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 hotspot[41] 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 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 Networks[54]

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 Networks[56]

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*.

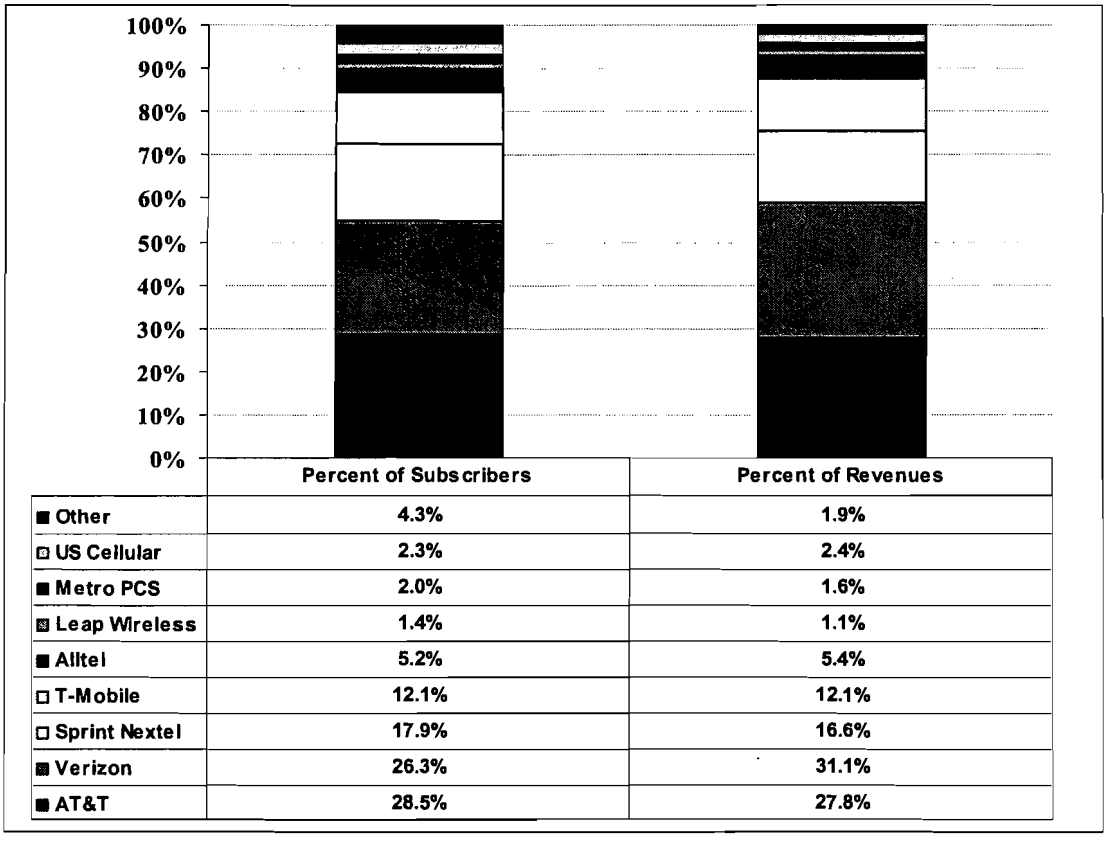
[56] Includes coverage by WCDMA/HSPA and EV-DO networks. American Roamer database, Nov. 2008 and Nov. 2009; population figures based on census blocks using 2000 Census data.

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

Table 3
Mobile Wireless Subscribers: Selected Facilities-Based Service Providers[58]

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-

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[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-Year2009 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

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[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.

