

provision of paging, dispatch, mobile voice, mobile data, facsimile, or combinations of these services,¹³⁶ the primary use for SMR traditionally has been dispatch services.¹³⁷ Dispatch differs from mobile voice communications offered by PCS and cellular carriers in that it allows both one-to-one and one-to-many communication (including real-time conferencing with groups), and it generally does not operate through interconnection with the public switched telephone network.¹³⁸ SMR systems have also had the ability to offer interconnected service, but until the development of digital technologies, analog SMR systems had limited capacity to provide mobile telephone services. In recent years, however, the nature of SMR service has evolved significantly. SMR providers such as Sprint Nextel (on its iDEN network) and SouthernLINC Wireless, a unit of energy concern Southern Company, have used digital technologies to increase spectral efficiency and to become more significant competitors in mobile telephony, while also providing dispatch functionality as a part of their service offerings.¹³⁹ Furthermore, in apparent response to the dispatch functionality of SMR services, many cellular and broadband PCS carriers have begun to offer push-to-talk functionality on their networks, including Verizon Wireless, Cingular, Sprint Nextel (on its CDMA network), and Alltel. SMR spectrum is also used for certain data-only networks.¹⁴⁰

65 Available Licenses and Spectrum Aggregation – In every geographical area of the country, the Commission initially authorized up to eight different mobile telephone licenses (two cellular and six broadband PCS), not including additional digital SMR licenses.¹⁴¹ Moreover, under Commission rules, broadband PCS, cellular, and auctioned SMR licensees may, with Commission approval, disaggregate (divide the spectrum into smaller amounts of bandwidth) or partition (divide the license into

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discussed below in Section III E 1 b, *infra*, the configuration of the 800 MHz band is changing as a result of a new band plan adopted by the Commission

¹³⁶ 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)

¹³⁷ Dispatch services allow two-way, real-time, voice communications between fixed units and mobile units (*e.g.*, between a taxicab dispatch office and a taxi) or between two or more mobile units (*e.g.*, between a car and a truck). *See Fifth Report*, at 17727-17728, for a detailed discussion. A number of providers continue to provide both commercial and private dispatch services at 800 MHz, 900 MHz, 220 MHz, 217-219 MHz, and 450-470 MHz. *See* Applications of Motorola, Inc., Motorola SMR, Inc., and Motorola Communications and Electronics, Inc. Assignors; and FCI 900, Inc., Assignee, For Consent to Assignment of 900 MHz Specialized Mobile Radio Licenses, *Order*, 16 FCC Rcd 8451 (2001) (“*Motorola Order*”). Dispatch and SMR are often used interchangeably, although SMR refers to specific spectrum ranges.

¹³⁸ *See* The Strategis Group, *The State of the SMR Industry: Nextel and Dispatch Communications*, Sept. 2000, at 57; The Strategis Group, *US Dispatch Markets*, Jan. 2000, at 1. *See also Motorola Order*, at 8457.

¹³⁹ According to Nextel, “[We are] referred to as an ‘SMR provider’ , although [our] services compete directly with and are regulated virtually identically to those of cellular and PCS providers.” Nextel, Automatic and Manual Roaming Obligations Pertaining to Commercial Mobile Radio Services, WT Docket No. 00-193, *Comments*, at note 4 (filed Jan. 5, 2001). However, in comparison with cellular and broadband PCS providers, digital SMR providers are more focused on the business than the individual consumer market. *See, e.g.*, Nextel Communications, Inc., SEC Form 10-Q, Nov. 14, 2000, at 16.

¹⁴⁰ *See* Section IV B 1 e, Data-Only Networks and Technology Deployment, *infra*.

¹⁴¹ Some areas may have fewer than eight active licenses because certain auction winners or licensees have defaulted on payments to the Commission, because some licensees did not meet their buildout requirements, some licensees returned their licenses, or some licenses remained unsold in an auction.

smaller geographical areas) their licenses, or both, to other entities¹⁴² Many licensees hold more than one license in a particular market While no longer in operation, at one time the Commission's CMRS spectrum cap molded the distribution of spectrum licenses Under the spectrum cap, no entity could control more than 45 megahertz of cellular, broadband PCS, and SMR¹⁴³ spectrum in an MSA, or more than 55 megahertz in an RSA¹⁴⁴ In November 2001, however, the Commission raised the spectrum cap to 55 megahertz in all markets, and decided to eliminate the restriction entirely effective January 1, 2003¹⁴⁵

b 800 MHz Band Reconfiguration and 1.9 GHz Spectrum Exchange

66 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 entities¹⁴⁶ 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 Nextel To accomplish the reconfiguration, the Commission required 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 Nextel's licenses to provide the right to operate on two five-MHz blocks in the 1.9 GHz band – specifically 1910-1915 MHz and 1990-1995 MHz – conditioned on Nextel fulfilling certain obligations specified in the Commission's decision As a new entrant in the 1.9 GHz band, 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 Nextel the value of the spectrum rights that Nextel is relinquishing and the actual costs 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, 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

c Narrowband Spectrum

67 In addition to the spectrum that mobile telephone carriers use to offer both voice and data CMRS services, two additional spectrum bands – paging and narrowband PCS – are used by licensees to offer CMRS services that consist only of data communications Spectrum designated for commercial messaging/paging is spread across several non-contiguous bands 35-36 MHz, 43-44 MHz, 152-159 MHz, 454-460 MHz, and 929-932 MHz¹⁴⁷ Each license consists of between 20 and 50 kilohertz¹⁴⁸ The

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

¹⁴³ No more than 10 megahertz of SMR spectrum was attributable to an entity under the cap 47 C.F.R. § 20.6(b)

¹⁴⁴ 47 C.F.R. § 20.6(a)

¹⁴⁵ *Spectrum Cap Order*, at 22669 The increase to 55 megahertz took effect February 13, 2002 See 67 Fed. Reg. 1626 (Jan. 14, 2002) All non pro forma license transfers are still subject to review by the Commission to determine whether they are in the public interest *Spectrum Cap Order*, at 22670-22671

¹⁴⁶ FCC Adopts Solution to Interference Problem Faced by 800 MHz Public Safety Radio Systems, *News Release*, Federal Communications Commission, Jul. 8, 2004

¹⁴⁷ FCC, *Paging (Lower) Bandplan*, <<http://wireless.fcc.gov/auctions/data/bandplans/pagingLwrband.pdf>>, FCC, *929 and 931 MHz Paging Bandplan*, <<http://wireless.fcc.gov/auctions/data/bandplans/auc26bnd.pdf>>

¹⁴⁸ *Id.*

Commission first allocated spectrum for paging in 1949 and licensed the spectrum on a site-by-site basis through the mid-1990s¹⁴⁹ In 2000 the Commission began auctioning additional paging licenses on a geographic area basis using EAs and MEAs¹⁵⁰ The Commission completed its third paging auction on May 28, 2003¹⁵¹

68 Narrowband PCS spectrum is located in the 901-902 MHz, 930-931 MHz, and 940-941 MHz bands and allows licensees to offer an array of two-way data services such as text messaging¹⁵² The Commission first auctioned narrowband PCS spectrum in 1994¹⁵³ Licenses consist of between 50 and 200 kilohertz each and were auctioned on a nationwide, regional, and MTA basis¹⁵⁴ The Commission completed its most recent auction of narrowband PCS licenses on September 25, 2003¹⁵⁵

d 700 MHz Bands

69 As discussed in the *Eighth Report*, the 700 MHz spectrum is being reclaimed from use by broadcast services in connection with the transition of the analog television service to digital television (DTV)¹⁵⁶ The reclamation of television spectrum has been addressed in two parts, primarily as a result of different statutory requirements applicable to the two bands and differing degrees of incumbency in the two bands¹⁵⁷ These two bands are the 698-746 MHz (known as the “Lower 700 MHz”) band and the 746-806 MHz (or “Upper 700 MHz”) band The Upper 700 MHz Band is currently used by TV stations on Channels 60-69 and comprises 60 megahertz, while the Lower 700 MHz Band, which is used by TV stations on Channels 52-59, comprises 48 megahertz of spectrum¹⁵⁸

70 Seventy-eight megahertz of the total 108 megahertz of Upper and Lower 700 MHz spectrum will generally be open to a broad range of flexible uses¹⁵⁹ These bands have many permissible

¹⁴⁹ Revision of Part 22 and Part 90 of the Commission’s Rules to Facilitate Future Development of Paging Systems, Implementation of Section 309(j) of the Communications Act – Competitive Bidding, *Notice of Proposed Rulemaking*, 11 FCC Rcd 3108, 3109-3110 (1996)

¹⁵⁰ See 929 and 931 MHz Paging Auction Closes, *Public Notice*, DA 00-508 (rel Mar 6, 2000); *Seventh Report*, at 13050-13051

¹⁵¹ Lower and Upper Paging Bands Auction Closes, *Public Notice*, DA 03-1836 (rel May 30, 2003)

¹⁵² Implementation of Section 309(j) of the Communications Act – Competitive Bidding Narrowband PCS, PP Docket No 93-253, *Third Memorandum Opinion and Order and Further Notice of Proposed Rulemaking*, 10 FCC Rcd 175 (1994)

¹⁵³ Announcing the High Bidders in the Auction of Ten Nationwide Narrowband PCS Licenses; Winning Bids Total \$617,006,674, *Public Notice*, PNWL 94-4 (Aug 2, 1994)

¹⁵⁴ *Id*, Announcing the High Bidders in the Auction of 30 Regional Narrowband PCS Licenses; Winning Bids Total \$490,901,787, *Public Notice*, PNWL 94-27 (rel Nov 9, 1994)

¹⁵⁵ Regional Narrowband PCS Spectrum Auction Closes, *Public Notice*, DA 03-3006 (rel Oct 1, 2003), Narrowband PCS Spectrum Auction Closes, *Public Notice*, DA 03-3012 (rel Oct 2, 2003) See, also, *Ninth Report*, at 20636-20637

¹⁵⁶ See *Eighth Report*, at 14798-14799

¹⁵⁷ Reallocation and Service Rules for the 698-746 MHz Spectrum Band (Television Channels 52-59), GN Docket No 01-74, *Notice of Proposed Rulemaking*, 16 FCC Rcd 7278, 7282 (2001)

¹⁵⁸ The Commission has allocated 24 megahertz of the Upper 700 MHz band for use by public safety entities, pursuant to Section 337(a) of the Communications Act 47 U S C § 337(a)

¹⁵⁹ See Reallocation and Service Rules for the 698-746 MHz Spectrum Band (Television Channels 52-59), GN Docket No 01-74, *Report and Order*, 17 FCC Rcd 1022 (2002) (“*Lower 700 MHz Report and Order*”), Service (continued)

uses new licensees may use the spectrum for fixed, mobile (including mobile wireless commercial services), and broadcast services¹⁶⁰ The Commission expects that many of the new technologies to be developed and deployed in this band will support advanced wireless applications¹⁶¹ However, portions of the Upper and Lower 700 MHz spectrum are currently encumbered by television broadcasters, and may remain so until the end of period when broadcasters convert from analog to digital transmission systems¹⁶² The Digital Television and Public Safety Act of 2005 (“DTV Act of 2005”) amended the statutory definition of that period and established February 17, 2009 as the end of the DTV transition¹⁶³ Nevertheless, there may be some portions of these bands that are not so encumbered and are available for immediate use by new licensees

