

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of)
)
Fostering Innovation and Investment in the) GN Docket No. 09-157
Wireless Communications Market)
)
A National Broadband Plan for Our Future) GN Docket No. 09-51

COMMENTS OF VERIZON WIRELESS

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SUMMARY

In its Notice of Inquiry, the Commission requested facts and data on innovation and investment in wireless services. The extensive facts and data that Verizon Wireless submits herein clearly demonstrate that the wireless ecosystem's consistent track record of innovation, investment and competition stands as a remarkable success by any metric. Moreover, the pace of that innovation has ramped up dramatically over the past five years and has accelerated even further during the past two years – despite the worst economic crisis in decades. Innovation is occurring not just at the “edges” of the networks, but in the networks themselves, fueled by enormous investments by network providers to build and operate state-of-the-art communications networks to meet the fast-evolving needs of consumers.

Section I of these Comments details the rapid pace of innovation throughout the wireless ecosystem and how such innovation benefits consumers and the economy. Wireless innovation has been and continues to be driven by the intense competition that characterizes this sector, inciting carriers constantly to invest in maintaining, improving and upgrading their networks, services and products, to attract new customers and retain existing customers. As a result, during the past five years, wireless networks have advanced from narrowband second generation technology to broadband third and now fourth generation technologies (*e.g.*, Verizon Wireless' plans to deploy LTE), bringing consumers enormous improvements in speed and performance.

Network advances continue to drive significant innovation in the application and content tiers, with increasing options for video and audio content as well as hundreds of thousands of applications for users. As recently as four years ago, virtually none of these options even existed. Today, choices for consumers are rampant. More than 600 handsets and devices are now available for consumers to use, with hundreds of new devices certified each year. Market

entry barriers for developers of applications and devices are virtually nonexistent. Today, these are highly competitive areas of the wireless ecosystem, with numerous new entrants – indeed, several manufacturers of top-selling wireless devices (like Apple) were not even in the wireless device market just a few years ago. And wireless carrier initiatives, such as Verizon Wireless’ Open Development Initiative, have made it even easier for small third-party innovators and entrepreneurs to introduce their products and access customers – indeed, 60 third party devices have already been certified ODI-compliant.

Innovation in the wireless ecosystem is also evident in the wide variety of service plans and business models that provide even more choices for consumers. As the Commission has previously recognized, the continual rollout of different pricing plans – whether national, regional, flat rate, minute bucket, prepaid or bundled – by both facilities-based and resale providers indicates a competitive marketplace with many options that benefit users. The existing business models and available service options are as varied as the customers the wireless industry serves. Section I also documents innovation and investment in the wireless sector through other proxies, including job creation and productivity gains (the wireless industry has grown 16 percent annually over last 15 years versus 3 percent for the general economy), the level of investment in infrastructure (an average of \$22.8 billion invested yearly since 2001), participation in research and development (wireless patents have grown at an exponential rate), and customer satisfaction indices (84 percent of wireless customers are “very or somewhat satisfied” according to a Government Accountability Office survey).

Verizon Wireless exemplifies the accelerating pace of innovation in the wireless ecosystem. Section II describes the wide variety of innovative wireless services and products the company offers – many of which have been introduced just this year. These include an array of

high-speed wireless data services, including video, music and GPS navigation, as well as unique services and applications designed to address the needs of particular types of users, such as seniors, children and Americans with disabilities. Moreover, Verizon Wireless is investing in machine-to-machine technologies and services and products to meet the unique needs of enterprise customers, such as smart service, monitoring and telemetry functions. The company also offers a variety of services and products to advance important social welfare goals, from public safety/homeland security to energy conservation to health care to education. Verizon Wireless' launch of its Open Development Initiative and LTE Innovation Center, as well as its participation in the Joint Innovation Lab and LiMo Foundation, will continue to spur innovation, expanding the choice of products and applications available to all wireless users.

As detailed in Section III of these Comments, Verizon Wireless strongly believes that the key to the development of new wireless services and technologies has been – and will continue to be – access to unfettered, exclusive use spectrum, which allows carriers the flexibility to best serve customers. Spectrum scarcity makes wireless networks fundamentally different from wireline networks. Changing consumer demand and competitive market pressures have driven wireless providers to invest in their networks to achieve greater levels of efficiency as well as improved service quality. Today, the wireless industry is a highly efficient user of radio spectrum, serving hundreds of millions of customers with limited spectrum. Proposed upgrades to LTE announced by many carriers will improve spectrum efficiency well beyond that of the best 3G networks deployed today. Yet, such advances are only possible because the Commission does not impose intrusive regulatory requirements on spectrum use that would impede or delay such improvements.

The Commission's existing spectrum management policies have facilitated this

innovative and efficient use of spectrum. The Commission has recognized the value of exclusive use licenses, which give licensees the flexibility to make use of their spectrum in ways that respond to consumer needs and evolving technologies. This flexibility is crucial to facilitating the innovation and investment in wireless services that has characterized this sector's history and will be necessary for its future. Also essential is certainty that licensees will continue to enjoy exclusive and flexible use of their investments.

The Commission should thus not propose or adopt regulatory mandates that would limit carriers' ability to use their current spectrum and obtain more spectrum to meet customer needs. The open auction process works well in putting spectrum in the hands of those who value it most highly and has been effective in distributing spectrum to a variety of entities, including small and rural wireless providers. Various secondary market processes – disaggregation and partitioning, leasing, and license assignments and transfers – similarly are effective means for all entities to access spectrum. There is absolutely no basis for spectrum aggregation limits or a lowered spectrum screen, “use-or-lose” construction requirements, rules addressing technology choices, or spectrum “overlays” or “underlays.” Rather, to continue the rapid pace of wireless innovation, the Commission should focus on identification and reallocation of more exclusive use spectrum for wireless services. History has shown that the allocation of additional spectrum bands for wireless services has consistently been a major factor in stimulating innovation and investment. Further, despite the efficiency gains of advanced technologies, additional spectrum will be needed to meet consumers' increasing demand for bandwidth-hungry services.

