, MS	397,022	387,725	102%	2465	2255	143.45
83	New Orleans, LA-MS (see note 1)	1,602,718	1,576,305	102%	3247	3038	171.93
161	San Diego, CA	3,062,637	3,001,072	102%	2574	2605	660.48
87	Beaumont-Port Arthur, TX	451,330	446,851	101%	3037	3094	89.2
31	Miami-Fort Lauderdale, FL	6,060,744	6,114,085	99%	2250	2557	483.2
135	Odessa-Midland, TX	401,917	406,313	99%	3671	3512	10.13
85	Lafayette, LA	617,580	629,216	98%	4660	4436	99.99
122	Wichita, KS-OK	1,163,451	1,182,342	98%	2798	1967	20.49
10	New York-North New Jersey-Long Island, NY-NJ-CT-PA	25,840,149	26,646,432	97%	2640	2632	890.56
81	Pensacola, FL	668,261	686,522	97%	2657	2085	154.06
20	Norfolk-Virginia Beach-Newport News, VA-NC	1,748,338	1,818,132	96%	2775	2058	289.89
22	Fayetteville, NC	530,982	554,048	96%	2857	1988	164.57
90	Little Rock-North Little Rock, AR	1,615,294	1,689,753	96%	4210	4044	46.09
172	Honolulu, HI	1,239,506	1,288,198	96%	2365	2369	187.2
12	Philadelphia-Wilmington-Atlantic City, PA-NJ-DE-MD	7,186,730	7,570,454	95%	2614	2652	778.84
80	Mobile, AL	677,754	710,168	95%	3106	2801	74.75
97	Springfield, IL-MO	490,209	514,014	95%	3910	3800	58.2
131	Houston-Galveston-Brazoria, TX	6,378,099	6,691,432	95%	2279	2278	169.25
133	McAllen-Edinburg-Mission, TX	1,138,690	1,202,189	95%	3025	3803	221.96
141	Denver-Boulder-Greeley, CO-KS-NE	4,313,611	4,540,177	95%	2339	2326	52.02
170	Seattle-Tacoma-Bremerton, WA	4,344,695	4,566,164	95%	2615	2571	190.45
29	Jacksonville, FL-GA	2,036,509	2,156,622	94%	2381	2228	112.52
86	Lake Charles, LA	506,078	539,898	94%	3354	3154	52.41
132	Corpus Christi, TX	524,058	559,249	94%	2471	2850	46.47
15	Richmond-Petersburg, VA	1,475,224	1,593,807	93%	3206	2355	124.03
79	Montgomery, AL	457,762	494,455	93%	2531	1838	66.86
121	North Platte, NE-CO	55,308	59,249	93%	5577	6272	4.95
128	Abilene, TX	202,179	216,950	93%	3457	3371	20.35
143	Casper, WY-ID-UT	407,544	439,965	93%	5256	5031	5.17
160	Los Angeles-Riverside-Orange County, CA-AZ	18,348,656	19,635,950	93%	2488	2542	286.1
163	San Francisco-Oakland-San Jose, CA	8,886,433	9,606,859	93%	2610	2526	271.07
34	Tampa-St. Petersburg-Clearwater, FL	2,519,668	2,733,761	92%	2291	1801	890.99
37	Albany, GA	457,309	497,476	92%	3040	2228	62.74
40	Atlanta, GA-AL-NC	6,254,177	6,776,384	92%	2411	2342	246.04
42	Asheville, NC	447,936	488,874	92%	4132	3930	128.63
59	Green Bay, WI-MI	625,112	681,496	92%	2837	2708	34.15
93	Joplin, MO-KS-OK	255,563	277,263	92%	3584	3404	74.68
99	Kansas City, MO-KS	2,426,298	2,651,516	92%	2290	2237	88.73
127	Dallas-Fort Worth, TX-AR-OK	8,238,206	8,944,362	92%	2623	2479	119
3	Boston-Worcester-Lawrence-Lowell-Brockton, MA-NH	7,477,030	8,182,770	91%	2800	2700	421.83

EA	EA Name	Subscribers	2008 Estimated EA Population	2008 Penetration Rate	2008 HHI	2007 HHI	EA Density
26	Charleston-North Charleston, SC	622,882	683,525	91%	2969	1961	149.8
28	Savannah, GA-SC	685,861	756,214	91%	2433	1795	91.95
30	Orlando, FL	4,044,360	4,435,636	91%	2486	2539	265.84
55	Cleveland-Akron, OH-PA	4,179,189	4,591,498	91%	3773	2641	427.84
70	Louisville, KY-IN	1,370,748	1,509,949	91%	2520	2534	180.92
71	Nashville, TN-KY	2,525,249	2,785,768	91%	2679	2699	105.12
84	Baton Rouge, LA-MS	738,091	807,491	91%	4999	4686	140.3
89	Monroe, LA	301,514	329,618	91%	4320	4271	56.12
136	Hobbs, NM-TX	178,509	196,227	91%	3073	3548	11.21
23	Charlotte-Gastonia-Rock Hill, NC-SC	2,214,894	2,473,299	90%	3059	2273	240.5
24	Columbia, SC	915,227	1,013,410	90%	3634	2235	125.95
25	Wilmington, NC-SC	916,535	1,018,797	90%	2760	1910	107.39
35	Tallahassee, FL-GA	710,634	786,450	90%	3084	2287	63.51
39	Columbus, GA-AL	463,777	515,179	90%	2888	2122	84.08
44	Knoxville, TN	978,794	1,091,091	90%	2816	2739	165.64
51	Columbus, OH	2,255,320	2,517,488	90%	3080	2839	190.4
64	Chicago-Gary-Kenosha, IL-IN-WI	9,758,562	10,863,175	90%	2140	2151	556.54
73	Memphis, TN-AR-MS-KY	1,758,238	1,959,370	90%	2709	2593	102.99
153	Las Vegas, NV-AZ-UT	2,090,698	2,311,014	90%	2297	2517	23.74
95	Jonesboro, AR-MO	273,192	305,662	89%	5032	4778	51.3
130	Austin-San Marcos, TX	1,578,703	1,765,864	89%	2640	2632	156.06
134	San Antonio, TX	2,250,096	2,518,581	89%	2220	2481	82.99
137	Lubbock, TX	343,283	387,146	89%	2832	2878	27.17
142	Scottsbluff, NE-WY	78,969	88,903	89%	6801	5666	7.81
41	Greenville-Spartanburg-Anderson, SC-NC	1,204,661	1,364,738	88%	4047	2792	183.62
50	Dayton-Springfield, OH	986,040	1,116,999	88%	2615	2590	318.52
69	Evansville-Henderson, IN-KY-IL	759,745	861,317	88%	4433	4340	75.31
124	Tulsa, OK-KS	1,275,769	1,451,768	88%	3222	3227	72.44
126	Western Oklahoma, OK	121,529	137,340	88%	3170	3110	12.04
19	Raleigh-Durham-Chapel Hill, NC	1,939,647	2,232,251	87%	2965	2141	188.38
53	Pittsburgh, PA-WV	2,510,463	2,891,964	87%	3157	3079	284.77
67	Indianapolis, IN-IL	2,838,314	3,264,138	87%	3033	2983	171.37
77	Jackson, MS-AL-LA	1,283,565	1,480,716	87%	3333	3225	49.67
88	Shreveport-Bossier City, LA-AR	507,029	580,798	87%	3810	3374	57.96
96	St. Louis, MO-IL	3,214,497	3,681,336	87%	2674	2708	127.01
107	Minneapolis-St. Paul, MN-WI-IA	4,179,353	4,824,484	87%	2588	2061	82.98
111	Minot, ND	91,788	105,574	87%	4304	4117	7
5	Albany-Schenectady-Troy, NY	1,037,835	1,202,416	86%	3352	3289	134.71
27	Augusta-Aiken, GA-SC	543,513	634,830	86%	3781	2203	89.79
32	Fort Myers-Cape Coral, FL	777,730	908,394	86%	2429	2515	234.27
36	Dothan, AL-FL-GA	301,007	349,130	86%	2536	2080	53.7
38	Macon, GA	705,680	818,370	86%	3662	2958	62.88
43	Chattanooga, TN-GA	674,119	784,456	86%	3494	3294	145.32
45	Johnson City-Kingsport-Bristol, TN-VA	515,676	598,600	86%	3936	2293	144.51
98	Columbia, MO	338,299	395,491	86%	4082	3843	58
103	Cedar Rapids, IA	360,877	420,766	86%	2561	2600	101.33
138	Amarillo, TX-NM	422,603	489,740	86%	2668	2644	11.79