71 The Balanced Budget Act of 1997 and certain subsequent legislation initially directed the Commission to license these reclaimed spectrum bands well in advance of the end of the DTV transition period¹⁶⁴ The Auction Reform Act of 2002 eliminated these statutory deadlines¹⁶⁵ and provided the Commission with a level of discretion on the timing of and deadlines for issuing licenses¹⁶⁶ The Auction Reform Act further ordered the Commission to delay the A, B, and E block portion of Auction No 44 (Lower 700 MHz) and the entire Auction No 31 (Upper 700 MHz), but directed it to proceed with an auction of the Lower 700 MHz C and D blocks¹⁶⁷ The initial auction of Lower 700 MHz C and D block licenses (Auction No 44) raised \$88.7 million in net bids¹⁶⁸ Subsequent auctions of licenses in these bands (Auction Nos 49 and 60) resulted in winning bids for all of the licenses that remained held by the Commission after Auction No 44 and raised additional net bids of over \$57 million¹⁶⁹

72 The DTV Act of 2005 provides a number of changes to the transition of the analog

(Continued from previous page)

Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission’s Rules, WT Docket No 99-168, *Third Report and Order*, 16 FCC Rcd 2703 (2001), Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission’s Rules, WT Docket No 99-168, *Second Memorandum Opinion and Order*, 16 FCC Rcd 1239 (2001); Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission’s Rules, WT Docket No 99-168, *Memorandum Opinion and Order and Further Notice of Proposed Rulemaking*, 15 FCC Rcd 20845 (2000); Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission’s Rules, WT Docket No 99-168, *Second Report and Order*, 15 FCC Rcd 5299 (2000) (“*Upper 700 MHz Second Report and Order*”)

¹⁶⁰ *Id*

¹⁶¹ *Lower 700 MHz Report and Order*, at 1032

¹⁶² *Id*, at 1028

¹⁶³ See Deficit Reduction Act of 2005, Pub L No 109-171, 120 Stat 4 (2006) (“DRA”) (amending Section 309(j)(14) and Section 337(e) of the Communications Act, as amended) Title III of the DRA is the DTV Act

¹⁶⁴ Balanced Budget Act of 1997, Pub L No 105-33, 111 Stat 251 § 3003 (1997) (adding new Section 309(j)(14) to the Communications Act of 1934, as amended), § 3007 (uncodified, reproduced at 47 U S C § 309(j) note 3); Consolidated Appropriations Act, 2000, Pub L No 106-113, 113 Stat 2502, App E, § 213, 145 Cong Rec H12493-94 (Nov 17, 1999) (“Consolidated Appropriations Act”), 47 U S C § 309(j)(14)(C)(ii)

¹⁶⁵ Auction Reform Act of 2002, Pub L No 107-195, 116 Stat 715 (“*Auction Reform Act*”)

¹⁶⁶ See 47 U S C § 309(j)(15), as added by the *Auction Reform Act*

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

¹⁶⁸ Lower 700 MHz Band Auction Closes, *Public Notice*, DA 02-2323 (rel Sept 20, 2002) See also *Ninth Report*, at 20638

¹⁶⁹ Lower 700 MHz Band Auction Closes, *Public Notice*, DA 03-1978 (rel June 18, 2003), Auction of Lower 700 MHz Band Licenses Closes, *Public Notice*, DA 05-2239 (rel Aug 5, 2005)

television service to digital television and the reclamation of the 700 MHz spectrum¹⁷⁰ These include amending Section 309(j)(14) of the Communications Act to establish February 17, 2009 as the end of the DTV transition¹⁷¹ Congress also addressed the timing of auctions for the assignment of remaining spectrum from TV Channels 52-69 The Communications Act now requires the Commission to commence the auction of recovered analog broadcast spectrum no later than January 28, 2008¹⁷² and deposit the proceeds of such auction in the Digital Television Transition and Public Safety Fund no later than June 30, 2008¹⁷³ Congress also extended the Commission's auction authority to September 30, 2011¹⁷⁴

e Advanced Wireless Services

73 U S mobile carriers have the flexibility to deploy advanced wireless technologies, including those commonly called Third Generation or "3G," that allow them to offer high-speed mobile data services using their existing CMRS spectrum¹⁷⁵ 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 advanced wireless services (AWS)¹⁷⁶ As noted in the *Tenth Report*, in 2002 the Commission, together with the National Telecommunications and Information Administration ("NTIA"), allocated 90 megahertz of spectrum in the 1710-1755 and 2110-2155 MHz bands that can be used to offer advanced wireless services, including 3G services¹⁷⁷

74 Since that time, the Commission has completed the process of establishing service rules for the 1710-1755 and 2110-2155 MHz bands in preparation for the auctioning of this spectrum in 2006 Initially, in November 2003, in WT Docket No 02-353, the Commission released a *Report and Order* adopting rules in the 1710-1755 and 2110-2155 MHz bands including application, licensing, operating and technical rules, and competitive bidding provisions (*AWS-1 Service Rules Order*)¹⁷⁸ More specifically, the Commission determined that this 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

¹⁷⁰ In light of these statutory changes, the Commission recently issued a Notice of Proposed Rule Making that revisits some of the Commission's early decisions regarding the 700 MHz band licenses by seeking public comment on a variety of licensing and service rules affecting recovered analog broadcast spectrum in these bands See Notice of Proposed Rule Making, Fourth Further Notice of Proposed Rule Making, and Second Further Notice of Proposed Rule Making, FCC 06-114 (rel Aug 10, 2006)

¹⁷¹ DTV Act of 2005 § 3002

¹⁷² *Id* § 3003 "Recovered analog spectrum" is defined in the DTV Act of 2005 *Id*

¹⁷³ DTV Act of 2005 §§ 3003(a), 3004 (establishing a Digital Television and Public Safety Fund)

¹⁷⁴ DTV Act of 2005 § 3003

¹⁷⁵ 47 C F R §§ 20.901(a) and 24.3

¹⁷⁶ 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

¹⁷⁷ *Tenth Report*, at 15941 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)

¹⁷⁸ Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands, WT Docket No 02-353, *Report and Order*, 18 FCC Rcd 25162 (2003) (*AWS-1 Service Rules Report and Order*); *Order on Reconsideration*, FCC 05-149 (rel Aug 15, 2005) (*AWS-1 Service Rules Order on Reconsideration*)

Commission's flexible, market-oriented Part 27 rules¹⁷⁹ In order to meet a variety of needs, including the needs of both large and small service providers, the Commission adopted a band plan for this spectrum employing paired spectrum blocks and Economic Areas (EAs), Regional Economic Areas (REAGs) and Rural Service Areas/Metropolitan Statistical Areas (RSA/MSA) licensing areas The band plan also permitted spectrum to be easily aggregated

75 The Commission decided not to impose ownership restrictions (other than those contained in Section 310 of the Communications Act), spectrum aggregation limits, eligibility restrictions, or interim performance requirements The Commission did limit the lower band (*i e*, 1710-1755 MHz band) to mobile transmissions and the upper band (*i e*, 2110-2155 MHz band) to base transmissions and established rules to protect co-channel and adjacent channel operations from interference The Commission also determined to assign licenses for this spectrum using the Commission's Part 1 competitive bidding rules and award bidding credits of 15 percent for small businesses and 25 percent for very small businesses¹⁸⁰

76 Subsequent to the *AWS-1 Service Rules Order*, the Commission released additional orders further clarifying the service rules for the 1710-1755 MHz and 2110-2155 MHz bands In 2005, in response to petitions for reconsideration of the *AWS-1 Service Rules Order*, the Commission amended the band plan, providing for a greater amount of spectrum to be licensed on a small geographic basis to encourage the participation of small and rural carriers in the AWS auction, and making other changes in response to the spectrum needs reflected in the record¹⁸¹ In 2006, the Commission adopted rules establishing new restrictions on the award of designated entity auction credits to an applicant or licensee that has an "impermissible" or "attributable" material relationship with a non-designated entity resulting from a spectrum lease or resale agreement, in order to ensure that the benefits of designated entity status at auction are reserved for actual designated entities and to prevent unjust enrichment of unintended beneficiaries¹⁸² Also in 2006, the Commission established procedures by which AWS licensees in the 2110-2155 MHz band, among others, could relocate existing incumbents in that band to other spectrum, including fixed microwave service licensees in the 2110-2150 MHz band and Broadband Radio Service licensees in the 2150-2162 MHz band, and also established rules under which other new licensees benefiting from the relocation of an incumbent would share in the costs of the relocation¹⁸³ In addition to these service rule orders, the Commission in 2006 also established procedures for the upcoming auction of the 1710-1755 MHz and 2110-2155 MHz bands that started on August 9, 2006¹⁸⁴

77 The Commission has also taken significant steps toward licensing other bands of spectrum for use by AWS In 2004, the Commission allocated an additional twenty megahertz of

¹⁷⁹ 47 C F R Part 27

¹⁸⁰ *Designated Entity Second Report, Designated Entity Order on Reconsideration*

¹⁸¹ See *AWS-1 Service Rules Order on Reconsideration* at ¶¶ 10-21

¹⁸² See Implementation of the Commercial Spectrum Enhancement Act and Modernization of the Commission's Competitive Bidding Rules and Procedures, *Second Report and Order and Second Further Notice of Proposed Rule Making*, 21 FCC Rcd 4753 (2006), *Order on Reconsideration*, FCC 06-78 (rel June 2, 2006)

¹⁸³ See Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems, ET Docket No 00-258, *Services Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands*, WT Docket No 02-353, *Ninth Report and Order and Order*, FCC 06-45 (rel Apr 21, 2006)

¹⁸⁴ See Public Notice, "Auction of Advanced Wireless Services Licenses Scheduled For June 29, 2006," AU Docket No 06-30, FCC 06-47 (rel Apr 12, 2006), Public Notice, "Auction of Advanced Wireless Services Licenses Rescheduled for August 9, 2006," AU Docket No 06-30, FCC 06-71 (rel May 19, 2006)

spectrum in the 1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz and 2175-2180 MHz bands¹⁸⁵ 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 Finally, in 2005, the Commission designated yet another 20 MHz of spectrum for AWS, specifically the 2155-2175 MHz band, thus establishing 70 MHz of contiguous AWS spectrum in the 2.1 GHz band (from 2110 to 2180 MHz)¹⁸⁶

f Broadband Radio Service

78 In July 2004, the Commission transformed the rules and policies governing the Multipoint Distribution Service (MDS) and the Instructional Television Fixed Service (ITFS) in the 2500-2690 MHz band by providing licensees with greater flexibility and establishing a more functional band plan¹⁸⁷ As one part of this action, the Commission renamed the MDS service the "Broadband Radio Service" (BRS) and renamed the ITFS service the Educational Broadband Service (EBS)

79 The Commission took several steps to restructure the BRS/EBS band and facilitate more efficient use of the spectrum First, the Commission expanded the 2500-2690 MHz band by five megahertz, from 2495-2690 MHz, to accommodate the relocation of BRS Channels 1 and 2, which are presently located in the 2.1 GHz band Specifically, the Commission created a one megahertz guard-band, 2495-2496 MHz, to separate incumbent operations below 2495 MHz and new BRS Channel 1 licensees that would operate at 2496-2502 MHz Second, 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 and creates incentives for the development of low-power, cellularized broadband operations, which were inhibited by the prior band plan

80 In addition, the Commission provided licensees with the flexibility to employ the

¹⁸⁵ Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, Including Third Generation Wireless Systems, ET Docket No. 00-258, *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, WT Docket No. 04-356, WT Docket No. 02-353, *Notice of Proposed Rulemaking*, 19 FCC Rcd 19263 (2004) (*AWS-2 Service Rules NPRM*)

¹⁸⁶ See Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, Including Third Generation Wireless Systems, ET Docket No. 00-258, *Eighth Report and Order, Fifth Notice of Proposed Rule Making and Order*, FCC 05-172 (2005)

¹⁸⁷ Amendment of Parts 1, 21, 73, 74, and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational, and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands, WT Docket No. 03-66, *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 In October 2002, three organizations representing MDS and ITFS providers – the Wireless Communications Association International, the National ITFS Association, and the Catholic Television Network (collectively, the Coalition) – submitted a proposal to the FCC requesting that it substantially change the rules governing this band In April 2003, the FCC released a Notice of Proposed Rulemaking seeking comment on the Coalition proposal and on other ways to foster efficient and effective use of this spectrum

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.