Section IV discusses the market-based regulatory paradigm for wireless services that is essential to continuing this story of innovation, investment and growing consumer choice. This paradigm is mandated by Congress and has been consistently adhered to by the Commission for

almost two decades, through both Democratic and Republican administrations. Time and again, the Commission has followed this approach and has found that it promotes competition and innovation. The Commission has also repeatedly recognized the harms to innovation, investment and competition that can flow from regulation, concluding that regulation of the wireless sector should be used sparingly and only to correct, in the narrowest effective way, a demonstrated problem that adversely impacts customers. Imposing additional regulation on the wireless industry would not only be unwarranted and harmful, but the Commission would also face serious legal hurdles in changing course. The Administrative Procedure Act requires that regulations be supported by substantial evidence, be consistent with statutory purposes and be reasonably tailored to address actual problems. The consistent and continuing record of innovation, investment and competition in the wireless industry documented in these Comments, and the Commission's own repeated findings that innovation and competition are best served by a market-based approach, set a high bar for altering course and adopting new regulation.

Nevertheless, there are certain steps the Commission can and should take to stimulate innovation and investment – by removing regulatory barriers. As detailed in Section V, the Commission should: (1) identify spectrum suitable for wireless broadband services, (2) work with Congress to enact a national framework for wireless consumers, (3) streamline tower siting and historic preservation processes to expedite investment in wireless infrastructure, (4) support congressional efforts to eliminate unnecessary taxes and fees on wireless services, (5) address remaining questions affecting the use of the 700 MHz spectrum, including the urgent need to relocate wireless microphones, and (6) commit to expediting the review process for applications. All of these actions would remove current regulatory barriers to service upgrades, advances and improvements that would benefit wireless users.

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Attachment A: LTE: The Future of Mobile Broadband Technology

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COMMENTS OF VERIZON WIRELESS

Verizon Wireless hereby submits its comments on the Notice of Inquiry (“NOI”) in the above-captioned proceedings.¹ As Chairman Genachowski noted, the facts and data submitted in response to the NOI will be used to inform future FCC decision making – to make sure the Commission “gets it right as we move into the brave new world of wireless broadband.”² These comments – and likely many others submitted in these and related proceedings – will show that the wireless ecosystem’s consistent and accelerating track record of innovation, investment and competition stands as a remarkable success by any metric.³

Our message is clear – the marketplace, freed sixteen years ago when Congress and the Commission adopted light-touch regulatory policies, must remain unfettered to spur the incredible investment and innovation historically seen in the dynamic and fast-paced wireless sector of the nation’s economy. The pace of that innovation has ramped up dramatically over the

¹ *Fostering Innovation and Investment in the Wireless Communications Market*, Notice of Inquiry, FCC 09-66 (2009) (“NOI”).

² *NOI*, Statement of Chairman Julius Genachowski.

³ The wireless ecosystem, also referred to herein as the wireless industry or sector, includes wireless providers, manufacturers, application developers, and all others that contribute to the provision of wireless service.

past five years and has accelerated further during the past two years, despite the worst economic crisis in decades. During that five-year span, wireless networks have advanced from narrowband second generation technology to broadband third generation and fourth generation technologies, bringing consumers enormous improvements in speed and performance. The most advanced wireless devices five years ago have been rendered obsolete several times over by a plethora of more versatile, more powerful, and more advanced successors. Five years ago there were no such things as software “app stores;” today consumers can choose from multiple app stores and hundreds of thousands of applications, with hundreds more appearing every month.

In the face of this unprecedented and remarkable wave of innovation, no facts or data exist that would justify risking the nation’s wireless broadband future with new and additional regulatory intervention; indeed, even casting regulatory uncertainty over the industry could stifle future innovation and investment. Nor do any facts or data support the story line favored by critics of the industry – that consolidation during the past five years has slowed both competition and innovation. As we demonstrate in our Comments filed today in the companion *Wireless Competition Notice of Inquiry*, competition has *intensified* during the past five years, spurred in part by Commission-approved consolidation. Thus, it should come as no surprise, as we demonstrate in these Comments, that wireless innovation and investment likewise has intensified during the same time period.

Today, wireless users benefit from constant innovation, enormous capital investment, and vigorous competition throughout the wireless ecosystem. Innovation is also the product of carriers’ relentless drive to compete to win and retain customers through improving and expanding their networks. Innovation is occurring not merely at the “edges” of networks, but in

networks themselves, fueled by enormous investments by network providers to build and operate state-of-the-art communications networks to meet the fast-evolving needs of customers.

No other industry is as dynamic, as constantly changing, as wireless. Every day the marketplace offers wireless customers new voice and data services and plans, more devices, more features on their devices, and more content and applications, which they can access in more locations, than the previous day. Verizon Wireless, in particular, provides its customers with a wide variety and constantly increasing range of innovative services, devices, applications, and content, made possible by its huge investments in spectrum and network infrastructure and the daily expansion and upgrading of its network. No other industry in our economy innovates as rapidly and as constantly as the wireless industry. Moreover, the rate of change and innovation has recently accelerated – even in the face of the worst economic climate in decades – and will, absent counterproductive regulatory intervention, only continue to accelerate.

The Commission’s oversight of the wireless industry is built on two pillars: a deregulatory paradigm that imposes regulation only where a compelling need has been demonstrated, and an exclusive use licensing approach that gives carriers the flexibility and incentive to deploy spectrum efficiently to meet their business plans. Before it considers altering either of these pillars through new regulation, the Commission should review the industry’s record carefully and dispassionately, and undertake a comprehensive fact- and data-driven analysis. Given the harms of intrusive regulation, it is critical – particularly in these economically adverse times – that the agency “gets it right.” We submit that this inquiry will confirm the wisdom of the agency’s successful deregulatory policies, for they have been in force for nearly twenty years, through both Democratic and Republican administrations. They have

gone hand-in-hand with the economic success of the wireless industry. They should remain the policies that guide the Commission in the years ahead.