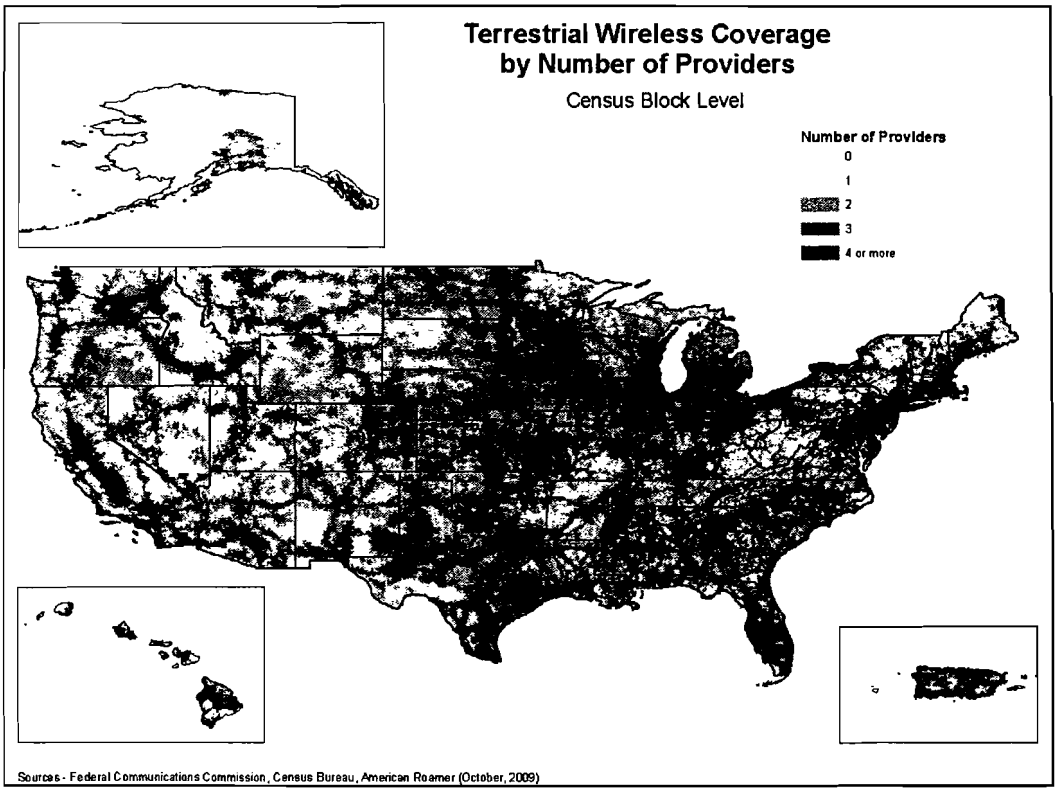
[87] A census block is the smallest geographic unit for which the Census Bureau tabulates decennial census data. *See*, U.S. Census Bureau, *Glossary Of Basic Geographic And Related Terms - Census 2000*, http://www.census.gov/geo/www/tiger/glossary.html#glossary (visited Dec. 15, 2008). Many blocks correspond 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 Competitors[91]



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 Land[92]

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 Land[93]

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]

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[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, 2009[97]

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, 2009[98]

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

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[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 x 100). If there are ten providers, each with ten percent of the market, the value of HHI would be 1,000 [$(10)^2$ x 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 [$(25)^2$ x 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 [$(40)^2 + (20)^2$ x 3]. If the number of carriers increases to five, each with a 20 percent subscriber share, the value of the HHI declines to 2000 [$(20)^2$ x 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

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[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.

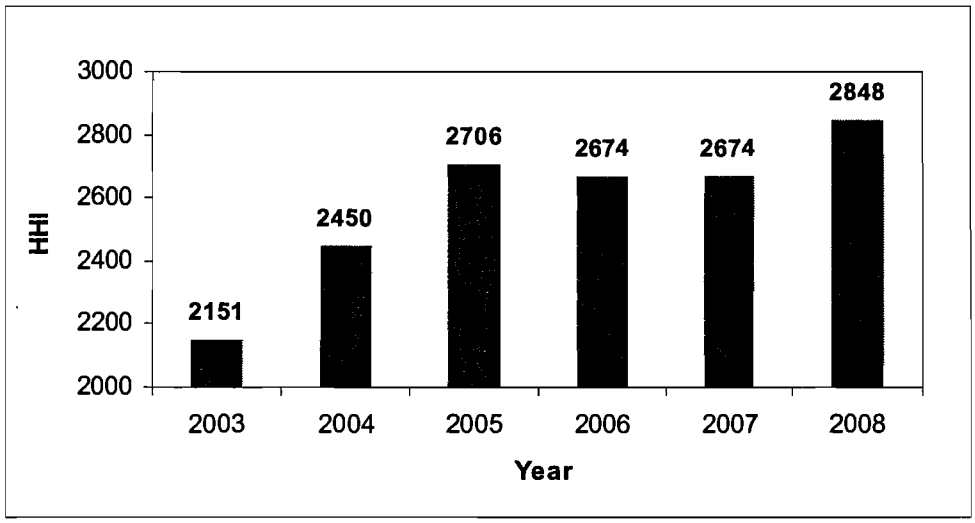
[116] *See Thirteenth Report*, 24 FCC Rcd at 6212, ¶ 46. The lowest EA value was 1795 in EA 28 and the highest was 6272 in EA 121.