81 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.¹⁸⁸ BRS and EBS providers will have thirty months from the effective date of the new rules during which they may propose transition plans for relocating existing facilities of all other licensees within the same Basic Trading Area (BTA) to new spectrum assignments in the revised band plan. Plan proponents must notify all licensees in the BTA and file their plans with the Commission. The Commission also allowed licensees to transition themselves if no proponent came forward in a BTA by the deadline for filing transition plans. It also made other changes to the transition rules to facilitate transitions to the new band plan. With respect to lease agreements, the Commission held that EBS licensees are permitted to enter into excess capacity leases for a maximum of 30 years, but leases with terms of 15 years or longer must include a right to review the educational use requirements of the leases every five years starting at year 15.

82 The changes made to the 2496-2690 MHz band should enable BRS/EBS providers to use this spectrum in a more technologically and economically efficient manner. The goal of the new rules is to facilitate the growth of new and innovative wireless technologies and services, including wireless broadband services that have the potential to compete with cable and DSL broadband providers and to extend broadband service to rural and underserved areas.

2 Other Potential Barriers to Entry

83 There are three other types of potential entry barriers, each of which captures separate dimensions of the difficulty of entering an industry.¹⁸⁹ The first type consists of the impediment to entry erected by advertising expenditures. Unlike tangible capital, advertising can neither be resold nor otherwise transferred to prospective buyers, such expenditures are irrecoverable or sunk. While the incumbent has already incurred the sunk costs, the entrant has not. Therefore, the entrant has higher incremental cost and incremental risk associated with its decision to enter. The second type of entry barrier arises from economies of scale, which allow firms to lower the cost per unit of producing and distributing a product as the volume of output expands. The more extensive economies of scale are, the larger the minimum efficient scale is relative to the size of the market. Consequently, a nascent firm risks depressing market price by producing at optimal scale. The alternative is to produce at less than minimum cost. Either way, expected profitability is lowered, and entry is dissuaded. The third type of entry barrier, and closely related to the second, is the inability of new firms to borrow sums sufficient to finance efficient start-ups. The inability to borrow sufficiently increases with the larger absolute capital requirement needed to realize minimum cost.

84 All three types of entry barriers have the potential to afford incumbent carriers first-mover advantages over latecomers. Therefore, it is possible that the three types of entry barriers are

¹⁸⁸ Amendment of Parts 1, 21, 73, 74, and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational, and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands, WT Docket No. 03-66, *et al.*, *Order on Reconsideration and Fifth Memorandum Opinion and Order and Third Memorandum Opinion and Order and Second Report and Order*, FCC 06-46 (rel. Apr. 27, 2006).

¹⁸⁹ See William J. Baumol and Robert D. Willig, *Fixed Cost, Sunk Cost, Entry Barriers and Sustainability of Monopoly*, *QUARTERLY JOURNAL OF ECONOMICS*, Vol. 96, Aug. 1981, at 406-431; Joe S. Bain, *Barriers to New Competition*, 1956, at 55; William S. Comanor and Thomas A. Wilson, *Advertising Market Structure and Performance*, *THE REVIEW OF ECONOMICS AND STATISTICS*, Vol. 49, Nov. 1967, at 425.

significant in mobile telephone service. Telecommunications has historically been an industry characterized by large investments in network infrastructure and vast scale economies, suggesting the scale economy and capital requirement barriers are both high. Increasing advertising expenditures by mobile telephone carriers as they seek to brand their products suggests that the product differentiation barrier in mobile telephone service is similarly high. As documented below in Section IV B 4 on carrier rivalry with respect to advertising and marketing, the four nationwide operators alone spent a total of \$3.5 billion on advertising in 2005, and one analysis determined that Cingular Wireless and Verizon Wireless were two of the top three U.S. brands as measured by dollars spent on advertising.¹⁹⁰ At the same time, regardless of the nature and potential significance of entry barriers, we nevertheless continue to observe entry in local markets due to the continued expansion of existing carriers. Furthermore, we have an expectation that the auction of AWS spectrum will facilitate entry into local mobile telephone markets by existing carriers, or possibly entirely new firms, despite the potential entry barriers discussed above.

F Rural Markets

1 Geographical Comparisons: Urban vs Rural

85 Since the release of the *Sixth Report*,¹⁹¹ the Commission has attempted to obtain a better understanding of the state of competition below the national level, and particularly in rural areas.¹⁹² The Commission does not have a statutory definition of what constitutes a rural area.¹⁹³ The Commission has used 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.”¹⁹⁴ In its Report and Order concerning deployment of wireless services in rural areas, the Commission adopted a “baseline” definition of rural as a county with a population density of 100 persons or fewer per square mile.¹⁹⁵ For this reason, we adopt this same

¹⁹⁰ Section IV B 4, Advertising and Marketing, *infra*

¹⁹¹ *Sixth Report*, at 13350

¹⁹² For example, In 2003, the Commission released a *Notice of Proposed Rulemaking* in 2003 to examine ways to promote the rapid and efficient deployment of spectrum-based services in rural areas. *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 (2003) (“*Rural NPRM*”). More recently, the 11th CMRS NOI included questions on a range of rural wireless issues.

¹⁹³ The federal government has multiple ways of defining rural, reflecting the multiple purposes for which the definitions are used. *Eighth Report*, at 14834; *Rural NPRM*, at 20808-11.

¹⁹⁴ Biennial Regulatory Review, *Spectrum Aggregation Limits for Wireless Telecommunications Carriers*, *Report and Order*, 15 FCC Rcd 9219, 9256 at note 203 (1999).

¹⁹⁵ *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, at 19087-19088 (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.”)

definition to analyze service availability in rural areas for this report ¹⁹⁶

2 Rural Competition

86 In comparing competitive entry in counties with population densities of 100 persons per square mile or less to those with densities greater than 100 persons per square mile, we find that the less densely populated counties have an average of 3.6 mobile competitors, while the more densely populated counties have an average of 4.9 competitors ¹⁹⁷. The average number of competitors in the less densely populated counties generally has remained unchanged for the past two years, whereas the average number of competitors in the more densely populated counties declined by 11 percent from an average of 5.5 competitors in the previous year, which itself represented a 7 percent decline from the previous year as reported in the *Tenth Report* ¹⁹⁸.

87 A number of commenters claimed there was strong innovation and competition occurring in rural areas. One commenter said, “carriers, including large and small, regional and local providers, have deployed new technologies and overlaid existing networks in order to meet consumers’ evolving expectations and needs,” adding later that “consumers enjoy a rich variety (and number) of rate plan choices in both rural and urban markets, in coastal cities and small towns, at competitive rates” ¹⁹⁹. Another commenter said, “[c]ompetition in our rural areas is strong. In much of our service area we compete with ten or more competitors. In fact, most of the national carriers cover parts of the areas that we serve and compete with us daily for customers” ²⁰⁰. A third commenter said, “[competition from nationwide carriers indicates that] larger carriers are increasingly building out their networks in rural and underserved areas” ²⁰¹.

3 Conclusion

88 Based on our rollout analysis, information and statements provided by commenters, and industry reports, we conclude that CMRS providers are competing effectively in rural areas. In addition, some analysts report that wireless competition is increasing in rural areas, particularly as a wireline substitute ²⁰². While it does appear that, on average, a smaller number of operators are serving rural areas than urban areas, this structural difference is not, by itself, a sufficient basis for concluding that CMRS

¹⁹⁶ We note that this definition was supported by many of the commenters responding to the *Ninth Report NOI*. See *Ninth Report*, note 266, at 20642. In the *Eighth Report*, the Commission analyzed service availability in rural areas using three different proxy definitions, and similar results were obtained for each definition. *Eighth Report*, at 14835-37.

¹⁹⁷ In its 2005 Wireless Survey, NTCA found that its “survey respondents are facing considerable competition from other carriers—the average respondent indicated that their company competes with between two and five other carriers.” CTIA Comments, at 22-23 (citing NTCA’s 2005 Wireless Survey). However, NTCA cautions that these numbers may be misleading, as many competitors may serve only a small portion of a rural area. NTCA, *PN Comments*, at 4 (filed Feb. 17, 2006).

¹⁹⁸ *Ninth Report*, at 20643, *Tenth Report*, at 15945.

¹⁹⁹ CTIA Comments, at 23 and 25.

²⁰⁰ Cellular South Comments, at 3.

²⁰¹ T-Mobile Reply Comments, at 6.

²⁰² See Raina Smyth *et al.*, *Telecom Services: Initiation of Coverage: High Payout Rural Telecoms Offer Near-term Opportunities, Long-term Risks*, Morgan Stanley, Equity Research, Apr. 17, 2006, at 3 (“wireless competition is gradually increasing in the non-metro markets where the RLECs operate”), and Jason Armstrong *et al.*, *Global Telecom Weekly*, Goldman Sachs, Equity Research, Mar. 3, 2006, at 2 (“Line loss trends accelerated across most RLECs owing to wireless substitution”).

competition is not effective in rural areas. We note that, market structure is only a starting point for a broader analysis of the status of competition based on the totality of circumstances, including the pattern of carrier conduct, consumer behavior, and market performance as discussed more fully below. Despite the smaller number of mobile operators in rural areas as compared to urban areas, there is no evidence in the record to indicate that this structural difference has enabled carriers in rural areas to raise prices above competitive levels or to alter other terms and conditions of service to the detriment of rural consumers. To the contrary, one analyst found that rural carriers are rolling out competitive national pricing plans with “surprisingly low per-minute pricing”²⁰³

IV CARRIER CONDUCT IN THE MOBILE TELECOMMUNICATIONS MARKET

89 A concentrated market, in conjunction with significant entry barriers, may lessen competition in the market for commercial mobile services in two distinct ways. First, it may increase the likelihood that a group of competing carriers will successfully engage in coordinated interaction aimed at raising prices and lowering output. Second, it may enable an individual carrier to profitably raise price and lower output unilaterally. However, neither coordinated interaction nor unilateral action to lessen competition is a necessary consequence of market concentration and entry barriers. For example, unilateral or coordinated action to lessen competition may be thwarted or undermined by the presence of one or more maverick carriers who have the ability and incentive to expand sales by undercutting the prices of rivals, offering innovative service packages and engaging in aggressive advertising and promotional campaigns.²⁰⁴ The analysis of carrier conduct thus focuses on whether incumbent carriers, given the prevailing market structure, engage in intense price and non-price rivalry or instead compete in a less aggressive manner.