I. THE RAPID PACE OF INNOVATION THROUGHOUT THE WIRELESS ECOSYSTEM BENEFITS CONSUMERS AND THE ECONOMY.

To “understand the state of both innovation and investment in wireless communications,” the NOI seeks comment on what metrics “are most appropriate to evaluate innovation and investment in the wireless sector.”⁴ Verizon Wireless submits that the most appropriate – and direct – measurement of the wireless industry’s track record on innovation and investment is a review of the continuing and accelerating pace and evolution of services, products, devices, and content in the mobile space. Innovation and investment in the wireless sector are also evident through other proxies, including job creation and productivity gains, the level of investment in infrastructure and research and development, and customer satisfaction indices. Each of these measures of innovation is discussed below. The indelible conclusion, regardless of the methodology, is that innovation has been and remains both rapid and widespread throughout the industry.

To the extent that innovation is viewed solely as visible “new” ideas and technologies introduced into the marketplace, the wireless ecosystem is extremely innovative. But innovation can also be virtually invisible to the consumer – in the nature of more efficient processes that lower costs to the consumer or networks that enable the introduction of better, newer, different products and services. Clearly the wireless industry exemplifies this less visible form of innovation as well, as evidenced by acceleration of change in the network and the hundreds of billions of dollars of investment in the past decades.

Wireless innovation has been driven by the intense competition that has characterized this industry, inciting carriers constantly to invest in maintaining and upgrading their networks, and

⁴ NOI, ¶ 10.

improving and updating their services and products, to attract new customers and retain existing customers. The FCC has repeatedly found, year after year, that the industry is effectively competitive.⁵ As recently as January 2009, in its latest assessment of the wireless market in the *Thirteenth Annual CMRS Competition Report*,⁶ the Commission reaffirmed that central finding based on an extensive record. Today, Verizon Wireless is submitting separate Comments in response to the Commission's request for additional data on the state of wireless competition.⁷ As documented in that filing, marketplace rivalry has not abated and is more intense than ever, as smaller carriers rapidly expand and new entrants plan their buildouts.

As detailed in this section of these Comments, there has been and continues to be an incredible amount of innovation and investment in wireless network capabilities, which has resulted in products and services that have plainly benefitted consumers. This innovation has been driven by wireless carriers through improvements they have made to their networks as well as through collaborations with equipment manufacturers and application developers. Wireless carriers recognize that tapping into the ideas of these players is essential to providing customers with the products and features they want, and thus continually develop the networks that make such collaboration possible. Recent innovation has occurred in a breathtakingly short time, unbowed by two economic recessions in the past eight years. And, the pace of innovation has been accelerating just as dramatically. Members of Congress and Commissioners have praised

⁵ See, e.g., *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*, Thirteenth Report, 24 FCC Rcd 6185 (WTB 2009) ("*Thirteenth Annual CMRS Competition Report*"); *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*, Twelfth Report, 23 FCC Rcd 2241 (2008); *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*, Eleventh Report, 21 FCC Rcd 10947 (2006); *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*, Tenth Report, 20 FCC Rcd 15908 (2005).

⁶ *Thirteenth Annual CMRS Competition Report*, ¶ 2

⁷ Comments of Verizon Wireless, WT Docket No. 09-66 (Sept. 30, 2009).

this innovation,⁸ and linked it to the Commission's longstanding policy to limit regulation.⁹ The benefits of innovation, and particularly the benefits brought to wireless consumers through innovation in the wireless sector, are well-established.¹⁰

A. Network Operators Are Driving Wireless Innovation.

Wireless network operators continue to invest heavily in deploying next-generation network technologies that provide critical platforms for advanced wireless services and

⁸ See, e.g., Wireless Innovation and Consumer Protection, Hearing Before the United States House of Representatives Committee on Energy and Commerce Subcommittee on Telecommunications and the Internet, Rep. Jane Harman (D-CA), July 11, 2007 ("I'm confident that the wireless industry, including the companies represented by our witnesses today, is doing its best to offer cutting edge services at competitive rates."); Consumer Wireless Issues, Hearing Before the United States Senate Committee on Commerce, Science & Transportation, Statement of Sen. Jim DeMint (R-SC), October 17, 2007 ("And I would just ask this committee before we move to get government involved that we recognize that first of all there is no track record that we can show that government has effectively improved service, particularly a service that is so fast paced, so fast changing as the wireless industry. . . . And if we look at what is actually happening in the market, the penetration of services and what is happening with innovation in the industry; let's don't try to fix something that is doing so well).

⁹ See, e.g., An Examination of Competition in the Wireless Industry, Hearing Before the United States House of Representatives Committee on Energy and Commerce, Subcommittee on Communications Technology and the Internet, Statement of Rep. Jerry McNearney (D-CA), May 7, 2009 ("[W]e've seen a tremendous transformation in the last decade or so. I'd like to see that competition continue. And I want to make sure that federal regulation doesn't – isn't part of the problem, that it's part of the solution."); Commissioner Meredith A. Baker, Incentives Matter: Decision Making at the FCC, Free State Foundation, September 10, 2009 ("I start with an assumption that markets work better than government intervention and that competition regulates market behavior more efficiently than regulators can. We should not adopt regulations to address anecdotes where there is no fact-based evidence that persuasively demonstrates a problem exists.").