EA	EA Name	Subscribers	2008 Estimated EA Population	2008 Penetration Rate	2008 HHI	2007 HHI	EA Density
167	Portland-Salem, OR-WA	2,842,754	3,286,569	86%	2469	2315	76.01
171	Anchorage, AK	587,874	686,293	86%	3927	3873	1.07
18	Greensboro-Winston-Salem-High Point, NC-VA	1,693,560	1,995,855	85%	2786	1985	189.09
101	Peoria-Pekin, IL	449,514	526,468	85%	3424	3366	90.99
125	Oklahoma City, OK	1,547,547	1,811,951	85%	3444	3486	65.04
154	Flagstaff, AZ-UT	408,492	478,450	85%	3833	2835	8.24
156	Albuquerque, NM-AZ	883,070	1,035,714	85%	2843	2103	20.89
164	Sacramento-Yolo, CA	2,278,601	2,680,240	85%	2621	2600	188.08
2	Portland, ME	657,097	782,854	84%	2812	2493	98.56
8	Buffalo-Niagara Falls, NY-PA	1,212,940	1,447,692	84%	3324	3222	212.89
11	Harrisburg-Lebanon-Carlisle, PA	1,013,427	1,208,890	84%	3235	3130	292.42
17	Roanoke, VA-NC-WV	720,763	857,872	84%	2439	1831	97.83
21	Greenville, NC	730,656	874,488	84%	2641	2235	87.74
56	Toledo, OH	1,076,840	1,275,362	84%	4566	3258	163.94
63	Milwaukee-Racine, WI	1,965,243	2,331,492	84%	2123	2200	366.88
75	Tupelo, MS-AL-TN	526,224	627,150	84%	5403	5275	49.76
102	Davenport-Moline-Rock Island, IA-IL	469,626	558,029	84%	2585	2548	108.27
151	Reno, NV-CA	643,698	768,870	84%	2556	2282	7.56
6	Syracuse, NY-PA	1,559,887	1,884,621	83%	4002	3884	104.74
33	Sarasota-Bradenton, FL	720,731	871,874	83%	2733	2074	273.56
49	Cincinnati-Hamilton, OH-KY-IN	1,935,674	2,337,216	83%	2247	2225	294.08
66	Fort Wayne, IN	613,053	741,382	83%	3038	3088	158.5
118	Omaha, NE-IA-MO	912,444	1,100,498	83%	3495	2128	62.4
120	Grand Island, NE	236,032	284,487	83%	6672	5989	11.56
157	El Paso, TX-NM	863,810	1,045,239	83%	2370	2050	33.04
158	Phoenix-Mesa, AZ-NM	3,664,125	4,440,500	83%	2683	2108	93.91
159	Tucson, AZ	985,051	1,183,947	83%	2622	2006	60.03
7	Rochester, NY-PA	1,214,616	1,478,494	82%	4389	4247	167.21
68	Champaign-Urbana, IL	513,173	629,200	82%	3378	3265	73.47
91	Fort Smith, AR-OK	286,419	347,505	82%	4121	4114	46.51
94	Springfield, MO	782,275	951,629	82%	3690	3514	48.14
108	Wausau, WI	401,743	489,282	82%	2477	2371	34.13
123	Topeka, KS	386,173	468,643	82%	2623	1850	35.62
169	Richland-Kennewick-Pasco, WA	624,145	759,564	82%	2723	2516	27.68
72	Paducah, KY-IL	186,310	229,282	81%	5938	5846	70.02
106	Rochester, MN-IA-WI	271,204	335,650	81%	3272	2799	55.65
139	Santa Fe, NM	221,840	272,281	81%	4568	2806	13.06
147	Spokane, WA-ID	742,292	914,396	81%	3338	3076	23.63
152	Salt Lake City-Ogden, UT-ID	2,060,297	2,533,880	81%	2265	2226	35.68
9	State College, PA	636,118	798,593	80%	4204	4238	92.41
60	Appleton-Oshkosh-Neenah, WI	368,450	458,449	80%	2618	1927	143.62
100	Des Moines, IA-IL-MO	1,378,065	1,727,108	80%	2982	2679	47.32
119	Lincoln, NE	324,131	403,030	80%	4909	4251	50.24
140	Pueblo, CO-NM	231,849	291,066	80%	2986	2646	8.71
150	Boise City, ID-OR	572,748	711,937	80%	2856	2703	13.69
144	Billings, MT-WY	347,514	441,859	79%	5375	5062	4.89
46	Hickory-Morganton, NC-TN	425,021	548,060	78%	2742	2646	131.9

EA	EA Name	Subscribers	2008 Estimated EA Population	2008 Penetration Rate	2008 HHI	2007 HHI	EA Density
48	Charleston, WV-KY-OH	924,959	1,178,626	78%	3442	2999	85.35
52	Wheeling, WV-OH	238,554	306,292	78%	4538	4436	124.54
62	Grand Rapids-Muskegon-Holland, MI	1,521,485	1,961,947	78%	2935	2709	206.76
65	Elkhart-Goshen, IN-MI	743,583	955,560	78%	2571	2332	185.73
129	San Angelo, TX	161,249	206,905	78%	2237	2464	10.05
166	Eugene-Springfield, OR-CA	664,561	847,451	78%	2322	1850	43.1
4	Burlington, VT-NY	478,471	620,023	77%	8263	4776	57.62
14	Salisbury, MD-DE-VA	313,773	409,070	77%	5507	5263	111.17
16	Staunton, VA-WV	271,405	350,536	77%	2881	2093	50.99
47	Lexington, KY-TN-VA-WV	1,473,102	1,921,072	77%	3807	3683	80.39
61	Traverse City, MI	230,588	300,465	77%	2882	4178	50.67
104	Madison, WI-IA-IL	774,390	1,002,884	77%	3442	3530	71.33
117	Sioux City, IA-NE-SD	192,264	248,114	77%	4240	4025	39.51
148	Idaho Falls, ID-WY	271,012	350,332	77%	4361	2388	10.85
149	Twin Falls, ID	135,160	176,400	77%	4175	2232	14.08
165	Redding, CA-OR	279,110	361,915	77%	2888	2273	14.36
1	Bangor, ME	408,137	533,602	76%	4250	4365	20.94
116	Sioux Falls, SD-IA-MN-NE	420,355	554,970	76%	5179	4288	15.11
162	Fresno, CA	1,233,651	1,633,280	76%	2962	2932	98.64
92	Fayetteville-Springdale-Rogers, AR-MO-OK	378,621	506,212	75%	4729	4629	88.43
113	Fargo-Moorhead, ND-MN	288,111	384,153	75%	4313	3286	16.4
115	Rapid City, SD-MT-ND-NE	165,888	224,401	74%	5140	4952	5.04
54	Erie, PA	371,032	509,551	73%	4241	4120	116.41
168	Pendleton, OR-WA	144,625	204,130	71%	2894	2150	8.67
76	Greenville, MS	158,768	226,125	70%	3575	3491	40.96
145	Great Falls, MT	112,542	163,194	69%	4910	4685	4.23
105	La Crosse, WI-MN	170,756	252,006	68%	3823	3815	53.67
58	Northern Michigan, MI	*	267,688	*	4261	4270	28.53
74	Huntsville, AL-TN (see note 2)	*	1,066,914	*	2550	*	119.14
109	Duluth-Superior, MN-WI	*	348,380	*	4107	3504	18.53
110	Grand Forks, ND-MN	*	220,264	*	4755	3848	10.16
112	Bismarck, ND-MT-SD	*	179,144	*	5015	4891	6.26
114	Aberdeen, SD	*	77,619	*	5000	4983	5.39
146	Missoula, MT	*	436,309	*	6327	6043	10.79

*Data withheld to maintain firm confidentiality.