A Price Rivalry

1 Developments in Mobile Telephone Pricing Plans

90 The continued rollout of differentiated pricing plans also indicates a competitive marketplace. In the mobile telephone sector, we observe independent pricing behavior, in the form of continued experimentation with varying pricing levels and structures, for varying service packages, with various handsets and policies on handset pricing. AT&T Wireless’s Digital One Rate plan, introduced in May 1998, is one notable example of an independent pricing action that altered the market to the benefit of consumers.²⁰⁵ Today all of the nationwide operators offer some version of a national 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. A more recent example is the introduction and spread of “family plan” packages, in which subscribers sign up for two lines and then have the option of adding additional lines at reduced prices, with all lines sharing the available minutes on the plan jointly.²⁰⁶ As noted in the *Tenth Report*, all the nationwide carriers also offer some version of a family

²⁰³ John Byrne, *Sprint Simplifies Plan Structure*, KAGAN WIRELESS MARKET STATS, July 22, 2005, at 3-4 (“Regional and local carriers with national plans report surprisingly low per-minute pricing”). Another analyst wrote, “[W]ith the national carriers expanding their networks into rural areas, rural wireless carriers were forced to modify/lower their pricing, which in turn has been pressuring their ARPUs.” Tim Horan, *Implications of AT’s Results On U.S. Wireless Industry*, Daily Datatimes, CIBC World Markets, Jan. 23, 2006.

²⁰⁴ An example is when AT&T introduced its digital-one-rate plan in May 1998, which was the first plan to include a large quantity of monthly minutes at a fixed rate and no long distance charges when used on the operator’s network. See *Fourth Report*, at 10155, and *Fifth Report*, at 17677-78.

²⁰⁵ See *AT&T Launches First National One-Rate Wireless Service Plan*, News Release, AT&T Corp., May 7, 1998.

²⁰⁶ See *Tenth Report*, at 15946. One analyst estimated that 54 percent of adult postpaid users, and 81% of all teens (13 to 17 years of age), were on a family plan in 2005. *Yankee Group Reveals Family and Prepaid Plans Continue to Drive Growth in the United States*, News Release, Yankee Group, June 12, 2006.

plan²⁰⁷

91 Recently, a few U S providers have introduced “mobile to anyone” calling options. The new feature, currently offered by regional operators Alltel and Suncom, allow subscribers unlimited free calling to and from any ten designated numbers in the United States, regardless of wireline or wireless carrier.²⁰⁸ Alltel’s new service is available to customers with plans that cost at least \$59.99 a month and offer 1,200 minutes,²⁰⁹ while Suncom feature costs an additional \$10 a month for regional calling or \$15 monthly for national calling.²¹⁰ These plans are premised on statistics showing that many consumers make most of their calls to about half a dozen numbers.²¹¹ Most other carriers have recognized the same trend, but their plans typically provide free calls only to customers who use the same wireless provider (“on-net”).²¹² While carriers typically pay fees to other carriers to connect calls on their networks (“off-net”), Alltel expects to offset that loss of revenue by getting customers to sign up for the higher priced monthly plans necessary to receive the “mobile to anyone” feature.²¹³ In addition, Sprint Nextel launched a similar, but more limited, calling service that allows for unlimited calling between a customer’s mobile phone and a designated home phone or office phone number, regardless of their local provider, for an additional fee.²¹⁴ One analyst wrote that they “expect wireless carriers to continue to offer these types of value added services, as they provide a way to help increase overall customer ARPU and reduce churn.”²¹⁵

92 The *Tenth Report* noted that early termination fees (“ETFs”) are a widespread phenomenon in the marketplace.²¹⁶ In June 2006, Verizon Wireless announced that the company will pro-rate ETFs for customers nationwide beginning in fall 2006.²¹⁷ The company will include new terms in customer contracts that will progressively reduce the amount a customer has to pay if they cancel their service with Verizon Wireless before the term of their contract expires. The pro-rated fees will apply to

²⁰⁷ See *Tenth Report*, at 15946

²⁰⁸ Timothy Horan, *et al*, *Alltel Launches New Mobile-to-Anyone Service*, Daily Datatimes, CIBC, Apr. 24, 2006, at 2; Timothy Horan, *et al*, *SunCom Launches New Mobile-to-Anyone Service*, Daily Datatimes, CIBC, Mar. 2, 2006, at 3

²⁰⁹ Ken Belson, *Alltel to Offer Free-Calling Plan, With Limits*, NYTIMES.COM, Apr. 21, 2006, at 1

²¹⁰ Timothy Horan, *et al*, *SunCom Launches New Mobile-to-Anyone Service*, Daily Datatimes, CIBC, Mar. 2, 2006, at 3

²¹¹ Ken Belson, *Alltel to Offer Free-Calling Plan, With Limits*, NYTIMES.COM, Apr. 21, 2006, at 1

²¹² *Id*

²¹³ *Id*

²¹⁴ COMMUNICATIONS DAILY, Mar. 9, 2006, at 12

²¹⁵ Timothy Horan *et al*, *Alltel Launches New Mobile-to-Anyone Service*, Daily Datatimes, CIBC, Apr. 24, 2006, at 2

²¹⁶ See *Tenth Report*, at 15946. The Commission has initiated two separate proceedings on this matter. See “Wireless Telecommunications Bureau Seeks Comment on Petition for Declaratory Ruling Filed by CTIA Regarding Whether Early Termination Fees are ‘Rates Charged’ Within 47 U.S.C. Section 332(c)(3)(A),” *Public Notice*, 20 FCC Rcd 9100 (2005), “Wireless Telecommunications Bureau Seeks Comment on Petition for Declaratory Ruling Filed by SunCom, and Opposition and Cross-Petition for Declaratory Ruling Filed by Debra Edwards, Seeking Determination of Whether State Law Claims Regarding Early Termination Fees are Subject to Preemption Under 47 U.S.C. Section 332(c)(3)(A),” *Public Notice*, 20 FCC Rcd 9103 (2005)

²¹⁷ *From Yankee Group Summit, Verizon Wireless CEO: Verizon Wireless to Pro-Rate Early Termination Fees. Will Add Customer Loyalty Benefits*, News Release, Verizon Wireless, June 28, 2006

contracts signed or renewed after the new policy takes effect, and the amount owed will vary depending on the time remaining in the contract²¹⁸ Verizon Wireless is the first major U S carrier to commit to a national policy to pro-rate ETFs It has been suggested that Verizon Wireless's plan to pro-rate ETFs may put competitive pressure on other carriers to follow suit²¹⁹ Thus, like AT&T's introduction of its digital-one-rate plan in 1998, Verizon Wireless's plan to pro-rate ETFs may be interpreted as a sign of competitive rivalry

2 Prepaid Service

93 In the United States, most mobile telephone subscribers pay their phone bills after they have incurred charges, an approach known as postpaid service Prepaid service, in contrast, requires customers to pay for a fixed amount of minutes prior to making calls Although prepaid plans are considered a good way to increase penetration rates, they typically produce lower ARPUs and higher churn rates in comparison to postpaid service²²⁰ For these reasons, the industry generally has not heavily promoted prepaid offerings in the past²²¹ However, the pool of unsubscribed customers qualified for postpaid plans²²² has declined to the point where prepaid offerings, which do not require credit checks, seem more attractive to carriers²²³ In response, some carriers have introduced new prepaid plans, or entire brands²²⁴ In some cases, they are tailoring their offerings to suit segments of the market that do not want or cannot get a traditional cellular plan, particularly the youth market

94 The result of these efforts has been a significant rise in the percentage of wireless users who subscribe to prepaid plans According to one analyst, prepaid accounted for roughly 11 percent of U S subscribers at the end of 2005, versus 9.5 percent at the end of 2004 and 8.1 percent at the end of

²¹⁸ *Id*

²¹⁹ *Citing Negative Impact on Industry, Verizon Wireless to Pro-Rate ETFs*, TRDAILY, June 29, 2006

²²⁰ Simon Flannery *et al*, *Prepaid Takes Share in Quarterly Wireless Survey*, Morgan Stanley, Equity Research, Jan 17, 2006, at 1 But prepaid subscribers have lower levels of bad debt, are cheaper to acquire, and pay more on a per-minute basis than postpaid subscribers Simon Flannery *et al*, *Prepaid Wireless Revisiting a Diamond in the Rough*, Morgan Stanley, Equity Research, Apr 6, 2005, at 5 ("*Diamond in the Rough*") "Prepaid offerings will almost certainly have a detrimental effect on key wireless metrics such as ARPU, churn and MOUs Ultimately, however, if prepaid service can add to profitability and free cash flow and generate a respectable return on investment, it is worth pursuing" *Id*, at 6

²²¹ Li Yuan, *Pay First, Call Later*, WALL STREET JOURNAL, Apr 25, 2005, at R10 ("*Pay First*"), Yuki Noguchi, *The Push Behind Prepaid*, WASHINGTON POST, June 2, 2005, at D01 ("*The Push Behind Prepaid*")

²²² Only about 58 percent of the US population has prime credit *Diamond in the Rough*, at 4 See, also, Roger Cheng, *Pre-Paid Customers Gain Traction With Wireless Carriers*, MarketWatch, Feb 22, 2006, at 1, citing Todd Rethemeier, an analyst for Soleil Securities Group ("We're running out of good customers in this industry Do you know anyone who doesn't have a cellphone?")