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 Concentration[119]

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

Chart 2
Average HHI of EAs[120]



[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

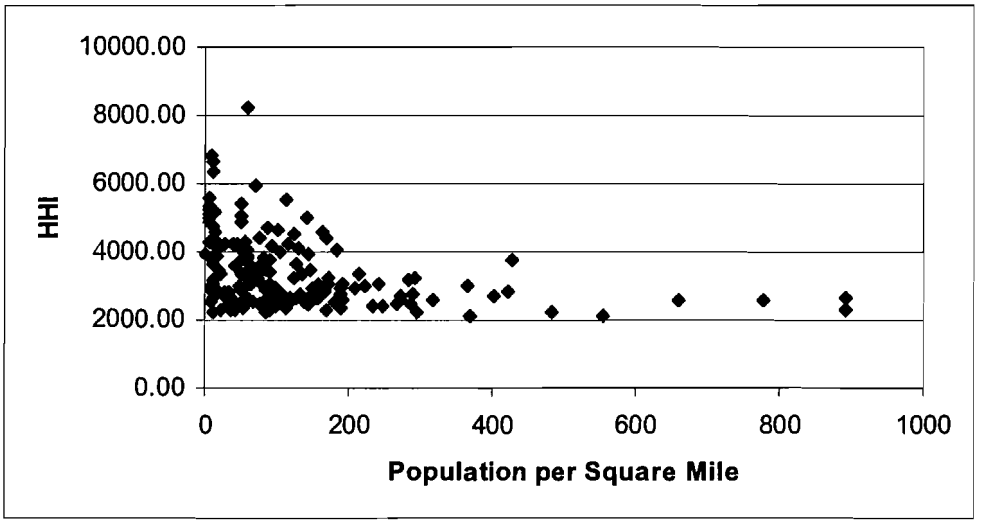
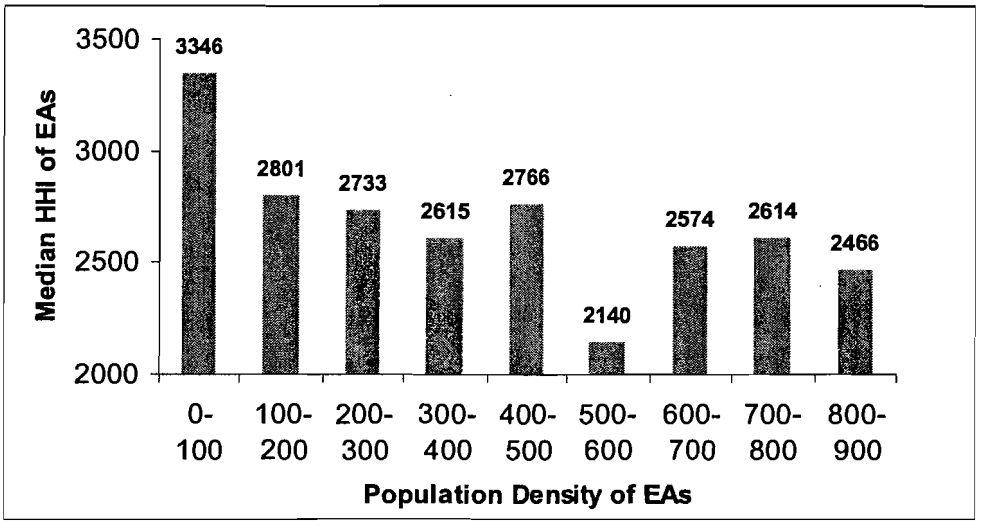


Chart 4
Median HHI of EAs in Population Density Bands[121]



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 cost[126] or entry barrier.[127] Non-regulatory or market conditions

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[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 polices, 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 transport[138] 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 cost[140] 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

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[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

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[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

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[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

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[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/l1_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

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[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.