¹⁰ Jerry Ellig, Costs and Consequences of Federal Telecommunications Regulations, 58 Fed. Comm. L.J. 37, 43 (January 2006) ("Empirical studies frequently find that economic deregulation generates larger price reductions and consumer benefits than economists predicted based on pre-deregulation costs and market conditions. Such findings underscore the importance of innovation and entrepreneurship in improving economic welfare."), citing Jerry Ellig, Railroad Deregulation and Consumer Welfare, 21 J. Reg. Econ. 143, 164-65 (2002); Clifford Winston, U.S. Industry Adjustment to Economic Deregulation, 12 J. Econ. Perspectives 89, 91 (1998); Clifford Winston, Economic Deregulation: Days of Reckoning for Microeconomists, 31 J. Econ. Lit. 1263, 1285-86 (1993). See also Dawn Kawamoto, Riding the Next Technology Wave, CNET News.com, available at http://news.com.com/2008-7351_3-5085423.html?tag=guts_bi_7351 (Oct. 2, 2003) ("[W]ireless is the biggest landscape for innovation and business creation."); Leonard J. Kennedy and Heather A. Purcell, Wandering Along the Road to Competition and Convergence – The Changing CMRS Roadmap, 56 Fed. Comm. L.J. 489, 496 (May 2004) ("Economists and industry analysts point to continuing technological innovation as the single most important growth factor affecting the wireless marketplace"), citing Harald Gruber, European Investment Bank, Spectrum Limits and Competition in Mobile Markets: The Role of Licence Fees 2 (2000), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=245288 ("The mobile telecommunications industry demonstrated that it is consistently improving the spectrum efficiency of its services. This ... provided room for drastic reductions in the cost of service. Firms thus captured an increasing number of customers.").

applications. Network operators also work closely with manufacturers to develop devices that fully leverage the unique characteristics of individual wireless networks. Recently, Verizon Wireless launched its groundbreaking Open Development Initiative (“ODI”) to foster collaboration with nontraditional business partners in an effort to tap into the nation’s collective ingenuity. Other carriers have followed with their own competitive initiatives. A recent statement by Commissioner Copps captures the extent of innovation fostered by the Commission’s market-based regulatory approach:

Wireless innovations have already empowered consumers in ways unimagined just a few short years ago. Those first seemingly magical devices that carried our voices hither and yon – when everything was working well – are now evolving into robust mobile computers. The wireless industry deserves recognition and credit for how much it has accomplished.¹¹

Continuation of the FCC’s regulatory restraint – coupled with the transition to Internet protocol (“IP”)-based fourth generation (“4G”) networks – will further drive innovation in advanced voice communications, applications and services.

1. Network Innovation Produces Significant Benefits for Consumers.

The remarkable developments in the wireless ecosystem have been driven by wireless service provider efforts to continually improve the speed, functionality, and geographic reach of their wireless networks. Indeed, commercial wireless providers have made great strides upgrading their network technology, and thereby improving the customer experience.¹² As the

¹¹ *NOI*, Statement of Commissioner Michael J. Copps at 1.

¹² JD Power and Associates recently released a report concluding that “[a]s the wireless services industry continues to invest in network upgrades and advanced technology, call quality performance has improved from six months ago, according to a new study by J.D. Power and Associates.” “2009 Wireless Call Quality Volume 2,” JD Power and Associates, available at <http://www.jdpower.com/telecom/articles/2009-Wireless-Call-Quality-Volume-2>. The report also concludes that “[a]s carriers continue to upgrade existing network infrastructure and create more robust coverage footprints, wireless customers are recognizing an improvement in performance,” and “[a]s customers continue to increasingly stress wireless networks with growing call volume and data usage for texting, e-

Commission recently remarked, as a “result of the flexibility afforded by the Commission’s market-based approach, different U.S. providers have chosen to deploy a variety of different technologies with divergent technology migration paths” and this “[c]ompetition 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.”¹³

Since the inception of commercial wireless service nearly thirty years ago, wireless providers have aggressively invested in their network technology and deployment to increase service quality and mobile capabilities. Generally, commercial mobile radio service (“CMRS”) providers use the same basic network design. All employ a series of low-power digital transmitters to serve relatively small areas (“cells”), and reuse spectrum to maximize efficiency.¹⁴ The two main second generation (“2G”) digital technologies used in the United States – which represent the first iteration of digital network technologies – are Code Division Multiple Access (“CDMA”) and Global System for Mobile Communications (“GSM”).¹⁵ These 2G network technologies represented a dramatic migration from analog to digital. The voice quality, device functionality and spectrum efficiency of these early digital networks easily trumped basic analog cellular networks.

mailing and mobile Web surfing, it is critical for carriers to keep enhancing network performance by maintaining and upgrading to next-generation technologies.” *Id.*

¹³ *Thirteenth Annual CMRS Competition Report*, ¶ 126.

¹⁴ *Id.* ¶ 129 n. 335.

¹⁵ *Id.* ¶ 130 n. 337. In addition, there are two other, less-widely used (by subscribers), technologies: integrated Digital Enhanced Network (“iDEN”) and the once-common Time Division Multiple Access (“TDMA”). These four technologies are commonly referred to as Second Generation, or “2G,” because they succeeded the first generation of analog cellular technology, Advanced Mobile Phone Systems (“AMPS”).

Wireless providers, however, did not cease investing and innovating after deploying 2G networks. In fact, they accelerated their investment in successive technologies. They invested considerable financial and human resources to migrate to third generation (“3G”) network technologies¹⁶ that provide higher mobile data transfer speeds, increased voice capacity, and mobile broadband capabilities.¹⁷ The 3G network technologies that many CDMA providers migrated to are CDMA2000 1xRTT (also referred to as “CDMA2000 1X” or “1xRTT”),¹⁸ CDMA2000 evolution-data optimized (“EVDO”) Revision 0, and EVDO Revision A (“EVDO Rev. A”) technologies.¹⁹ The best of these technologies – EVDO Rev. A – increases maximum data throughput speeds to 3.1 Mbps.²⁰ The 3G network technologies deployed by many U.S. GSM/TDMA providers include General Packet Radio Service (“GPRS” or “GSM/GPRS”)²¹, Enhanced Data Rates for GSM Evolution (“EDGE”) technology,²² and Wideband CDMA (“WCDMA”).