²²³ Roger Cheng, *Pre-Paid Customers Gain Traction With Wireless Carriers*, MarketWatch, Feb 22, 2006, at 1 ("There's greater growth in prepaid," said Sprint Chief Financial Officer Paul Saleh "That's what's happening in the market It's really on a fast-growth pace" As a result, the big carriers have increasingly accepted higher credit risks and aggressively pursued the market")

²²⁴ See Section III B 2, *Resale/MVNO Providers*, *supra* According to one analyst, "each of the major carriers has recently launched or re-launched its prepaid service, which is another move to increase penetration of lower income brackets at the expense of ARPU and margins" Simon Flannery and Vance Edelson, *Wireless Carriers Susceptible to Slowing Industry Growth*, Morgan Stanley, Equity Research, May 25, 2005, at 2 See, also, Kelly K Spors, *Paying Before You Talk on a Cellphone*, WALL STREET JOURNAL, July 24, 2005

2003²²⁵ According to another analyst's survey, 27 percent of the net subscriber adds in the fourth quarter of 2005 were prepaid customers²²⁶ Among the nationwide carriers, T-Mobile had 15 percent of its subscribers on prepaid plans, Cingular Wireless and Sprint Nextel each had 6 percent,²²⁷ and Verizon Wireless had 3 percent²²⁸

3 Mobile Data Pricing

95 As noted in the *Ninth Report*, mobile data services that enable subscribers to browse customized web sites, send text and multimedia messages, download ringtones and games, and access other content on their cellphones are marketed primarily as an add-on to mobile voice service²²⁹ During the past year carriers continued to use a variety of different options for pricing such handset-based mobile data services These options include pricing based on kilobytes consumed, a flat rate for each use or download of an application ("pay-as-you-go" or "pay-per-use"), and fixed monthly subscription fees for packages allowing either a set amount of data usage or unlimited data use²³⁰ The availability of these pricing options varies by type of application as well as by provider, with providers frequently offering customers a choice of pricing options for a particular application In addition to allowing customers to purchase particular applications on a stand-alone or *a la carte* basis, carriers also offer certain applications bundled with monthly data packages for cellphones As in the past, mobile data pricing continues to be characterized by considerable complexity due to the diversity of pricing options²³¹

96 Mobile subscribers who wish to browse web sites that have been customized for handsets generally have two principal pricing options to choose from First, they can purchase monthly data packages that allow subscribers to browse the customized web sites, view email, and access other services and content on their cellphones for a fixed monthly fee²³² This includes wireless data plans for mobile broadband networks such as Verizon Wireless's V Cast and Sprint Nextel's Power Vision services²³³ The specific content of such mobile data packages varies by provider²³⁴ While these data packages typically allow unlimited data use or unlimited use of selected services such as web browsing and email

²²⁵ David Janazzo *et al* , *US Wireless Matrix 4Q05*, Merrill Lynch, Equity Research, Mar 24, 2006, at 16 ("*US Wireless Matrix 4Q05*")

²²⁶ Simon Flannery *et al* , *Prepaid Takes Share in Quarterly Wireless Survey*, Morgan Stanley, Equity Research, Jan 17, 2006, at 1

²²⁷ Sprint Nextel does not offer prepaid plans under its own name, but markets prepaid offerings through its subsidiary brand, Boost Mobile This percentage excludes subscribers to its Virgin Mobile joint venture, who are counted as wholesale subscribers See Section III B 2, Resale/MVNO Providers, *supra*, for a discussion of Virgin Mobile and Boost Mobile

²²⁸ *4Q05 Wireless 411*, at 8

²²⁹ *Ninth Report*, at 20645

²³⁰ *Id* , at 20646

²³¹ *Id* See also Sandeep Junnarkar, *A Dizzying Array of Options for Using the Web on Cellphones*, NEW YORK TIMES, June 23, 2005 ("*Options for Using the Web on Cellphones*")

²³² Cingular Wireless, *Media and Services* (visited March 30, 2006) <www.cingular.com>, Nextel, *Services* (visited March 30, 2006) <www.sprint.com> See, also, *Cell Services That Go Beyond the Call*, CONSUMER REPORTS, Jan 2006, at 22 (noting that Sprint offers unlimited access, email, and instant messages for a fixed monthly fee) ("*Cell Services That Go Beyond the Call*")

²³³ See Section IV B 6, Mobile Data Services and Applications, *infra*

²³⁴ See, e.g., *Options for Using the Web on Cellphones*

access, some carriers also offer metered plans that include a fixed amount of megabytes and keep track of the number of kilobytes subscribers use when they download applications and transmit or receive information²³⁵ If a subscriber exceeds the monthly allotment of megabytes under a metered plan, the carrier charges additional data fees on a per-kilobyte basis Alternatively, some carriers deduct from a subscriber's airtime for using their data plans²³⁶ Second, mobile subscribers may also access the same content on a pay-as-you-go basis, without purchasing a monthly data plan, by paying a casual usage rate such as a per-kilobyte fee²³⁷ However, Telephia estimates that subscribers who access the web via their cellphones are nearly twice as likely to subscribe to monthly data packages as to use a pay-per-use option²³⁸ According to Telephia, this is because consumers perceive mobile web browsing to be too expensive without using monthly data packages, and want to avoid being surprised by additional charges billed to their monthly cellphone invoices²³⁹

97 Mobile subscribers who use communications data services such as text messaging services ("SMS") and photo or other multimedia messaging services ("MMS") can choose from a number of pricing options Some carriers bundle various packages and combinations of text messages and multimedia messages with monthly mobile data packages²⁴⁰ In addition, carriers typically offer customers a choice of two *a la carte* pricing options for SMS and MMS (1) send and receive messages on a pay-as-you-go basis for a flat rate per message sent or received, or (2) purchase a messaging package for a fixed monthly fee that yields a lower unit price per message as compared with the flat pay-as-you-go rate²⁴¹ Some carriers also offer unlimited text or photo messaging packages for a fixed monthly fee²⁴² The pay-as-you-go option is significantly more expensive on a per message basis for photo messaging and other types of MMS than it is for simple text messaging²⁴³ Consequently, Telephia estimates that MMS users are nearly three times as likely to subscribe to monthly MMS packages as to use the pay-per-use option, whereas among SMS users the pay-per-use option and monthly SMS packages are almost

²³⁵ See, e.g., Cingular Wireless, *Media and Services* (visited March 30, 2006) <www.cingular.com> See also, *Options for Using the Web on Cellphones* (noting that Cingular Wireless, in contrast to other carriers, offers metered wireless data plans that track usage based on the number of megabytes downloaded)

²³⁶ *Cell Services That Go Beyond the Call* (noting that Verizon deducts from a subscriber's airtime for using its data plans)

²³⁷ See, e.g., Cingular Wireless, *Media and Services* (visited March 30, 2006) <www.cingular.com> ("*Cingular Media and Services*"); Sprint, *Sprint PCS Vision Guide*, at 77 (visited March 30, 2006) <www.sprint.com>

²³⁸ *Telephia Reports Mobile Data Usage Adoption Hits 50 Percent Mark, With Text Messaging Consumption Leading the Way*, News Release, Telephia, Apr. 5, 2006 ("*Telephia Reports Mobile Data Usage Adoption*") Telephia's estimates are based on consumer billing records

²³⁹ *Id.*

²⁴⁰ *Cingular Media and Services; Nextel, Services* (visited March 30, 2006) <www.sprint.com> See also, *Options for Using the Web on Cellphones*

²⁴¹ *Cingular Media and Services, T-Mobile, Services & Accessories* (visited March 30, 2006) <www.t-mobile.com> ("*T-Mobile Services & Accessories*"), *Nextel, Services* (visited March 30, 2006) <www.sprint.com> ("*Nextel Services*")

²⁴² *T-Mobile Services & Accessories, Nextel Services* See also, *Cell Services That Go Beyond the Call* (noting that Sprint and T-Mobile both offer unlimited text messaging for a fixed monthly fee, and that Verizon Wireless offers unlimited messaging to anyone within the Verizon Wireless network for a fixed monthly fee)

²⁴³ *Cingular Media and Services, T-Mobile Services & Accessories; Nextel Services* In general, these carriers were charging \$0.25 per message to send a photo message or other type of multimedia message on a pay-as-you-go basis, versus \$0.10 per message for a text message

equally popular²⁴⁴

98 Downloadable applications such as ringtones and games are generally priced on a pay-as-you-go basis. Some carriers charge just a one-time fixed fee per game or ringtone to purchase such an application and use it for an unlimited period²⁴⁵. Other carriers charge customers for the kilobytes or minutes of airtime used while downloading a ringtone or game, in addition to a one-time fixed fee to purchase and use each application²⁴⁶. Under the latter pricing approach, the subscriber may be able to avoid the additional kilobyte-based charge by purchasing a monthly data plan with unlimited data use or a sufficient allotment of metered data usage²⁴⁷. Some carriers offer other pricing options for downloadable applications. For example, in addition to a one-time fee for unlimited use of a game, some carriers offer customers the option of paying a lower fee for a monthly subscription to the same game²⁴⁸.

99 The pricing of advanced multimedia services such as streaming video clips, mobile television, and over-the-air music downloading services for cellphones also varies by type of application and by provider²⁴⁹. Depending on the carrier, type of content, or its source, video content for cellphones may be available bundled with a carrier's monthly mobile data package, on a subscription basis for an additional fixed monthly fee, or on a pay-per-view basis²⁵⁰. Both Sprint Nextel and Verizon Wireless price their new over-the-air music downloading services on a pay-as-you-go basis for a flat rate per song. In particular, both carriers charge customers a uniform fee to purchase and download a full-length song directly to their mobile handsets²⁵¹. For the same price, customers get two copies of a song, one for their cellphone and the other for a personal computer. Verizon Wireless also allows customers to purchase and download songs from their personal computer and transfer them to their cellphone at a lower price than that for a direct over-the-air download to a cellphone. Verizon Wireless customers need a subscription to a monthly V Cast data package, as well as a calling plan, to access its music service. Although Sprint Nextel customers technically do not need a monthly data plan to purchase songs from the Sprint Music Store, a subscription to a monthly data plan is necessary to avoid paying additional per-kilobyte data fees for casual usage while downloading each song.

100 Aside from handset-based applications, carriers offer monthly mobile Internet access packages for data users who access the Internet through laptops or Personal Digital Assistants ("PDAs")

²⁴⁴ *Telephia Reports Mobile Data Usage Adoption*

²⁴⁵ *T-Mobile Services & Accessories*

²⁴⁶ *See, e.g., Cingular Media and Services*

²⁴⁷ *Id.*, Sprint, *Sprint PCS Vision Guide*, at 77 (visited March 30, 2006) <www.sprint.com>

²⁴⁸ *See, e.g., Verizon Wireless, Get It Now* (visited March 30, 2006) <www.verizonwireless.com>

²⁴⁹ *See* Section IV B 6, *Mobile Data Services and Applications*, *infra*, for a discussion of over-the-air music downloading services for cellphones. For information on video services for cellphones, *see Tenth Report*, at 15960; *see, also, Implementation of Section 19 of the 1992 Cable Act (Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming), 2006 Report*, ¶¶ 133-134 (2006)

²⁵⁰ *See, e.g., Sprint TV Live Launches on Sprint Multimedia Handsets*, Press Release, Sprint, Sept. 26, 2005 (announcing the availability of a new TV package for cellphones for a monthly subscription fee), *Watch This! Cingular Video™ Now Available*, Press Release, Cingular, Mar. 7, 2006 (indicating that, in addition to video content that is bundled with an unlimited use data package, premium content is available on a monthly subscription basis, while certain other content is available on a pay-per-view basis for a 24-hour period). *See also, Tenth Report*, at 15961

²⁵¹ *Sprint Launches the First Instant, Over the Air Music Download Service in the U.S.*, Press Release, Sprint, Oct. 31, 2005, *V CAST Music From Verizon Wireless Call Your Music*, Press Release, Verizon Wireless, Jan. 17, 2006

The nationwide carriers continue to price mobile Internet access packages in two principal ways based on a set amount of megabytes per month or unlimited monthly data use²⁵² This pricing approach extends to mobile Internet access packages for wireless broadband networks, including Verizon Wireless's EV-DO-based BroadbandAccess service, Sprint's EV-DO service, and Cingular's WCDMA/HSDPA-based BroadbandConnect service²⁵³ As noted in the *Ninth Report*, under the megabyte-based pricing scheme, the monthly rate per package increases with the amount of megabytes included in the package, but the volume discounts provided by larger packages result in a progressively lower price per megabyte²⁵⁴