Source: Federal Communications Commission internal analysis based on year-end 2008 filings for Numbering Resource Utilization in the United States. Density is persons per square mile. EA populations are based on Census estimates as of July 1, 2008.

Note 1: As discussed in the *Twelfth Report*, the penetration rate in EA83 (New Orleans) appears to be an aberration. That EA lost over 260,000 people between 2000 and 2006, while its subscriber count remained relatively unchanged, creating a large increase in its penetration rate. One explanation for this may be that, after the flooding, people leaving the area took their cell phones (and cell phone numbers) with them. Thus, those numbers may still be associated with New Orleans rate centers, even though the people actually no longer live anywhere near there.

Note 2: We believe there was a discrepancy in the data for this EA, making the subscriber data and HHI for this market unreliable.

Table C-4: Top 16 Mobile Wireless Operators by Subscribers

(with publicly-available subscriber counts, in thousands)

Year-End 2007			Year-End 2008		
	Operator	Total		Operator	Total
1	AT&T (1)	70,052		AT&T (1)	77,009
2	Verizon Wireless (1)	65,707		Verizon Wireless (1)	72,056
3	Sprint Nextel (1)	53,003		Sprint Nextel (1)	48,338
4	T-Mobile	28,685		T-Mobile (1)	32,758
5	Alltel (1, 2)	13,400		Alltel (1, 2)	13,219
6	US Cellular (1)	6,122		US Cellular (1)	6,196
7	MetroPCS	3,963		MetroPCS	5,367
8	Leap	2,864		Leap	3,845
9	Centennial	1,093		Centennial (3)	1,100
10	América Móvil / Claro (4)	3,496		América Móvil / Claro (4)	4,809
11	Cellular South (6)	700		Cellular South (6)	800
12	iPCS	630		iPCS (5)	691
13	Cincinnati Bell Wireless	571		Cincinnati Bell Wireless	551
14	Clearwire	394		Clearwire	475
15	Ntelos	407		Ntelos	435
16	Pocket Comm. (7)	200		Pocket Comm.	300

Sources: For 2007, see *Thirteenth Report*, Table A-4 at xxxx. Some numbers in 2007 were adjusted or corrected as noted below. For 2008, publicly-available company documents such as operators' news releases and SEC filings. Subscriber information for privately-held companies is taken from news reports, as noted below.

Notes:

- (1) For 2008, AT&T number includes 60,098 (in thousands) postpaid and 16,911 prepaid customers. Verizon number includes 70,021 retail customers and 2,035 wholesale customers. SprintNextel number includes 36,678 direct post-paid customers and 3,597 direct pre-paid customers (Boost subscribers), 8,063 wholesale subscribers, but not 927 affiliated company subscribers. (SprintNextel number in 2007 was incorrectly due to a mistake in the *Thirteenth Report*.) T-Mobile number includes 26,806 postpaid and 5,952 prepaid customers. Alltel includes 12,813 retail customers and 406 wholesale customers derived from Verizon's pro forma numbers. US Cellular number includes 5,420 postpaid, 287 prepaid, and 489 wholesale customers. Cincinnati Bell includes 404 postpaid and 147 prepaid subscribers.
- (2) On January 5, 2009, Verizon Wireless completed its acquisition of Alltel. Alltel number in 2007 is substituted by its number in the first quarter of 2008. Alltel numbers are derived from Verizon's pro forma numbers.
- (3) On November 6, 2009, AT&T completed its acquisition of Centennial with estimated 1.1 million subscribers.
- (4) This includes Claro subscribers in Dominican Republic, Puerto Rico and Jamaica. No separated subscriber counts were reported. The number for 2007 was adjusted accordingly from the *Thirteenth Report*. Tracfone's subscriber counts were not included.
- (5) On October 19, 2009, SprintNextel announced it is acquiring its wireless affiliate iPCS.
- (6) For 2008 subscriber counts, see *TRDaily*, January 20, 2010; for 2007 subscriber counts, see <http://memphis.bizjournals.com/memphis/stories/2007/12/10/daily7.html>.
- (7) Pocket Communications subscriber count in 2007 was corrected from 175 to 200.

Table C-5: Selected Smartphone Launches in 2008-2009

<u>Smartphone</u>	<u>Date Launched</u>	<u>Wireless Service Provider(s)</u>	<u>Offered Exclusively at Launch?</u> ¹	<u>Handset Manufacturer</u>	<u>Platform/ Operating System</u>
BlackBerry 8820 ²	Mar. 2008	AT&T T-Mobile Cellular One	No	RIM	BlackBerry
BlackBerry Pearl 8120 ³	Apr. 2008	AT&T T-Mobile Corr	No	RIM	BlackBerry
BlackBerry Curve 8330 ⁴	Apr. 2008	Sprint Nextel Verizon Wireless ACS Alltel Appalachian Bluegrass Boost Carolina West Cbeyond Cellcom Cellular One (Montana) Cellular South Closecall Credo Mobile Metro PCS nTelos Pioneer US Cellular	No	RIM	BlackBerry
BlackBerry Pearl 8110 ⁵	Apr. 2008	AT&T Cellular One of NEPA Long Lines Viaero West Central	No	RIM	BlackBerry

¹ Based on reviewing company websites and press releases.

² *T-Mobile USA Launches BlackBerry 8820*, Press Release, RIM, Mar. 24, 2008, available at <http://press.rim.com/release.jsp?id=1478>). U.S. providers carrying the 8820 listed on BlackBerry's page for the device at <http://na.blackberry.com/eng/devices/blackberry8800>.

³ *T-Mobile and RIM Announce the BlackBerry Pearl 8120*, Press Release, RIM, Apr. 1, 2008, available at <http://press.rim.com/release.jsp?id=1484>). U.S. providers carrying the Pearl 8120 listed on RIM's page for the device at <http://na.blackberry.com/eng/devices/blackberrypearl8100>.

⁴ *Sprint Bolsters Industry-Leading BlackBerry Portfolio with Addition of the BlackBerry Curve 8330*, Press Release, RIM, Apr. 1, 2008, available at <http://press.rim.com/release.jsp?id=1494>). U.S. providers carrying the Curve 8330 listed on RIM's page for the device at <http://na.blackberry.com/eng/devices/blackberrycurve8300>.

⁵ *AT&T Launches the GPS-Enabled BlackBerry Pearl 8110 Smartphone*, Press Release, RIM, Apr. 23, 2008, available at <http://press.rim.com/release.jsp?id=1522>). U.S. providers carrying the Pearl 8110 listed on RIM's page for the device at <http://na.blackberry.com/eng/devices/blackberrypearl8100>.