Although WCDMA and EVDO technologies were deployed just a few short years ago, wireless providers are already taking the next technology leap forward, upgrading to 4G technologies: Long Term Evolution (“LTE”) or WiMAX. Both technologies are based on

¹⁶ *Id.* ¶ 131 n. 339.

¹⁷ *Id.* ¶ 131 n. 340.

¹⁸ 1xRTT doubles voice capacity and delivers peak data rates of 307 kbps in mobile environments and typical speeds of 40-70 kbps. *Id.* ¶ 132 n. 346.

¹⁹ EVDO allows maximum data throughput speeds of 2.4 Mbps, while EVDO Rev. A increases maximum data throughput speeds to 3.1 Mbps. *Id.* at n. 347.

²⁰ *Id.*

²¹ GPRS is a packet-based data-only network upgrade that allows for faster data rates by aggregating up to eight 14.4 kbps channels. *Id.* ¶ 131 n. 341.

²² EDGE offers average data speeds of 100-130 kbps.

Orthogonal Frequency Division Multiple Access (“OFDMA”) modulation technology.²³ LTE can support up to 100 Mbps for downlink transmission and 50 Mbps for uplink transmission with 2x20 MHz spectrum and a 2x2 Multiple Input Multiple Output (“MIMO”) antenna structure. As detailed below, Verizon Wireless, AT&T, Cox Communications, Leap Wireless, MetroPCS, and US Cellular²⁴ have adopted LTE as their 4G network technology.²⁵ Mobile WiMAX technology can support peak downlink data rates up to 63 Mbps and peak uplink data rates up to 28 Mbps in a 10 MHz channel.²⁶ CLEAR²⁷ – including its owners Sprint, Google, Comcast, Time Warner

²³ See *EDGE, HSPA and LTE—The Mobile Broadband Advantage*, Rysavy Research and 3G Americas, September 2007, at 16, available at http://www.3gamericas.com/pdfs/2007_Rysavy_091007.pdf (last visited Sept. 30, 2009).

²⁴ See 3G Americas, *LTE Commitments* (September 2009), <http://www.3gamericas.org/documents/LTE%20Commitments%20September%202009.pdf>; see also Press Release, 3G Americas, “555 Million Subscriptions for GSM Technologies in the Americas at End of First Quarter 2009” (May 20, 2009), available at <http://www.3gamericas.org/index.cfm?fuseaction=pressreleasedisplay&pressreleaseid=2234> (noting that more than 120 wireless operators worldwide have announced plans to pursue LTE).

²⁵ See Press Release, Verizon Wireless, *Verizon Selects LTE As 4G Wireless Broadband Direction, Technology Platform to be Trialed in 2008* (Nov. 29, 2007), available at <http://news.vzw.com/news/2007/11/pr2007-11-29.html>; Marin Perez, *MetroPCS Chooses LTE For 4G Wireless Network*, InformationWeek, Aug. 13, 2008, available at <http://www.informationweek.com/story/showArticle.jhtml?articleID=210003630>; Press Release, AT&T, “AT&T Acquires Key Spectrum To Set Foundation For Future Of Wireless Broadband, More Choices For Customers” (Apr. 3, 2008), available at <http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=25428>; Press Release, Cox Communications, “Cox to Launch Next Generation Bundle with Wireless in 2009” (Oct. 27, 2008), available at http://media.corporate-ir.net/media_files/irol/76/76341/release102708.pdf. Although T-Mobile has not publicly announced its 4G technology, its European counterpart – T-Mobile International has selected LTE. See “T-Mobile Steps Forward with LTE Voice Standard, Faces Uphill Battle,” Engadget Mobile, <http://www.engadgetmobile.com/2009/07/08/t-mobile-steps-forward-with-lte-voice-standard-faces-uphill-bat/>.

²⁶ See *Mobile WiMAX – Part I: A Technical Overview and Performance Evaluation*, Mobile WiMAX Forum, August 2006, at 10, available at http://www.wimaxforum.org/technology/downloads/Mobile_WiMAX_Part1_Overview_and_Performance.pdf.

²⁷ CLEAR was formerly known as “Clearwire.” See Clear, http://www.clear.com/about_clear.php (last visited Sept. 29, 2009).

Cable, Intel Capital, and Bright House Networks – have begun to deploy WiMAX as their 4G wireless broadband network.²⁸

Verizon Wireless and other wireless companies continue to invest heavily to deploy 3G – and now 4G – wireless broadband services.²⁹ Already, Verizon Wireless’s 3G mobile wireless broadband capability using EVDO Rev. A technology is available to 284 million Americans. Verizon Wireless has adopted an aggressive, nationwide multi-billion dollar investment approach to stay ahead of the growing demand for Verizon Wireless’s voice and data services. The company has invested more than \$50 billion on network infrastructure alone, not counting spectrum acquisition costs, since it was formed in 2000 – \$5.5 billion on average every year.³⁰ And LTE deployment is close behind.³¹ In 2008, Verizon Wireless invested over \$9 billion for 700 MHz spectrum in Auction No. 73 – including licenses for 22 MHz of contiguous spectrum throughout the continental United States and Hawaii. Verizon Wireless plans to use this spectrum to deploy its 4G LTE network. Initial LTE services have the potential of offering peak download speeds of up to 86 Mbps, with an average of 5-12 Mbps downstream.³² In 2010,

²⁸ *Thirteenth Annual CMRS Competition Report*, ¶ 353. CLEAR’s 4G WiMax service already is available in fourteen markets serving 10 million people. Press Release, CLEAR, “Clearwire Introduces CLEAR(TM) 4G WiMAX Internet Service in 10 New Markets” (Sep. 1, 2009) *available at* <http://newsroom.clearwire.com/phoenix.zhtml?c=214419&p=irol-newsArticle&ID=1326282>.