B Non-Price Rivalry

101 Service providers in the mobile telecommunications market also compete on many more dimensions other than price, including non-price characteristics such as coverage, call quality, data speeds, and mobile data content Indicators of non-price rivalry include advertising and marketing, capital expenditures, technology deployment and upgrades, and the provision of mobile data services

1 Technology Deployment and Upgrades

a Overview

102 The subject of technology deployment and upgrades by U S mobile telecommunications carriers is properly analyzed under the heading of carrier conduct because of the Commission's market-based approach to managing spectrum for commercial mobile voice and data services In particular, the Commission's policies allow mobile telecommunications carriers the freedom to choose among the various standards for second-generation and more advanced network technologies that are identified and described below In contrast, the European Community mandated a single harmonized standard for second-generation mobile telecommunications services, and has also adopted a single standard for third-generation services²⁵⁵ Thanks to the flexibility afforded by the Commission's market-based approach, different U S carriers have chosen a variety of different technologies and associated technology migration paths, and competition among multiple incompatible standards has emerged as an important dimension of non-price rivalry in the U S mobile telecommunications market and a distinctive feature of the U S mobile industry model

103 Theory and evidence suggest that allowing the use of multiple standards may have several pro-competitive advantages over standardization of wireless network technologies Since the types of services tend to differ across technologies, use of multiple standards may result in greater product variety and greater differentiation of services offered by carriers using different technologies²⁵⁶

²⁵² Cingular Wireless, *Data Connect* (visited April 14, 2006) <www.cingular.com>, Sprint, *Wireless Laptop Access Plans* (visited April 14, 2006) <www.sprint.com>, T-Mobile, *Internet & E-mail Plans* (visited April 14, 2006) <www.t-mobile.com>, Verizon Wireless, *NationalAccess* (visited April 14, 2006) <www.verizonwireless.com>

²⁵³ Verizon Wireless, *BroadbandAccess* (visited April 14, 2006) <www.verizonwireless.com>, *Sprint Begins Launch of EV-DO Wireless High-Speed Data Service*, Press Release, Sprint, July 7, 2005; *Cingular Launches 3G Network*, Press Release, Cingular, Dec 6, 2005, Walter S. Mossberg, *Cingular Joins Rivals With Fast, Reliable Wireless Broadband*, WALL STREET JOURNAL, Jan 19, 2006, p. A9 See, also, Amol Sharma and Dionne Searcey, *Cell Carriers to Web Customers Use Us, But Not Too Much*, WALL STREET JOURNAL, May 11, 2006, p. B1

²⁵⁴ *Ninth Report*, at 20648

²⁵⁵ Neil Gandal, David Salant, and Leonard Waverman, *Standards in Wireless Telephone Networks*, TELECOMMUNICATIONS POLICY, Vol. 27, 2003 ("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

²⁵⁶ *Id.*, at 329-330

Diversified and heterogeneous services make it more difficult for carriers to coordinate their behavior so as to restrict competition with regard to pricing. Other potential pro-competitive advantages of multiple standards include greater technological competition and greater price competition between operators using different technologies.²⁵⁷ In particular, competition between carriers using competing incompatible technologies tends to put pressure on carriers to achieve sufficiently high adoption of their technology in order to ensure it survives the “standards war.”²⁵⁸ The pressure to fill their networks may lead carriers to enact price cuts and handset subsidies.²⁵⁹ Finally, the adoption of a particular standard may enable one carrier, or a subset of carriers, to gain a temporary competitive advantage over rival carriers, which may also tend to undermine the incentive and the ability of carriers to coordinate their conduct in such a way as to restrict competition.

104 The following analysis of technology deployment and upgrades is divided into four parts. As background to examining the particular technological choices made by different carriers, Section IV B 1 b provides an introduction to cellular network design and technology and identifies and describes the major digital technologies and associated migration paths. Section IV B 1 c examines the specific technological choices made by mobile carriers that use the same spectrum bands, network design and technologies to offer both voice and data services. Section IV B 1 d examines the impact of these choices on coverage by technology type. Finally, Section IV B 1 e examines the technology deployment decisions of carriers with regard to data-only networks and services.

b Background on Network Design and Technology

105 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.²⁶⁰ In the past, cellular and SMR networks used an analog technology, while PCS networks were designed from the start to use a digital format. Digital technology provides better sound 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 band. Digital technology is now dominant in the mobile telephone sector, with approximately 97 percent of all wireless subscribers using digital service.²⁶¹

106 The four main digital technologies used in the United States are Code Division Multiple Access (“CDMA”), Global System for Mobile Communications (“GSM”), integrated Digital Enhanced Network (“iDEN”), and Time Division Multiple Access (“TDMA”). These four technologies are

²⁵⁷ *Id.*

²⁵⁸ Carl Shapiro and Hal R. Varian, *Information Rules*, Harvard Business School Press, 1999, at 261-296; Simon Flannery *et al.*, *3G Economics a Cause for Concern*, Morgan Stanley, Equity Research, Feb. 1, 2005, at 11 (“*3G Economics a Cause for Concern*”).

²⁵⁹ *3G Economics a Cause for Concern*, at 10-11.

²⁶⁰ 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*, at 13361, note 55.

²⁶¹ See Section VI B 1, Subscriber Growth, *infra*.

commonly referred to as Second Generation, or “2G,” because they succeeded the first generation of analog cellular technology, Advanced Mobile Phone Systems (“AMPS”) ²⁶² As discussed in the *Seventh Report*, in light of industry developments this report no longer distinguishes between TDMA and GSM networks in its analysis of digital coverage, but considers the two as one migration path towards more advanced digital capabilities The large U S carriers are in the process of phasing out TDMA ²⁶³

107 Beyond the 2G digital technologies, mobile telephone carriers have been deploying next-generation network technologies²⁶⁴ that allow them to offer mobile data services at higher data transfer speeds and, in some cases, to increase voice capacity ²⁶⁵ For TDMA/GSM carriers, the first step in the migration to next-generation network technologies is General Packet Radio Service (“GPRS” or “GSM/GPRS”), a packet-based data-only network upgrade that allows for faster data rates by aggregating up to eight 14.4 kbps channels ²⁶⁶ Beyond GPRS, most U S TDMA/GSM carriers have begun to deploy 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 carriers beyond EDGE and allows maximum data transfer speeds of up to 2 Mbps and average user speeds of 220-320 kbps ²⁶⁷ Finally, deployment of WCDMA with HSDPA (High Speed Data Packet Access) technology will allow average download speeds of 400-700 kbps with burst rates of up to several Mbps ²⁶⁸ Although WCDMA/HSDPA is not backwards compatible with GPRS/EDGE, wireless modem cards that are compatible with both WCDMA/HSDPA and GPRS/EDGE, and enable handoff between the two types of networks, are available for use with laptop computers ²⁶⁹

108 Many CDMA carriers have upgraded their networks to CDMA2000 1xRTT (also referred to as “CDMA2000 1X” or “1xRTT”), a technology that doubles voice capacity and delivers peak data rates of 307 kbps in mobile environments and typical speeds of 40-70 kbps ²⁷⁰ The next step in the CDMA migration beyond 1xRTT is CDMA2000 1xEV-DO (evolution-data only, “EV-DO”), which

²⁶² See note 273, *infra*, for a discussion of the cellular analog requirement and its sunset

²⁶³ See, e.g., Cingular Wireless, SEC Form 10-K, filed Feb. 24, 2006, at 8-9 (noting that TDMA is used by Cingular in some markets pending subscriber migration to GSM-based technologies, and also that, as of the end of 2005, more than 86 percent of its subscriber base was GSM-equipped and 95 percent of its minutes were being carried by its GSM network)

²⁶⁴ For purposes of this report, all of the network technologies beyond 2G that carriers have deployed, as well as those that they plan to deploy in the future, are generally referred to as “next-generation network technologies.” The International Telecommunication Union (“ITU”) has defined 3G network technologies as those that can offer maximum data transfer speeds of 2 megabits per second (“Mbps”) from a fixed location, 384 kbps at pedestrian speeds, and 144 kbps at traveling speeds of 100 kilometers per hour See *Fifth Report*, at 17695 There is ambiguity among other industry players, however, as to which network technologies constitute 3G and which constitute interim technologies, often labeled “2.5G.” See *Seventh Report*, at 12990 and 13038 Therefore, this report uses a more general label to describe all of the technologies beyond 2G

²⁶⁵ See Section IV B 1 c, Technology Choices and Upgrades of Mobile Telephone Carriers, *infra*

²⁶⁶ See *Seventh Report*, at 12990 This upgrade is also labeled GSM/GPRS because many TDMA/GSM carriers are upgrading their TDMA markets with GSM and GPRS simultaneously

²⁶⁷ *Tenth Report*, at 15951

²⁶⁸ *Id.*

²⁶⁹ See, e.g., Novatel Wireless, *Products Merlin U730 Wireless PC Modem Card* (visited May 12, 2006) <www.novatelwireless.com>

²⁷⁰ See *Seventh Report*, at 12990, *Ninth Report*, at 20650

allows maximum data throughput speeds of 2.4 Mbps.²⁷¹ Whereas WCDMA and HSDPA are incompatible with earlier technologies on the GSM migration path, the more advanced technologies on the CDMA migration path are backwards compatible.²⁷²

c Technology Choices and Upgrades of Mobile Telephone Carriers

109 Of the four nationwide mobile telephone operators, Cingular and T-Mobile use TDMA/GSM as their 2G digital technology, Verizon Wireless and Sprint Nextel use CDMA, and Sprint Nextel also uses iDEN on the former Nextel network.²⁷³ The four nationwide mobile carriers, together with other U.S. mobile carriers, have continued to deploy next-generation network technologies over the past year.

110 Verizon Wireless has deployed 1xRTT technology throughout “virtually all” of its network.²⁷⁴ In addition, since October 2003, Verizon Wireless has launched EV-DO technology in 181 markets, covering approximately 150 million people.²⁷⁵ With the EV-DO service, subscribers can access the Internet while mobile via a wireless modem card connected to a laptop computer or PDA, or they can download a range of multimedia content and advanced applications on certain mobile handset models.²⁷⁶ Furthermore, 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.²⁷⁷ Verizon Wireless reports that its EV-DO delivers average user speeds of 400-700 kbps.²⁷⁸ Verizon Wireless plans additional market launches and an expansion of EV-DO coverage in existing markets in 2006.²⁷⁹

111 Prior to its merger with Nextel in August 2005, the former Sprint had already deployed 1xRTT across its entire CDMA network footprint.²⁸⁰ In addition, Sprint had begun rolling out EV-DO technology in July 2005, initially deploying its EV-DO network to business districts and major airports in 34 U.S. cities.²⁸¹ By the end of 2005, Sprint Nextel had deployed EV-DO in markets where approximately 50 percent of the U.S. population lives or works.²⁸² The company plans to offer EV-DO-

²⁷¹ *Id.*

²⁷² *Standards in Wireless Telephone Networks*, at 328.