<u>Smartphone</u>	<u>Date Launched</u>	<u>Wireless Service Provider(s)</u>	<u>Offered Exclusively at Launch?</u>¹	<u>Handset Manufacturer</u>	<u>Platform/ Operating System</u>
XV6900 ⁶	Apr. 2008	Verizon Wireless	Yes; phone is no longer available from provider	HTC	Windows Mobile 6 Professional
N78 ⁷	June 2008	Unlocked	No	Nokia	Symbian OS 9.3, S60 rel. 3.2
iPhone 3G ⁸	July 2008	AT&T	Yes	Apple	iPhone OS
Treo 800w ⁹	July 2008	Sprint Nextel	Yes; phone is no longer available from carrier	Palm	Windows Mobile 6.1 Professional
E71 ¹⁰	July 2008	Unlocked	No	Nokia	Symbian OS 9.2, S60 rel. 3.1 UI
Q Global ¹¹	Aug. 2008	AT&T	Yes	Motorola	Windows Mobile 6.1
Treo Pro ¹²	Sept. 2008	Unlocked Sprint Nextel Alltel	No	Palm	Windows Mobile 6.1

⁶ *Verizon Wireless Unveils Stylish, Intuitive XV6900 For Mobile Professionals*, Press Release, Verizon Wireless, Mar. 31, 2008, available at <http://news.vzw.com/news/2008/03/pr2008-03-28k.html>. Product no longer available through Verizon Wireless website, but HTC's page for the device at <http://www.htc.com/us/products/verizon-xv6900> indicates that, when the device was available, it was available exclusively from Verizon Wireless.

⁷ *A Perfect Fusion Of Features And Services – The Nokia N78 Now Available In US*, Press Release, Nokia, June 24, 2008, available at <http://www.nokia.com/press/press-releases/showpressrelease?newsid=1230590>.

⁸ *AT&T to Offer Next-Generation iPhone on Its High-Performance 3G Network*, Press Release, AT&T, June 9, 2008, available at <http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=25791&mapcode>. Press release indicates U.S. exclusivity through AT&T.

⁹ *Palm and Sprint Introduce the 800w Smartphone*, Press Release, Palm, July 14, 2008, available at <http://investor.palm.com/releasedetail.cfm?ReleaseID=321781>). Press release indicates exclusive Sprint content, but product no longer available through Palm or Sprint.

¹⁰ *Nokia E71 makes its US debut at the Nokia Flagship Store in New York*, Press Release, Nokia, July 29, 2008, available at <http://www.nokia.com/press/press-releases/showpressrelease?newsid=1238972>.

¹¹ *MOTO Q Global with Windows Mobile 6.1 Now Available from AT&T*, Press Release, Motorola, Sep. 2, 2008, available at <http://mediacenter.motorola.com/content/detail.aspx?ReleaseID=5862&NewsAreaId=2>). Press release indicates U.S. exclusivity through AT&T.

¹² *Treo Pro by Palm, Now Available, Offers True End-to-End Enterprise Solution*, Press Release, Palm, Sep. 26, 2008, available at <http://investor.palm.com/releasedetail.cfm?ReleaseID=337019>. The Treo Pro was initially available unlocked from Palm directly. Subsequently, Alltel began offering the device in March 2009. See *Alltel Wireless Now Offers Treo Pro Smartphone by Palm*, Press Release, Palm, Mar. 5, 2009, available at <http://investor.palm.com/releasedetail.cfm?ReleaseID=369034>). Later in March, 2009, Sprint also began offering the Treo Pro on its network. See *Sprint and Palm Announce Upcoming Availability of Treo Pro on America's Most Dependable 3G Network*, Press Release, Palm, Mar. 4, 2009, available at <http://investor.palm.com/releasedetail.cfm?ReleaseID=368795>.

<u>Smartphone</u>	<u>Date Launched</u>	<u>Wireless Service Provider(s)</u>	<u>Offered Exclusively at Launch?</u>¹	<u>Handset Manufacturer</u>	<u>Platform/ Operating System</u>
BlackBerry Pearl Flip 8220 ¹³	Oct. 2008	T-Mobile Cellular One (Montana) Iowa Wireless Viaero West Central	No	RIM	BlackBerry
Epix ¹⁴	Oct. 2008	AT&T	Yes	Samsung	Windows Mobile 6.1
G1 ¹⁵	Oct. 2008	T-Mobile	Yes	HTC	Google Android
Touch Pro ¹⁶	Oct. 2008	Sprint Nextel Verizon Wireless Alltel US Cellular	No; phone is no longer available from providers	HTC	Windows Mobile 6.1 Professional
N96 ¹⁷	Nov. 2008	Unlocked	No	Nokia	Symbian OS 9.3, S60 rel. 3.2
BlackBerry Bold 9000 ¹⁸	Nov. 2008	AT&T	Yes	RIM	BlackBerry
Fuze ¹⁹	Nov. 2008	AT&T	Yes; phone is no longer available from provider	HTC	Windows Mobile 6.1
Incite ²⁰	Nov. 2008	AT&T	Yes	LG	Windows Mobile 6.1

¹³ *T-Mobile USA Launches First BlackBerry Flip Phone*, Press Release, RIM, Oct. 13, 2008, available at <http://press.rim.com/release.jsp?id=1837>). U.S. wireless service providers carrying the Pearl Flip 8220 listed on RIM's page for the device at <http://na.blackberry.com/eng/devices/blackberrypearl8200>.

¹⁴ *AT&T Introduces Samsung Epix, the First Smartphone with Built-In Optical Mouse*, Press Release, AT&T, Oct. 21, 2008, available at <http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=26222&mapcode>). Press release indicates U.S. exclusivity through AT&T.

¹⁵ *T-Mobile Unveils the T-Mobile G1 – the First Phone Powered by Android*, Press Release, T-Mobile, Sep. 23, 2008, available at http://www.t-mobile.com/company/PressReleases_Article.aspx?assetName=Prs_Prs_20080923&title=T-Mobile%20Unveils%20the%20T-Mobile%20G1%20-%20the%20First%20Phone%20Powered%20by%20Android). Press release indicates U.S. exclusivity through T-Mobile.

¹⁶ *Sprint Introduces the Highly Anticipated HTC Touch Pro*, Press Release, Sprint Nextel, Oct. 24, 2008, available at <http://newsreleases.sprint.com/phoenix.zhtml?c=127149&p=irol-newsArticle%20newsroom&ID=1217060&highlight=touch%20pro>). The HTC Touch Pro is no longer available for purchase from the providers' websites.

¹⁷ *Enticing Entertainment – the Nokia N96*, Press Release, Nokia, Nov. 3, 2008, available at <http://www.nokia.com/press/press-releases/showpressrelease?newsid=1265787>).

¹⁸ *AT&T Customers to Enter a 'Bold' New Wireless World*, Press Release, RIM, Oct. 22, 2008, available at <http://press.rim.com/release.jsp?id=1887>. Press release indicates U.S. exclusivity through AT&T.

¹⁹ *HTC FUZE From AT&T Fuses Fun and Function with the One-Touch Power of TouchFLO 3D*, Press Release, AT&T, Nov. 11, 2008, available at <http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=26299&mapcode>). The HTC FUZE is no longer available for purchase through AT&T's website.

²⁰ *AT&T Debuts LG Incite Global 3G Smartphone*, Press Release, AT&T, Nov. 18, 2008, available at <http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=26322&mapcode>). Press release indicates U.S. exclusivity through AT&T.