²⁹ Some analysts estimate that, by 2014, over 100 million subscribers will be using LTE-based mobile broadband services. Dusan Belic, IntoMobile, *Juniper Research: There will be over 100 million LTE subscribers by 2014* (July 9, 2009), <http://www.intomobile.com/2009/07/09/juniper-research-there-will-be-over-100-million-lte-subscribers-by-2014.html>.

³⁰ See “Best Network,” Verizon Wireless, http://aboutus.vzw.com/bestnetwork/network_facts.html (last visited Sept. 22, 2009).

³¹ This build comes on the heels of multi-billion dollar investments that resulted in two major 3G network upgrades.

³² Testimony of Randal S. Milch, Verizon, United States Senate Subcommittee on Antitrust, Competition Policy, and Consumer Rights, at 3 (June 16, 2009).

Verizon Wireless intends to offer its 4G network in 25-30 markets – reaching approximately 100 million Americans. Verizon Wireless anticipates that this significant roll-out will occur “in one fell swoop rather than . . . a traditional market-by-market rollout.”³³ By the end of 2013, Verizon Wireless expects its service to reach 285 million people in 210 markets.³⁴

While Verizon Wireless is the leader in broadband investment, its investments are driving its competitors to respond. AT&T already offers 3G technology in nearly 350 markets,³⁵ and is taking interim steps to upgrade its current 3G High Speed Packet Access (“HSPA”) network to faster speeds.³⁶ AT&T also is preparing for field trials of 4G LTE wireless networks next year, with deployment planned to follow in 2011.³⁷ CLEAR plans to offer its competing 4G WiMAX service widely by the end of next year,³⁸ and the service is currently available in fourteen

³³ “Verizon Wireless Plans Mass LTE Deployment,” Information Week (Sept. 24, 2009), <http://www.informationweek.com/news/mobility/business/showArticle.jhtml?articleID=220200106> (last visited Sept. 25, 2009).

³⁴ “Verizon to Get Android Devices, LTE in 210 Markets by 2012,” Chris Ziegler, engadget Mobile (May 28, 2009), http://www.engadgetmobile.com/2009/05/28/verizon-to-get-android-devices-lte-in-210-markets-by-2012?icid=sphere_blogsmith_inpage_downloadsquad (last visited Sept. 25, 2009).

³⁵ Comments of AT&T Inc., GN Docket No. 09-51, at 129 (June 8, 2009).

³⁶ See Kevin Fitchard, *AT&T Doubling 3G Capacity*, Telephony Online (Apr. 20, 2009), available at <http://telephonyonline.com/wireless/news/att-3g-network-capacity-increase-0420/>. In addition, this year, AT&T will invest at least two-thirds of \$17 billion in both wired and wireless broadband networks. Press Release, AT&T, “AT&T to Invest More Than \$17 Billion in 2009 to Drive Economic Growth: Wireless and Wired Broadband Investment will Expand Service Coverage, Capacity, Quality” (Mar. 10, 2009) available at <http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=26597>. AT&T also recently announced that it “plans to invest between \$17 billion and \$18 billion this year, more than two-thirds of which is going toward broadband and wireless. The company’s deployment of HSPA 7.2 and additional backhaul connections are a key part of this network enhancement strategy.” Press Release, AT&T, “AT&T to Make Faster 3G Technology Available in Six Major Cities This Year” (Sept. 9, 2009), available at <http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=27068>.

³⁷ Press Release, AT&T, “AT&T to Make Faster 3G Technology Available in Six Major Cities This Year” (Sept. 9, 2009), available at <http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=27068>.

³⁸ See Verizon at JPMorgan Global Technology, Media and Telecom Conference Transcript, Thompson StreetEvents, http://investor.verizon.com/news/20090519/20090519_transcript.pdf, at 7 (May 19, 2009).

markets serving 10 million people.³⁹ CLEAR has indicated that it is testing VoIP in Portland, and is looking at introducing mobile voice services.⁴⁰ MetroPCS plans to offer LTE services in its major markets in 2010.⁴¹ Wireless Internet service providers (“WISPs”) also are aggressively deploying fixed wireless broadband networks.⁴²

The cable industry also has shown a strong interest in providing next generation wireless broadband services. Comcast and Time Warner have already either begun or announced plans to resell CLEAR’s 4G network wireless services.⁴³ Additionally, Cox Communications anticipates using its AWS spectrum and newly acquired 700 MHz spectrum to provide wireless broadband

³⁹ Press Release, Clearwire, “Clearwire Introduces CLEAR(TM) 4G WiMAX Internet Service in 10 New Markets” (Sep. 1, 2009) available at <http://newsroom.clearwire.com/phoenix.zhtml?c=214419&p=irol-newsArticle&ID=1326282>. Additionally, Clearwire recently announced that it “launched a WiMax test network in Silicon Valley that will cover 20 square miles, aimed at fostering the development of broadband wireless applications by Google and other tech firms in the area.” Todd Spangler, “Clearwire Opens WiMax 'Sandbox' In Silicon Valley”, Multichannel News, Sept. 15, 2009, <http://www.multichannel.com/article/353913-Clearwire-Opens-WiMax-Sandbox-In-Silicon-Valley.php>.

⁴⁰ See Wireless, Communications Daily, Apr. 3, 2009; Clearwire Continues Expansion, Targets Applications, Communications Daily (Apr. 22, 2009)

⁴¹ Lynnette Luna, “MetroPCS names Ericsson LTE network vendor, Samsung handset supplier,” FierceBroadband.com, Sept. 16, 2009, available at <http://www.fiercebroadbandwireless.com/story/metropcs-names-ericsson-lte-network-vendor-samsung-handset-supplier/2009-09-16>; Press Release, MetroPCS, “Unlimited Wireless Carrier MetroPCS Announces Vendors for 2010 4G LTE Launch” (Sept. 15, 2009), available at <http://investor.metropcs.com/phoenix.zhtml?c=177745&p=irol-newsArticle&ID=1331809&highlight=>.