²⁷³ In addition, all operators using cellular spectrum must deploy AMPS, an analog technology, throughout the part of their networks using cellular spectrum. See 47 C.F.R. §§ 22.901, 22.933. In 2002, the Commission decided to eliminate the requirement after a five-year transition period. Year 2000 Biennial Regulatory Review – Amendment of Part 22 of The Commission’s Rules to Modify or Eliminate Outdated Rules Affecting The Cellular Radiotelephone Service and Other Commercial Mobile Radio Services, *Report and Order*, 17 FCC Rcd 18401, 18414 (2002).

²⁷⁴ Verizon Wireless, SEC Form 10-K, filed Mar. 14, 2006, at 9.

²⁷⁵ *Id.*

²⁷⁶ See *Tenth Report*, at 15961.

²⁷⁷ See *Ninth Report*, at 20652.

²⁷⁸ Verizon Wireless, SEC Form 10-K, filed Mar. 14, 2006, at 9.

²⁷⁹ *Id.*

²⁸⁰ *Ninth Report*, at 20652.

²⁸¹ *Tenth Report*, at 15952.

²⁸² Sprint Nextel, SEC Form 10-K, filed March 31, 2006, at 8.

based services in additional markets in 2006²⁸³ As noted in the *Ninth Report*, Sprint altered its technology strategy by deploying EV-DO, rather than waiting for a successor technology to become commercially available, in response to competitive pressure from Verizon Wireless's deployment of EV-DO²⁸⁴ In addition to offering Sprint-branded wireless services over its CDMA network, Sprint Nextel provides Nextel postpaid and Boost Mobile prepaid wireless services over the former Nextel iDEN network²⁸⁵ Sprint Nextel operates an iDEN network that serve 297 of the top 300 U S markets where approximately 270 million people live or work²⁸⁶ In order to offer customers the benefits of all of its services, Sprint Nextel expects to introduce a dual-mode handset designed to operate on both the CDMA and iDEN network platforms²⁸⁷

112 Apart from the two nationwide CDMA carriers, some of the regional CDMA carriers have also begun to deploy EV-DO, including Alltel, Midwest Wireless, and Alaska Communications Systems As noted in the *Tenth Report*, Alltel initially launched EV-DO in Akron and Cleveland, OH²⁸⁸ During 2005, Alltel expanded its EV-DO deployments to include 12 markets, covering 20 percent of its POPs²⁸⁹ Alltel plans to continue to expand EV-DO into approximately 60 percent of its markets by the end of 2006²⁹⁰ In addition, Alltel's deployment of 1xRTT technology covers 92 percent of its POPs, up from 50 percent in 2004²⁹¹ It plans to continue expanding its deployment of 1xRTT technology to cover 94 percent of its POPs by the end of 2006²⁹²

113 As noted in the *Tenth Report*, when Cingular acquired AT&T Wireless in October 2004, the latter had already deployed UMTS (or WCDMA) in six U S cities Seattle, San Francisco, Phoenix, Detroit, San Diego, and Dallas²⁹³ In December 2005, Cingular commercially launched WCDMA with HSDPA in sixteen cities across the United States Austin, Baltimore, Boston, Chicago, Dallas, Houston, Las Vegas, Phoenix, Portland, Salt Lake City, San Diego, San Francisco, San Jose, Seattle, Tacoma and Washington, DC²⁹⁴ This included the replacement of the six WCDMA systems which had been previously deployed by AT&T Wireless²⁹⁵ As noted in the *Tenth Report*, it has been reported that Cingular decided to upgrade WCDMA with HSDPA in an effort to compete with Verizon Wireless's EV-DO network, which offers speeds similar to or slightly below HSDPA and faster than WCDMA²⁹⁶ As

²⁸³ *Sprint Begins Launch of EV-DO Wireless High-Speed Data Service*, Press Release, Sprint, July 7, 2005

²⁸⁴ See *Ninth Report*, at 20653

²⁸⁵ Sprint Nextel, SEC Form 10-K, filed March 31, 2006, at 7

²⁸⁶ *Id*

²⁸⁷ *Id*, at 5

²⁸⁸ *Tenth Report*, at 15952

²⁸⁹ Alltel, SEC Form 10-K, filed March 10, 2006, at 10

²⁹⁰ *Id*

²⁹¹ *Id*

²⁹² *Id*

²⁹³ *Tenth Report*, at 15953

²⁹⁴ Cingular Wireless, SEC Form 10-K, filed Feb 24, 2006, at 9

²⁹⁵ *Id*

²⁹⁶ *Tenth Report*, at 15953 See, also, Cingular Wireless, SEC Form 10-K, filed Feb 24, 2006, at 14 (stating Cingular's belief that it is well positioned to offer competitive 3G services and that its WCDMA/HSDPA technology is superior to EV-DO in terms of peak speed and applicability to voice as well as data)

with the EV-DO service offered by Verizon Wireless and Sprint Nextel, subscribers on Cingular's WCDMA/HSDPA network can access the Internet while mobile via a wireless modem card connected to a laptop computer or PDA, or they can download a range of multimedia content and advanced applications on certain mobile handset models²⁹⁷ In markets where WCDMA/HSDPA is not available, laptop modem cards that are compatible with both WCDMA/HSDPA and GPRS/EDGE will seamlessly fall back to Cingular's EDGE and GPRS networks, albeit at lower speeds²⁹⁸ Cingular plans to continue deploying WCDMA with HSDPA throughout the majority of the largest U S metropolitan markets in 2006²⁹⁹ In addition to launching WCDMA with HSDPA and replacing the WCDMA systems deployed by AT&T Wireless, during 2005 Cingular continued the process of integrating the former AT&T Wireless GSM/GPRS/EDGE network with its own existing GSM/GPRS/EDGE network footprint in areas where they had overlapping coverage, a task Cingular expects to have substantially completed by the end of 2006³⁰⁰

114 T-Mobile has a nationwide EDGE network but has not yet announced a schedule for deploying a next-generation network beyond EDGE³⁰¹ Analysts expect T-Mobile to launch a wireless broadband network in late 2007 or in 2008, provided T-Mobile is a successful bidder in the auction of AWS spectrum³⁰²

d Coverage by Technology Type

115 Virtually the entire population of United States live in counties where operators offer digital mobile telephone service, using CDMA, TDMA/GSM, or iDEN (including their respective next generation technologies), or some combination of the three³⁰³ These counties make up almost the entire land area of the United States To estimate the current levels of deployment of the three main digital mobile telephone technologies individually, we have prepared maps of each technology, which combine the network coverage of all of the relevant operators³⁰⁴ We have also prepared maps showing the extent of next generation network technology deployment³⁰⁵

116 CDMA has been launched in at least some portion of counties containing 284 million people, or roughly 99 percent of the U S population, while TDMA/GSM has been launched in at least

²⁹⁷ See Section IV B 6, Mobile Data Services and Applications, *infra*

²⁹⁸ Cingular Wireless, SEC Form 10-K, filed Feb 24, 2006, at 6 As noted in the *Tenth Report*, prior to its merger with AT&T Wireless Cingular had deployed GSM/GPRS technology across its entire network footprint and had upgraded its data network to EDGE with respect to two-thirds of its covered network POPs See *Tenth Report*, at 15953, note 274 As of the end of 2005, more than 86% of Cingular's subscriber base was equipped with GSM/GPRS devices Cingular Wireless, SEC Form 10-K, filed Feb 24, 2006, at 9

²⁹⁹ *Id.*, at 6

³⁰⁰ *Id.*, at 9-10

³⁰¹ Mark Shuper *et al.*, *The North American 3G Wireless Report*, Morgan Stanley, Equity Research, Feb 28, 2006, at 4 ("*North American 3G*"), Cingular Wireless, SEC Form 10-K, filed Feb 24, 2006, at 14

³⁰² *North American 3G*, at 4

³⁰³ Broadband PCS-based and digital SMR-based coverage are estimated using counties, and cellular-based coverage is estimated using CMAs The caveats mentioned in Section II B, Sources of Information, and in Section II C 1, Number of Mobile Telephone Competitors, *supra*, apply to this analysis as well

³⁰⁴ See Appendix B, Maps 5-8, *infra*

³⁰⁵ See Appendix B, Map 9, *infra*

some portion of counties containing 280 million people, or 98 percent of the U S population³⁰⁶ To date, iDEN-based service is available at least some portion of counties containing over 268 million people, or approximately 94 percent of the U S population³⁰⁷

117 CDMA 1xRTT and/or 1xEV-DO has been launched in at least some portion of counties containing 283 million people, or roughly 99 percent of the U S population, while GPRS, EDGE, and/or WCDMA/HSDPA has been launched in at least some portion of counties containing 269 million people, or about 94 percent of the U S population³⁰⁸ The higher speed technologies, EV-DO and WCDMA/HSDPA, are available in counties containing 63 percent and 20 percent of the U S population, respectively

e Data-Only Networks and Technology Deployment

118 In addition to the networks discussed above, which mobile telephone carriers use to offer both voice and data services, mobile carriers operate a number of other types of networks in order to provide IP-based broadband, as well as narrowband, data-only commercial mobile services

119 Clearwire has launched wireless broadband service in 29 U S cities using Orthogonal Frequency Division Multiplexing (OFDM) and Time Division Duplex (TDD) technology, and spectrum in the 2.5 GHz BRS/EBS band³⁰⁹ Because it allows signals to pass through buildings and trees, OFDM technology enables carriers to offer wireless broadband services without a direct line-of-sight between the transmitter and the receiver³¹⁰ Using OFDM technology, Clearwire has eliminated the need for customers to attach an antenna to their rooftop and instead allows them to access the Internet with “plug-and-play” modem devices connected to a personal or laptop computer Customers can transport these devices to other locations where a network signal is available, and downstream speeds range from 768 kbps to 1.5 Mbps³¹¹ Clearwire’s equipment is developed and manufactured by its equipment subsidiary, NextNet Wireless, and Clearwire has announced that it will deploy wireless broadband equipment based on the IEEE 802.16e WiMax standard, which also employs OFDM technology, once the standard has been finalized and equipment becomes commercially available³¹²

120 Sprint Nextel holds a significant amount of spectrum in the 2.5 GHz BRS/EBS band and, over the past year, has been testing different wireless broadband technologies, including WiMax, that could eventually be deployed in this spectrum³¹³ In February 2006, the company launched its FanView service which uses BRS/EBS spectrum to enable NASCARTM spectators to watch live race and audio at

³⁰⁶ See Appendix A, Table 7, *infra*

³⁰⁷ *Id*

³⁰⁸ See Appendix B, Map 9, *infra*

³⁰⁹ See Section III B 3, Data-Only Providers, *supra*, Clearwire Corporation, SEC Form S-1, filed May 11, 2006, at 53

³¹⁰ See *Tenth Report*, at 15954, Clearwire Corporation, SEC Form S-1, filed May 11, 2006, at 53

³¹¹ See *Tenth Report*, at 15954, Clearwire, *Service Plans* (visited June 5, 2006) <http://www.clearwire.com/store/service_plans.php>

³¹² See *Tenth Report*, at 15954, Clearwire Corporation, SEC Form S-1, filed May 11, 2006, at 82

³¹³ Kelly Hill, *Sprint Nextel Delves Deeper into 4G with New Devices, ‘Global Reach,’* RCR Wireless News, May 25, 2006, *Sprint and Samsung to Explore Wireless Broadband*, News Release, Sprint Nextel, Sept. 16, 2005, *Sprint and Motorola in Wireless Broadband Development Pact*, News Release, Sprint Nextel, June 30, 2005, *Sprint and Intel to Explore Wireless Broadband Technologies*, News Release, Sprint Nextel, May 5, 2005

the races via customized mobile devices that can be rented at NASCAR™ events³¹⁴

121 As previously mentioned, BellSouth currently offers a non-light-of-sight, portable wireless broadband service using OFDM technology in five southern cities³¹⁵. The service allows wireless high-speed Internet access via a plug-and-play wireless modem device manufactured by Navini Networks³¹⁶. Downstream speeds range from 384 kbps to 1.5 Mbps³¹⁷.