<u>Smartphone</u>	<u>Date Launched</u>	<u>Wireless Service Provider(s)</u>	<u>Offered Exclusively at Launch?</u>¹	<u>Handset Manufacturer</u>	<u>Platform/ Operating System</u>
BlackBerry Storm ²¹	Nov. 2008	Verizon Wireless	Yes	RIM	BlackBerry
Omnia ²²	Nov. 2008	Verizon Wireless	Yes	Samsung	Windows Mobile 6.1 Professional
XPERIA X1 ²³	Nov. 2008	Unlocked	No; phone is no longer available through manufacturer	Sony Ericsson	Windows Mobile 6.1
N79 ²⁴	Dec. 2008	Unlocked	No	Nokia	Symbian OS 9.3, S60 v. 3.2 UI
N85 ²⁵	Dec. 2008	Unlocked	No	Nokia	Symbian OS 9.3, S60 rel. 3.2
BlackBerry Curve 8350i ²⁶	Dec. 2008	Sprint Nextel SouthernLINC	No	RIM	BlackBerry
E63 ²⁷	Jan. 2009	Unlocked	No	Nokia	Symbian OS 9.2, S60 v. 3.1 UI
5800 Xpress Music ²⁸	Feb. 2009	Unlocked	No	Nokia	Symbian OS 9.4, S60 rel. 5

²¹ *Customers Across the Country Line Up As BlackBerry Storm Blows Into Verizon Wireless Communications Stores*, Press Release, Verizon Wireless, Nov. 21, 2008, available at <http://news.vzw.com/news/2008/11/pr2008-11-21b.html>). Press release indicates U.S. exclusivity through Verizon Wireless.

²² *Verizon Wireless Adds Samsung Omnia™ To Its Touch Screen Lineup*, Press Release, Verizon Wireless, Nov. 25, 2008, available at <http://news.vzw.com/news/2008/11/pr2008-11-25a.html>). U.S. exclusivity through Verizon Wireless indicated by Samsung's website identifying the Omnia as a Verizon Wireless device at http://www.samsung.com/us/consumer/mobile/mobile-phones/verizon-wireless-phones/SCH-I910ZKAVZW/index.idx?pagetype=prd_detail.

²³ Darren Murph, *Sony Ericsson XPERIA X1 makes date with US: Black Friday for \$799.99*, ENGADGET, Nov. 12, 2008, at <http://www.engadget.com/2008/11/12/sony-ericsson-xperia-x1-makes-date-with-us-black-friday-for-79/>). The XPERIA X1 is no longer available for purchase from Sony Ericsson's website.

²⁴ *Give the gift of beauty and entertainment for the holidays – the Nokia N85 and Nokia N79*, Press Release, Nokia Dec. 15, 2008, available at <http://www.nokia.com/press/press-releases/showpressrelease?newsid=1277593>.

²⁵ *Id.*

²⁶ *Sprint Launches BlackBerry Curve 8350i for Customers Wanting the Most Advanced Push-to-Talk BlackBerry Smartphone Ever*, Press Release, RIM, Dec. 15, 2008, available at <http://press.rim.com/release.jsp?id=1931>). U.S. providers carrying the Curve 8350i listed on RIM's page for the device at <http://na.blackberry.com/eng/devices/blackberrycurve8300>.

²⁷ *Messaging made simple – the Nokia E63 heads to the United States*, Press Release, Nokia, Jan. 7, 2009, available at <http://www.nokia.com/press/press-releases/showpressrelease?newsid=1280903>.

²⁸ *Nokia 5800 XpressMusic hits shelves in the United States*, Press Release, Nokia, Feb. 27, 2009, available at <http://www.nokia.com/press/press-releases/archive/archiveshowpressrelease?newsid=1293991>.

<u>Smartphone</u>	<u>Date Launched</u>	<u>Wireless Service Provider(s)</u>	<u>Offered Exclusively at Launch?</u> ¹	<u>Handset Manufacturer</u>	<u>Platform/ Operating System</u>
BlackBerry Curve 8900 ²⁹	Feb. 2009	AT&T T-Mobile Cellular One (Montana) Cellular One of East Texas Corr Long Lines MTPCS/Cellular One/Chinook Viaero West Central	No	RIM	BlackBerry
E75 ³⁰	Apr. 2009	Unlocked	No	Nokia	Symbian OS 9.3, S60 rel. 3.2
Propel Pro ³¹	Apr. 2009	AT&T	Yes	Samsung	Windows Mobile 6.1
Nokia E71x ³²	May 2009	AT&T	Yes	Nokia	Symbian OS 9.2, S60 rel. 3.1 UI
Jack ³³	May 2009	AT&T	Yes	Samsung	Windows Mobile 6.1
Pre ³⁴	June 2009	Sprint Nextel Verizon Wireless	No	Palm	Palm OS
iPhone 3G S ³⁵	June 2009	AT&T	Yes	Apple	iPhone OS

²⁹ *T-Mobile USA to Offer Customers the Thinnest and Lightest Full-QWERTY BlackBerry Smartphone*, Press Release, RIM, Jan. 7, 2009, available at <http://press.rim.com/release.jsp?id=1984>. U.S. providers carrying the Curve 8900 listed on RIM's page for the device at http://na.blackberry.com/eng/devices/blackberrycurve8900/curve_wherebuy.jsp.

³⁰ *Email the way you want it – Nokia E75 begins shipping*, Press Release, Nokia Apr. 6, 2009, available at <http://www.nokia.com/press/press-releases/showpressrelease?newsid=1303620>.

³¹ *AT&T Unveils New Integrated Devices for Texting, Email and More*, Press Release, AT&T, Mar. 30, 2009, available at <http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=26664>. U.S. exclusivity through AT&T indicated by Samsung's website at http://www.samsung.com/us/consumer/mobile/mobile-phones/at-t-phones/SGH-I627MAAATT/index.idx?pagetype=prd_detail (identifying the Propel Pro as an AT&T device).

³² *Nokia E71x with AT&T in stores across the U.S. today*, Press Release, Nokia, May 4, 2009, available at <http://www.nokia.com/press/press-releases/showpressrelease?newsid=1310666>. Exclusivity indicated by AT&T's page for the device at <http://www.wireless.att.com/businesscenter/NokiaE71x/index.jsp>.

³³ *AT&T Completes Its Full House of Smart Devices with the New Samsung Jack*, Press Release, AT&T, May 14, 2009, available at <http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=26818&mapcode> (indicates exclusivity).

³⁴ Charlie Sorrel, *It's Official: Palm Pre to Launch June 6th for \$300*, Gadget Lab Blog, WIRED, May 19, 2009, at <http://www.wired.com/gadgetlab/2009/05/boom-palm-pre-to-launch-june-6th-300>.

³⁵ *iPhone 3G S Available at AT&T Tomorrow*, Press Release, AT&T, June 18, 2009, available at <http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=26868&mapcode>. U.S. exclusivity with AT&T of the iPhone 3G S indicated in the fine print/footnote on Apple's iPhone purchase page at <http://www.apple.com/iphone/buy>.

<u>Smartphone</u>	<u>Date Launched</u>	<u>Wireless Service Provider(s)</u>	<u>Offered Exclusively at Launch?</u> ¹	<u>Handset Manufacturer</u>	<u>Platform/ Operating System</u>
BlackBerry Pearl Flip 8230 ³⁶	June 2009	Verizon Wireless ACS Alltel Appalachian Bluegrass Carolina West Cellcom Cellular One of NEPA Cellular South Inland Nex-Tech/United nTelos Panhandle/PTCI US Cellular	No	RIM	BlackBerry
Snap ³⁷	June 2009	Sprint Nextel US Cellular	No	HTC	Windows Mobile 6.1
Ozone ³⁸	June 2009	Verizon Wireless	Yes	HTC	Windows Mobile 6.1
N97 ³⁹	June 2009	Unlocked	No	Nokia	Symbian OS 9.4, S60 rel. 5
N86 ⁴⁰	July 2009	Unlocked	No	Nokia	Symbian OS 9.3, S60 rel. 3.2
Dash 3G ⁴¹	July 2009	T-Mobile	Yes	HTC	Windows Mobile 6.1

³⁶ Verizon Wireless Customers Will Flip For The New 3G-Enabled BlackBerry Pearl Flip Smartphone, Press Release, RIM, June 4, 2009, available at <http://press.rim.com/release.jsp?id=2345>. U.S. providers carrying the Pearl Flip 8230 listed on RIM's page for the device at <http://na.blackberry.com/eng/devices/blackberrypearl8200>.