⁴² See “WiMAX WISPs Target the Enterprise,” John Cox, Network World (July 23, 2008), <http://www.networkworld.com/news/2008/072308-wimax-wireless-isps.html?page=1> (last visited Sept. 26, 2009) (explaining the popularity of WiMAX among WISPs); “WiMAX vs. LTE: A False Idea?”, Tara Seals, VON (Sept. 22, 2009), <http://www.von.com/news/wimax-vs-lte-a-false-idea.html> (last visited Sept. 26, 2009) (stating that “there are also 18 other WISPs across the country [that] are deploying WiMAX”).

⁴³ In late June, Comcast announced that it is now offering a wireless broadband service in the Portland, Oregon market over Clearwire’s 4G Wi-MAX network, and that it would expand this offering to other markets nationwide as Clearwire builds out its network. See Press Release, Comcast, “Comcast Begins National Rollout of High-Speed Wireless Data Service” (June 29, 2009), available at <http://www.comcast.com/About/PressRelease/PressReleaseDetail.ashx?PRID=887&fss=Portland>. Comcast says that this service allows customers speeds of up to 4 Mbps on the go. *Id.* Time Warner announced in late June that it would begin reselling Clearwire’s WiMAX service in Dallas, Texas and Charlotte, North Carolina this fall. Marguerite Reardon, CNET News, *Time Warner Cable to Resell WiMAX Service*, (Jun. 30, 2009) available at http://news.cnet.com/8301-1035_3-10300017-94.html.

services.⁴⁴ Specifically, Cox Communications holds 30 AWS licenses and 22 700 MHz licenses, and the company is constructing infrastructure in its current cable service markets using these holdings.⁴⁵ In the near term, Cox Communications has announced that it intends to enter the mobile market by utilizing Sprint's 3G CDMA network.⁴⁶ In the future, Cox Communications anticipates using LTE and intends to conduct 4G trials in two markets in 2010.⁴⁷ These wireless broadband providers will continue to apply competitive pressure to one another to upgrade their networks, ensuring that widespread innovation will persist going forward.⁴⁸

Network providers' massive investments in broadband technologies enable advances in voice and data communications capabilities, including new applications, handsets, and content. The new networks increase capacity and network speed, which increase the availability of network resources to customers for streaming and bandwidth-heavy services and applications. Specifically, LTE substantially improves end-user throughputs and sector capacity and reduces user latency to deliver a significantly improved user experience.⁴⁹ Further, the use of advanced

⁴⁴ See also Press Release, Cox Communications, Cox to Launch Next Generation Bundle with Wireless in 2009 (Oct. 27, 2008), available at <http://coxenterprises.mediaroom.com/index.php?s=43&item=19>.

⁴⁵ Reply Comments of Cox Wireless, WT Docket No. 09-66 (filed Jul. 13, 2009) at 4.

⁴⁶ *Id.*

⁴⁷ *Id.*

⁴⁸ In the current competitive market, carriers continue to build out their networks in order to expand coverage and capacity and to improve service. To that end, the number of operational cell sites deployed across the country has steadily increased, and, in 2008, a record of nearly 29,000 cell sites were activated, bringing the total number of cell sites in operation to over 242,000. See *infra* Figure 2.

⁴⁹ "Spectrum Analysis for Future LTE Deployments," Motorola, p. 7, http://www.motorola.com/staticfiles/Business/Solutions/Industry%20Solutions/Service%20Providers/Wireless%20Operators/LTE/Document/Static%20Files/LTE_Spectrum_Analysis_White_Paper_New.pdf. See also "LTE - Delivering the Optimal Upgrade Path for 3G Networks," Nokia, at 2 http://www.nokia.com/NOKIA_COM_1/Press/Press_Events/Nokia_Technology_Media_Briefing/LTE_Press_Backgrounder.pdf ("A key aspect of LTE is its simplified, flat network architecture, derived from it being an all-IP, packet-based network, and the use of new techniques to get high volumes of data through a mobile network. This allows many of the network elements involved in the data transport between an operator's base stations and its core

sectorized antennas will allow for efficient spectrum utilization by “assigning spectrum usage on a dynamic basis according to user demand and re-using the same frequency to transmit different information to customers who are in different directions.”⁵⁰ Other functionalities facilitated by LTE are plug and play, Frequency Division Duplex (“FDD”) and Time Division Duplex (“TDD”) in the same platform, improved end-user experience and simple architecture resulting in low operating expenditures.⁵¹

2. Network Advances and the Competitive Wireless Marketplace Produce Innovative Applications and Content for Consumers.

The 3G and 4G network-level innovation currently underway will continue to drive significant innovation at the application and content tiers. Network advances and partnerships between wireless carriers and manufacturers, software developers and other entrepreneurs already have created a wireless ecosystem that allows for web browsing, location services, music services, instant chat, streaming video and radio services, downloadable ringtones, social networking, and mobile business. Applications and content available to consumers will continue to increase exponentially as wireless service providers upgrade network speeds and capabilities, particularly with respect to highly specialized health care, education, machine-to-machine (“M2M”) applications, telematics, and location-based applications.

network in current cellular systems to be removed. This helps to reduce latency (the time it takes data to travel within the network), but also helps to significantly reduce cost, since fewer pieces of network equipment are needed to achieve the same results.”)