122 Among the providers of narrowband mobile data services to enterprise customers, several carriers use paging spectrum to operate networks that offer traditional one-way paging services. Some paging carriers also operate data networks using narrowband PCS spectrum, which allow them to offer two-way messaging services. Narrowband PCS carriers use the ReFLEX technology protocol, which can transmit data at speeds ranging from 3.2 to 25 kbps³¹⁸. USA Mobility's narrowband PCS network uses ReFLEX technology developed by Motorola and covers 90 percent of the U.S. population³¹⁹.

123 In addition, Sprint Nextel's subsidiary, Velocita Wireless, and Motient operate two-way data networks that use the 900 MHz SMR and 800 MHz SMR spectrum bands, respectively. Velocita Wireless's network, known as Mobitex, uses packet-switched radio technology to provide always-on, two-way messaging and data delivery, and covers 93 percent of the urban business population in the U.S.³²⁰ The DataTAC network includes more than 2,200 base stations and provides coverage in 400 U.S. cities covering 90 percent of the U.S. business population. In February 2006, Motient announced that it was modifying the DataTAC network to focus on on-street coverage and that in-building signal strength would diminish³²¹. Space Data is using narrowband PCS spectrum in the 900 MHz band and balloon-borne platforms, called SkySites™, to offer wireless telemetry services to oil and gas companies in Texas, Louisiana, Oklahoma, New Mexico, and the Gulf of Mexico³²².

³¹⁴ *NASCAR Nextel FanView Gives Fans a New Perspective*, News Release, Sprint Nextel and NASCAR, Feb. 9, 2005.

³¹⁵ See Section III B 3, *Data-Only Providers*, *supra*.

³¹⁶ *BellSouth to Launch Wireless Broadband in August*, News Release, BellSouth and Navini Networks, June 7, 2005.

³¹⁷ BellSouth, *Wireless Broadband Service - Products* (visited June 5, 2006) <http://www.wirelessbb.bellsouth.net/sales/asp/wbb_Products.asp>

³¹⁸ See *Tenth Report*, at 15955.

³¹⁹ *Id.*; USA Mobility, *Wireless Messaging Network Advantages – Messaging Reliability* (visited June 22, 2006) <http://www.usamobility.com/bus_solutions/wireless_messaging/network_advantages/default.htm>

³²⁰ Mobitex Technology, *Velocita Wireless* (visited June 22, 2006) <http://www.mobitex.com/operators/reference_operators/4-2-18_cingular.asp>. In October 2004, Cingular Wireless spun off its Cingular Interactive unit, which included the Mobitex network, and the unit was acquired by an affiliate of Cerberus Capital Management, L.P., which changed its name to Velocita Wireless. In February 2006, Sprint Nextel completed its acquisition of Velocita Wireless. *Acquisition of Cingular Interactive Completed, Company Changes Name to Velocita Wireless*, News Release, Velocita Wireless, Oct. 26, 2004, *Sprint Nextel Completes Acquisition of Velocita Wireless*, News Release, Velocita Wireless, Feb. 28, 2006.

³²¹ *Motient Communications to Initiate Changes to DataTAC Network Coverage*, News Release, Motient, Feb. 10, 2006, *Tenth Report*, at 15955.

³²² *Id.*, at 15955-15956, Space Data Corp., *Coverage Area* (visited June 6, 2006) <<http://www.spacedata.net/coverage.htm>>

2 Capital Expenditures

124 Capital expenditures, alternatively called “capital spending” or abbreviated to “capex,” are funds spent during a particular period to acquire or improve long-term assets such as property, plant, or equipment³²³ In the mobile telephone industry, capex consists primarily of spending to expand and improve the geographic coverage of networks, increase the capacity of existing networks so they can serve more customers, and improve the capabilities of networks (by allowing higher data transmission speeds, for example)³²⁴ One analyst estimated that the wireless industry spent roughly \$25 billion on capex in 2005, an increase of 18 percent from the \$22 billion spent in 2004, which in turn was on top of a 12 percent increase from 2003³²⁵ One analyst has argued that capex spent to expand coverage is now mostly over and that future capex will be spent largely on technological upgrades and capacity needs³²⁶

3 Roaming

125 All mobile calling plans specify a calling area – such as a particular metropolitan area, a state, a region, the carrier’s entire network, or the entire United States – within which the subscriber can make a call without incurring additional charges When a subscriber exits this area, or “roams,” he or she may incur additional charges for each minute of use Sometimes these roaming charges go directly to the subscriber’s carrier, and sometimes the charges are used to pay a carrier other than the subscriber’s, on whose network the subscriber was roaming³²⁷ Roaming revenues account for a higher percentage of total service revenues for many rural and smaller regional carriers than for nationwide carriers³²⁸ In the *Tenth Report*, we noted that the roaming revenues of these carriers were under pressure as roaming rates have declined and nationwide carriers continued to expand into smaller communities³²⁹ In 2005, there was a reversal of this trend, as most of the regional and smaller carriers grew roaming revenues on a year-over-

³²³ CNNMoney, *Money 101 Glossary* (visited Mar 20, 2003) <<http://money.cnn.com/services/glossary/c.html>> There are differing opinions on what constitutes capital spending versus non-capital spending

³²⁴ *Eighth Report*, at 14818

³²⁵ Phil Cusick, Richard Choe, and Colin V Morawski, *US Wireless Services Preview of First-Quarter 2006 Results*, Bear Stearns, Equity Research, Apr 2006, at 70; *Tenth Report*, at 15956 It does not appear that this increase is due to Hurricane Katrina For example, one measure of the hurricane’s impact on expenditures, capex as a percentage of service revenues, is not appreciably different for carriers in the last half of 2005 than it was in previous periods Phil Cusick, Richard Choe, and Colin V Morawski, *US Wireless Services Preview of First-Quarter 2006 Results*, Bear Stearns, Equity Research, Apr 2006, at 70 However, the hurricane did impose some additional costs on many carriers Colette M Fleming *et al*, *Wireless 411*, UBS Warburg, Equity Research, Jan 3, 2006, at 12 (“3Q05 Wireless 411”), at 53 (“Hurricane-related charges adversely impacted cash costs in the third quarter of 2005 for many carriers Cingular reported \$96 million of charges due to significant damage in Louisiana, Mississippi, Alabama, and Texas markets Verizon Wireless incurred hurricane-related costs of \$44 million and Sprint Nextel recorded hurricane-related charges of \$65 million for its wireless business”)

³²⁶ *Ninth Report*, at 20656 See, also, *4Q05 Wireless 411*, at 14 (“We believe the trend of fewer cell site additions will continue given that the majority of capital expenditures will relate to capacity increases and 3G deployment (which will generally involve adding capacity and equipment upgrade to existing cell sites), as well as quality enhancements such as better in-building coverage”)

³²⁷ The fees that a carrier collects from non-subscribers using its network are called “outcollect” fees, and the fees that a carrier pays for its subscribers to roam on other networks are called “incollect” fees Margo McCall, *Roaming Feeds Regional Carriers*, WIRELESS WEEK, Mar 26, 2001, at 23

³²⁸ See *4Q05 Wireless 411*, at 47 (Table 22 Roaming Revenues as a Percentage of Total Service Revenues)

³²⁹ *Tenth Report*, at 15956

year basis for four consecutive quarters, with rural carriers showing particular improvement³³⁰

126 Nevertheless, CTIA reported that roaming revenues for the entire mobile telephone industry decreased over the past year, from \$4.2 billion in 2004 to \$3.8 billion in 2005, roughly the level of 2003.³³¹ The contribution of roaming revenues to total service revenues continued its decline, from 4.1 percent in 2004 to 3.3 percent in 2005, down from over 10 percent six years ago.³³² One analyst explains that these trends are not surprising “given the fall in roaming rates as well as the consolidation activity in the wireless industry. Also, a smaller portion of revenues are classified as roaming, as compared to historical years, given the proliferation of much larger ‘home’ footprints and national pricing plans.”³³³

127 In May 2006, Sprint Nextel and Alltel announced a 10-year roaming deal that covers cellphone calls as well as new wireless data services.³³⁴ It has been argued that the roaming arrangement “could give Sprint an edge over competitor Verizon Wireless in the race to extend wireless broadband access to more American consumers” by enabling Sprint’s customers to get access to Alltel’s data services in areas where Sprint does not make those services available.³³⁵ From Sprint Nextel’s standpoint, therefore, the roaming deal with Alltel may provide a means to overcome any first-to-market advantage Verizon Wireless gained by being the first nationwide CDMA carrier to launch a commercial EV-DO network. At the same time, since Alltel has a roaming deal with Verizon Wireless that covers voice service, one analyst also argues that the new roaming deal with Sprint Nextel gives Alltel “another option for a national roaming partner if Verizon Wireless tries to pressure it for higher rates when their roaming agreement is up in 2011.”³³⁶

4 Advertising and Marketing

128 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 telecommunications service is an “experience good,”³³⁷ and in general, advertising for an experience good tends to be persuasive rather than informational in nature.

129 In 2005, telecommunications ad spending for the top seven cellphone carriers dropped to \$4 billion from \$4.7 billion in 2004, or 14.6 percent.³³⁸ Much of the falloff was due to the merger of Sprint and Nextel.³³⁹ The four nationwide operators spent a total of \$3.5 billion on advertising in 2005,³⁴⁰

³³⁰ *4Q05 Wireless 411*, at 41. See, also, *4Q05 Wireless 411*, at 46, for year-over-year growth in roaming revenues.

³³¹ See Appendix A, Table 1, *infra*.

³³² *Id*.

³³³ *4Q05 Wireless 411*, at 13.

³³⁴ Amol Sharma, *Sprint and Alltel Announce 10-Year Roaming-Service Deal*, WALL STREET JOURNAL, May 9, 2006, at B4.

³³⁵ *Id*.

³³⁶ Philip Cusick, *AT/S Roaming Deal Could be Big Positive for Alltel, Small Positive for Sprint*, Bear Stearns, Equity Research, May 9, 2006.

³³⁷ 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, Wesley, Longman, Inc., 1999, at 484.

³³⁸ Alice Z. Cuneo, *AT&T Deal Signals Spending Falloff*, ADVERTISING AGE, Mar. 13, 2006, at 8 (citing Advertising Age and TNS Media Intelligence).

³³⁹ *Id*.