³⁷ Sprint Strengthens Social Network Connections with Customers, Press Release, Sprint Nextel, June 22, 2009, available at http://newsreleases.sprint.com/phoenix.zhtml?c=127149&p=irol-newsArticle_newsroom&ID=1300933&highlight). US Cellular subsequently made the HTC Snap available on its network and for purchase on its website at <http://www.uscellular.com/uscellular/cell-phones/phoneDetailsPopup.jsp?IDparam=prod680004>.

³⁸ HTC Ozone Brings Verizon Wireless' Smartphone Lineup to New Heights, Press Release, Verizon Wireless June 25, 2009, available at <http://news.vzw.com/news/2009/06/pr2009-06-25.html>. Exclusivity indicated by Verizon Wireless's webpage at <http://www.verizonwireless.com/b2c/store/controller?item=phoneFirst&action=viewPhoneDetail&selectedPhoneId=4848&cmp=KNC-PaidSearch>.

³⁹ Nokia N97 mobile computer to begin selling worldwide in June, Press Release, Nokia, June 2, 2009, available at <http://www.nokia.com/press/press-releases/showpressrelease?newsid=1319081>.

⁴⁰ The ultimate imaging device – the Nokia N86 8MP – coming to the United States, Press Release, Nokia, July 17, 2009, available at <http://pressbulletinboard.nokia.com/2009/07/17/the-ultimate-imaging-device-%E2%80%93-the-nokia-n86-8mp-%E2%80%93-coming-to-the-united-states/>.

⁴¹ T-Mobile USA To Offer New 3G-Enabled Smartphone, Press Release, T-Mobile, June 17, 2009, available at http://www.t-mobile.com/company/PressReleases_Article.aspx?assetName=Prs_Prs_20090618&title=T-Mobile%20USA%20To%20Offer%20New%203G-Enabled%20Smartphone. T-Mobile's U.S. exclusivity indicated by name being "T-Mobile Dash 3G" and by the Dash 3G being a new generation of the T-Mobile Dash, which was exclusively available through T-Mobile. See T-Mobile Unveils a New Full-Featured Smartphone, the T-Mobile Dash, Press Release, T-Mobile, Oct. 11, 2006, available at http://www.t-mobile.com/company/PressReleases_Article.aspx?assetName=Prs_Prs_20061011&title=T-Mobile%20Unveils%20a%20New%20Full-Featured%20Smartphone,%20the%20T-Mobile%20Dash.

<u>Smartphone</u>	<u>Date Launched</u>	<u>Wireless Service Provider(s)</u>	<u>Offered Exclusively at Launch?</u>¹	<u>Handset Manufacturer</u>	<u>Platform/ Operating System</u>
Surge ⁴²	July 2009	AT&T	Yes	Nokia	Symbian OS, S60 3.2 Edition
myTouch 3G ⁴³	Aug. 2009	T-Mobile	Yes	HTC	Google Android
BlackBerry Curve 8520 ⁴⁴	Aug. 2009	AT&T T-Mobile Iowa Wireless Long Lines MTPCPS/Cellular One/Chinook	No	RIM	Blackberry
Touch Pro 2 ⁴⁵	Aug. 2009	T-Mobile Sprint Nextel Verizon Wireless US Cellular	No	HTC	Windows Mobile 6.1 Professional
BlackBerry Tour ⁴⁶	Aug. 2009	Sprint Nextel Verizon Wireless ACS Alltel Appalachian Bluegrass Carolina West Cellcom Cellular South Credo Mobile Inland nTelos Panhandle/PTCI Pioneer US Cellular	No	RIM	BlackBerry

⁴² AT&T and Nokia ride a social wave into summer with Nokia Surge, Press Release, Nokia, July 13, 2009, available at <http://www.nokia.com/press/press-releases/showpressrelease?newsid=1328505>. Exclusivity indicated by AT&T's page for the device at <http://www.wireless.att.com/businesscenter/nokia-surge/index.jsp>.

⁴³ T-Mobile myTouch 3G Available in Stores Nationwide Beginning Today, Press Release, T-Mobile, Aug. 5, 2009, available at http://www.t-mobile.com/company/PressReleases_Article.aspx?assetName=Prs_Prs_20090805&title=T-Mobile%20myTouch%203G%20Available%20in%20Stores%20Nationwide%20Beginning%20Today. Exclusivity indicated by full name being "T-Mobile® myTouch 3G" and HTC's site referring to it as a T-Mobile device at <http://www.htc.com/us/products/t-mobile-mytouch-3g?view=1-2&sort=0>.

⁴⁴ T-Mobile USA and RIM Introduce the New BlackBerry Curve 8520, Press Release, RIM, July 27, 2009, available at <http://press.rim.com/release.jsp?id=2437>. U.S. providers carrying the Curve 8520 listed on RIM's webpage at <http://na.blackberry.com/eng/devices/blackberrycurve8500>.

⁴⁵ T-Mobile USA Debuts HTC Touch Pro2 in the U.S., Press Release, T-Mobile, July 29, 2009, available at http://www.t-mobile.com/company/PressReleases_Article.aspx?assetName=Prs_Prs_20090729&title=T-Mobile%20USA%20Debuts%20HTC%20Touch%20Pro2%20in%20the%20U.S.. U.S. providers carrying the Touch Pro2 identified on HTC's webpage at <http://www.htc.com/us/products>.

⁴⁶ RIM Introduces the BlackBerry Tour Smartphone, Press Release, RIM, June 16, 2009, available at <http://press.rim.com/release.jsp?id=2393>. U.S. providers carrying the Tour listed on RIM's page for the device at http://na.blackberry.com/eng/devices/blackberrytour/tour_wherebuy.jsp.

Smartphone	Date Launched	Wireless Service Provider(s)	Offered Exclusively at Launch?¹	Handset Manufacturer	Platform/ Operating System
Touch Diamond ⁴⁷	Sept. 2008	Sprint Nextel Verizon Wireless	No	HTC	Windows Mobile 6.1 Professional
Pure ⁴⁸	Oct. 2009	AT&T	Yes	HTC	Windows Mobile 6.5
Imagio ⁴⁹	Oct. 2009	Verizon Wireless	Yes	HTC	Windows Mobile 6.5
Hero ⁵⁰	Oct. 2009	Cellular South Sprint Nextel	No	HTC	Google Android
BlackBerry Storm 2 ⁵¹	Oct. 2009	Verizon Wireless	Yes	RIM	BlackBerry
N97 Mini ⁵²	Oct. 2009	Unlocked	No	Nokia	Symbian OS 9.4, S60 rel. 5
Tilt 2 ⁵³	Oct. 2009	AT&T	Yes	HTC	Windows Mobile 6.5
Moment ⁵⁴	Nov. 2009	Sprint Nextel	Yes	Samsung	Google Android
CLIQ ⁵⁵	Nov. 2009	T-Mobile	Yes	Motorola	Google Android

⁴⁷ *Sprint Gives the Gift of Choice with a Diverse Holiday Lineup for Consumers and Businesses Offering the Benefits of the Now Network™ - Speed, Ease of Use, Exclusive Content and Worry-Free Pricing*, Press Release, Sprint Nextel, Sep. 10, 2008, available at http://newsreleases.sprint.com/phoenix.zhtml?c=127149&p=irol-newsArticle_newsroom&ID=1195804&highlight=diamond. Verizon Wireless subsequently offered the Touch Diamond for its network. See *HTC Touch Diamond Available On Nation's Most Reliable Wireless Network*, Press Release, Verizon Wireless, Apr. 9, 2009, available at <http://news.vzw.com/news/2009/04/pr2009-04-09.html>.

⁴⁸ *AT&T and HTC Debut HTC Tilt 2 and HTC Pure Windows Phones*, Press Release, AT&T, Oct. 5, 2009, available at <http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=27204&mapcode>. Exclusivity of Pure indicated by AT&T's product page for the device at <https://www.wireless.att.com/businesscenter/HTC-PURE/index.jsp>.

⁴⁹ *Imagine The Possibilities For Work And Play With The HTC Imagio Exclusively From Verizon Wireless*, Press Release, Verizon Wireless, Oct. 1, 2009, available at <http://news.vzw.com/news/2009/10/pr2009-09-30b.html> (indicates exclusivity).

⁵⁰ *The Innovation and Openness of a True Mobile Internet Experience Coming Soon to America's Most Dependable 3G Network from Sprint on HTC Hero with Google*, Press Release, Sprint Nextel, Sep. 3, 2009, available at http://newsreleases.sprint.com/phoenix.zhtml?c=127149&p=irol-newsArticle_newsroom&ID=1327394&highlight=. Cellular South subsequently began offering the Hero on its network, as indicated at https://www.cellularsouth.com/cscommerce/products/phones/product_phone_detail.jsp?navAction=push&navCount=0&id=prod26560022.

⁵¹ *A Powerful New Storm Rolls Onto Verizon Wireless' Network on Oct. 28*, Press Release, RIM, Oct. 26, 2009, available at <http://press.rim.com/release.jsp?id=2590>. U.S. exclusivity of Storm2 indicated on RIM's page for the device at http://na.blackberry.com/eng/devices/blackberrystorm/storm_wherebuy.jsp (Verizon Wireless only U.S. provider listed).

⁵² *Nokia N97 gets even better with a new software update; Nokia N97 mini now available in stores*, Press Release, Nokia, Oct. 28, 2009, available at <http://www.nokia.com/press/press-releases/showpressrelease?newsid=1350820>.

⁵³ *AT&T and HTC Debut HTC Tilt 2 and HTC Pure Windows Phones*, Press Release, AT&T Oct. 5, 2009, available at <http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=27204&mapcode>. Exclusivity of Tilt2 indicated by AT&T's product page for the device at <https://www.wireless.att.com/businesscenter/HTC-Tilt-2/index.jsp>.

⁵⁴ *Samsung's First Android-Powered Phone, Samsung Moment with Google, Coming Soon to America's Most Dependable 3G Network*, Press Release, Sprint Nextel, Oct. 7, 2009, available at http://newsreleases.sprint.com/phoenix.zhtml?c=127149&p=irol-newsArticle_newsroom&ID=1339737&highlight. Exclusivity indicated by the Moment's fact sheet available at <http://phx.corporate-ir.net/External.File?item=UGFyZW50SUQ9MTgwMzZ8Q2hpbGRJRDR0tMXxUeXBIPtM=&t=1>.

Smartphone	Date Launched	Wireless Service Provider(s)	Offered Exclusively at Launch?¹	Handset Manufacturer	Platform/ Operating System
DROID ⁵⁶	Nov. 2009	Verizon Wireless	Yes	Motorola	Google Android
DROID Eris ⁵⁷	Nov. 2009	Verizon Wireless	Yes	HTC	Google Android
Pixi ⁵⁸	Nov. 2009	Sprint Nextel	Yes	Palm	Palm OS
E72 ⁵⁹	Nov. 2009	Unlocked	No	Nokia	Symbian OS 9.3, S60 v. 3.2 UI
N900 ⁶⁰	Nov. 2009	Unlocked	No	Nokia	Maemo 5 Linux
Behold II ⁶¹	Nov. 2009	T-Mobile	Yes	Samsung	Google Android
BlackBerry Curve 8530 ⁶²	Nov. 2009	Sprint Nextel Verizon Wireless Alltel US Cellular	No	RIM	BlackBerry
BlackBerry Bold 9700 ⁶³	Nov. 2009	AT&T T-Mobile	No	RIM	Blackberry
Ipaq ⁶⁴	Nov. 2009	AT&T	Yes	HP	Windows Mobile 6.5

(Continued from previous page) —————

⁵⁵ *T-Mobile USA Launches Motorola CLIQ with MOTOBLUR In Stores Beginning Today*, Press Release, T-Mobile, Nov. 2, 2009, available at http://www.t-mobile.com/company/PressReleases_Article.aspx?assetName=Prs_Prs_20091102&title=T-Mobile%20USA%20Launches%20Motorola%20CLIQ%20with%20MOTOBLUR%20In%20Stores%20Beginning%20Today (indicates exclusivity).

⁵⁶ *Hello Humans: Droid by Motorola Arrives Next Week*, Press Release, Verizon Wireless, Oct. 28, 2009, available at <http://news.vzw.com/news/2009/10/pr2009-10-27.html> (indicates exclusivity).

⁵⁷ *Bring An Android Device Home For The Holidays With DROID ERIS By HTC, Exclusively From Verizon Wireless*, Press Release, Verizon Wireless, Nov. 5, 2009, available at <http://news.vzw.com/news/2009/11/pr2009-11-05.html> (indicates exclusivity).

⁵⁸ *Palm Pixi Available Nov. 15 for Just \$99.99 Exclusively from Sprint*, Press Release, Sprint Nextel, Oct. 26, 2009, available at http://newsreleases.sprint.com/phoenix.zhtml?c=127149&p=irol-newsArticle_newsroom&ID=1346184&highlight=pixi (indicates exclusivity).

⁵⁹ *Nokia E72 in stores now*, Press Release, Nokia, Nov. 16, 2009, available at <http://www.nokia.com/press/press-releases/showpressrelease?newsid=1355243>.

⁶⁰ *The Nokia N900 is now available to US consumers*, Press Release, Nokia, Nov. 18, 2009, available at <http://www.nokia.com/press/press-releases/showpressrelease?newsid=1355897>.

⁶¹ *T-Mobile USA Launches the Samsung Behold II on November 18*, Press Release, T-Mobile, Nov. 13, 2009, available at http://www.t-mobile.com/company/PressReleases_Article.aspx?assetName=Prs_Prs_20091113&title=T-Mobile%20USA%20Launches%20the%20Samsung%20Behold%20II%20on%20November%2018 (indicates exclusivity).

⁶² *Verizon Wireless Introduces the BlackBerry Curve 8530 Smartphone*, Press Release, RIM, Nov. 5, 2009, available at <http://press.rim.com/release.jsp?id=2686>. U.S. providers carrying the Curve 8530 listed on RIM's page at <http://na.blackberry.com/eng/devices/blackberrycurve8500>.

⁶³ *RIM Introduces the New BlackBerry Bold 9700 Smartphone*, Press Release, RIM, Oct. 21, 2009, available at <http://press.rim.com/release.jsp?id=2567>. U.S. providers carrying the Bold 9700 listed on RIM's page at http://na.blackberry.com/eng/devices/blackberrybold9700/bold_wherebuy.jsp.

⁶⁴ *AT&T and HP Introduce HP Ipaq Glisten, 3G World Phone for Mobile Professionals*, Press Release, AT&T, Nov. 24, 2009, available at <http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=27587&mapcode>. U.S. exclusivity of the iPaq through AT&T indicated at <http://www.wireless.att.com/businesscenter/hp-ipaq-glisten/index.jsp>.

<u>Smartphone</u>	<u>Date Launched</u>	<u>Wireless Service Provider(s)</u>	<u>Offered Exclusively at Launch?</u> ¹	<u>Handset Manufacturer</u>	<u>Platform/ Operating System</u>
Omnia 2 ⁶⁵	Dec. 2009	Verizon Wireless	Yes	Samsung	Windows Mobile 6.5
eXpo ⁶⁶	Dec. 2009	AT&T	Yes	LG	Google Android
5800 Navigation Edition ⁶⁷	Dec. 2009	Unlocked	No	Nokia	Symbian OS 9.4, S60 rel. 5
Nexus One ⁶⁸	Jan. 2010	T-Mobile (locked or unlocked) Unlocked (other GSM providers)	No	HTC	Google Android

⁶⁵ *Verizon Wireless Announces The Availability Of The Samsung Omnia II*, Press Release, Verizon Wireless, Nov. 23, 2009, available at <http://news.vzw.com/news/2009/11/pr2009-11-23a.html>. U.S. exclusivity of the Omnia II through Verizon Wireless indicated at <http://phones.verizonwireless.com/samsung/omnia2>.

⁶⁶ *AT&T and LG Mobile Phones Announce the First 1 GHz Smartphone in the United States, the LG Expo*, Press Release, AT&T, Nov. 30, 2009, available at <http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=27621&mapcode> (indicates exclusivity).

⁶⁷ *Over the river and through the woods, Nokia knows the way*, Press Release, Nokia, Dec. 8, 2009, available at <http://www.nokia.com/press/press-releases/showpressrelease?newsid=1359877>.

⁶⁸ *Google Offers New Model for Consumers to Buy a Mobile Phone*, Press Release, Google, Jan. 5, 2010, available at http://www.google.com/intl/en/press/pressrel/20100105_phone.html. The device must be purchased through Google's webstore at <http://www.google.com/phone>. It can be purchased either unlocked for use on any GSM network at a higher cost (\$529) or for a significantly reduced amount (\$179) if bundled with a two-year T-Mobile service contract.

Table C-6: Mobile Wireless High-Speed Capable Devices and Subscribers by State

State	Mobile Wireless High-Speed Capable Devices	Mobile Wireless High-Speed Subscribers
Alaska	99,263	43,073
Alabama	970,480	281,221
Arkansas	547,605	178,042
Arizona	1,809,386	522,283
California	12,011,071	3,493,995
Colorado	1,523,199	460,860
Connecticut	1,223,598	337,695
District of Columbia	316,042	180,733
Delaware	311,648	77,462
Florida	4,625,734	1,542,128
Georgia	2,522,273	773,067
Guam	*	*
Hawaii	421,662	145,919
Iowa	575,653	115,476
Idaho	502,251	133,160
Illinois	3,405,338	1,057,326
Indiana	1,623,844	383,545
Kansas	731,369	207,224
Kentucky	671,274	246,419
Louisiana	1,026,180	395,066
Massachusetts	2,117,106	565,699
Maryland	2,011,551	595,144
Maine	166,934	39,589
Michigan	2,379,563	605,567
Minnesota	1,337,231	357,180
Missouri	1,191,487	364,192
Northern Mariana Islands	*	*
Mississippi	412,925	142,010
Montana	*	*
North Carolina	2,433,544	701,010
North Dakota	240,813	40,691
Nebraska	532,865	151,973
New Hampshire	401,763	84,607
New Jersey	3,849,463	903,269
New Mexico	536,659	140,604
Nevada	786,593	256,832
New York	5,864,099	1,708,429
Ohio	3,343,239	816,038
Oklahoma	643,785	239,088
Oregon	1,010,635	267,457
Pennsylvania	3,657,848	871,477
Puerto Rico	383,990	126,088
Rhode Island	295,152	80,601
South Carolina	1,185,162	313,073
South Dakota	*	*
Tennessee	1,754,405	452,014

State	Mobile Wireless High-Speed Capable Devices	Mobile Wireless High-Speed Subscribers
Texas	6,082,603	2,348,605
Utah	749,847	189,217
Virginia	2,802,441	900,735
Virgin Islands	*	*
Vermont	*	*
Washington	2,219,293	681,902
Wisconsin	1,184,522	306,326
West Virginia	258,231	80,118
Wyoming	221,208	42,695
TOTAL	85,765,327	25,117,013

Source: High-Speed Services for Internet Access: Status as of December 31, 2008, Federal Communications Commission, February 2010 (Table 14: High-Speed Connections by Technology by State as of December 31, 2008); Form 477 filings with the Commission.

Notes:

* = Data withheld to maintain form confidentiality.

** The reported number of business and residential subscribers whose mobile devices are capable of sending or receiving data at information transfer rates exceeding 200 kbps in at least one direction.

Table C-7: Mobile Wireless Resellers and Mobile Virtual Network Operators (MVNOs)

Name	Number of Subscribers
7-11 Speak Out	Not Available
Advanced Communications Technology	Not Available
Air Voice Wireless AT&T	Not Available
AirLink Mobile	Not Available
Albany Mutual Tel. Association;	Not Available
Beaver Creek Cooperative Telephone Company	Not Available
Beyond Mobile	50,203 total customers as of 12/31/09*
Bratz Mobile	Not Available
Camellia Communications	Not Available
CenCom, Inc.	Not Available
Champaign	Not Available
Christensen Communications	Not Available
Circle K Stores Inc	Not Available
Consolidated Communications Network, Inc.	More than 20,000*
Consumer Cellular, Inc	Not Available
Credo Mobile, Inc.	Not Available
DFT Local Service Corporation	Not Available
eCall Plus	Not Available
En-Tel	Not Available
Firefly Communications, Inc.	Not Available
Garden Valley Telephone Co.	Not Available
Germantown Cellular	Not Available
Hawaiian Telcom Services Company, Inc.	Not Available
Hayneville Telephone Company, Inc.	Not Available
Home TeleNetworks	Not Available
Hood Canal	Not Available
HTC	Not Available
IdeaOne	Not Available
Jitterbug	Not Available
Kennebec Telephone Co.	Not Available
KMTelecom;	Not Available
Lakedale Telephone Company	Not Available
Liberty Wireless	Not Available
Lightyear Network Solutions, LLC	More than 60,000*
Locus Telecommunications	More than 300,000
Movida	Not Available
Nehalem TeleCommunications, Inc.	Not Available
New Ulm Telecom	Not Available
One Communications Corp.	More than 160,000 businesses*
Otter Tail Telcom	Not Available
Page Plus Cellular	Not Available
PemTel Wireless	Not Available
Pend Oreille Telephone Company	Not Available
PlatinumTel Wireless	Not Available
Randolph Telephone Company	Not Available
Red River Rural Telephone Association	Not Available
Silverado	Not Available
Sleepy Eye Telephone Company	Not Available
STI Mobile	Not Available
Total Call Mobile	Not Available
TouchTone	Not Available

Tracfone.	14.4 million as of Dec. 2009
Tuyo Mobile	Not Available
Venture Communications Coop.	Not Available
Virgin Mobile USA	Not Available
Warwick	Not Available
Winn Telephone Company	Not Available
Yadkin Valley Telephone	Not Available
Zapp Unlimited LLC	Not Available
Zone Telecom, Inc.	Not Available

* According to company website, the figure appears to be customers for all services, not just wireless subscribers.