⁵⁰ *Modification of Parts 2 and 15 of the Commission’s Rules for Unlicensed Devices and Equipment Approval*, Notice of Proposed Rulemaking, 18 FCC Rcd 18919, 18913 (¶¶ 8-9) (2003). *See also Modification of Parts 2 and 15 of the Commission’s Rules for Unlicensed Devices and Equipment Approval*, Report and Order, 19 FCC Rcd 13539, 13541 (¶ 7) (2004).

⁵¹ Verizon Wireless, “LTE: The Future of Mobile Broadband Technology,” attached as Attachment A (“Verizon Wireless LTE Paper”).

Already, wireless providers compete for mobile data customers with rival offerings and differentiated products and services. For example, in March 2007, Verizon Wireless launched V CAST Mobile TV, the first mobile TV service using Qualcomm’s MediaFLO USA network.⁵² In 2008, AT&T launched its own mobile TV service on MediaFLO in 58 markets.⁵³ Competition also has pushed advances in push-to-talk (“PTT”) applications. For years, the Nextel iDEN network has offered PTT technology that appealed to certain wireless users. In response to this success, Verizon Wireless has launched its own 3G, packet-based PTT application, which enables users to make quick exchanges, place group calls, check availability of contacts with “Presence,” and manage contact lists online.⁵⁴

Further, the current mobile applications market is characterized by a proliferation of “app stores” and platforms, motivated by fierce competition among manufacturers, software developers, wireless carriers, and other independent players, including:

Wireless Providers:

- Verizon Wireless V CAST Apps (to be launched late 2009)
- AT&T Media Mall
- Cox Wireless (BREW based platform)

Handset Manufacturers:

- Apple App Store
- BlackBerry® App World
- Sony Ericsson
- LG

⁵² Press Release, Verizon Wireless, “Verizon Revolutionizes TV at Home and On Mobile Phones” (Jan. 7, 2007), available at <http://news.vzw.com/news/2007/01/pr2007-01-07c.html>.

⁵³ *Thirteenth Annual CMRS Competition Report*, ¶ 164, citing Press Release, AT&T, “AT&T to Deliver MediaFLO USA’s FLO TV Services in 58 Markets on New AT&T-Exclusive Handsets Designed for Mobile TV Viewing; AT&T Introduces CNN Mobile Live, PIX and CNCRT, a Special Concert Channel” (May 1, 2008).

⁵⁴ “Push-to-Talk,” Verizon Wireless, https://myaccount.verizonwireless.com/accessmanager/public/pttloginform.jsp?goto=https%3A%2F%2Fpushtotalk.vzw.com%3A443%2Fvzw_html%2Fptt.html (last visited Sept. 17, 2009).

- Samsung Application Store
- Nokia Ovi Store
- Palm Apps Catalog

Software/Hardware developers:

- Microsoft Windows Marketplace
- Qualcomm Retail Plaza
- Sun Microsystems Java Store
- Symbian Horizon
- Google Android Market

Others Developers:

- Handango
- GetJar
- Continental AutoLinQ (telematics)
- PocketGear

According to its website, Handango offers more than 140,000 applications and digital content titles.⁵⁵ Apple's iTunes App Store offers approximately 85,000 applications,⁵⁶ in one day alone, approved over 1,400 new applications, and has had over 2 billion downloads.⁵⁷ PocketGear's catalog contains more than 70,000 applications.⁵⁸ GetJar's catalog includes 54,339 game and application files.⁵⁹ The Palm Software Store has over 5,000 applications,⁶⁰ and received more

⁵⁵ See Press Release, Handango, "Handango and LG CNS Announce Deal to Bring Top Smartphone Apps to All New LG Smartphone App Stores Worldwide" (Sept. 15, 2009), available at http://corp.handango.com/PressRelease.jsp?siteId=1&CKey=1_PRESSRELEASE_091509 (last visited Sept. 30, 2009).

⁵⁶ Dan Moren, Apple announces iPhone 3.1, Sept. 9, 2009, available at http://www.macworld.com/article/142702/2009/09/iphone_31_update.html.

⁵⁷ Press Release, Apple, "Apple's App Store Downloads Top Two Billion" (Sept. 28, 2009), <http://www.apple.com/pr/library/2009/09/28appstore.html> (last visited Sept. 28, 2009).

⁵⁸ "About PocketGear," PocketGear, <http://corp.pocketgear.com/> (last visited Sept. 24, 2009).

⁵⁹ "About GetJar," GetJar, <http://www.getjar.com/site/info> (last visited Sept. 24, 2009).

⁶⁰ "Palm Application Store," TopTenReviews, <http://mobile-technology.toptenreviews.com/palm-opens-new-application-store.html> (last visited Sept. 18, 2009).

submissions than it could handle for launch.⁶¹ Samsung anticipates offering over 2,000 applications by year-end.⁶² The Android Market has over 10,000 applications.⁶³ The BlackBerry® “App World” also is filled with more than 2,000 popular and innovative applications.⁶⁴ As recently as four years ago, virtually none of these applications even existed.⁶⁵

Moreover, the barriers to entry for third party application developers have become minimal to nonexistent. Handset manufacturers, software purveyors, and wireless carriers all want to market a wide variety of applications that will operate on their varying devices and operating systems. Moreover, there are multiple operating systems in use and available for developers to work with (*e.g.*, Windows Mobile, BlackBerry, Palm, Android, Symbian, BREW). Developers need only comply with certification standards, reach business agreements, and secure license agreements for distribution of content. These practices are designed to ensure that applications do not interfere with wireless networks and are compliant with copyright law. The benefits to application developers are sizable. Developers obtain distribution channels, billing

⁶¹ “App Catalogue Review Process,” Palm Message Boards, <https://developer.palm.com/distribution/viewtopic.php?p=7622#p7622> (site admin stating “[w]e got more applications than we could handle well, which is a good problem to have”).

⁶² “Samsung Launches App Store,” Information Week (Sept. 14, 2009), <http://www.informationweek.com/news/mobility/business/showArticle.jhtml?articleID=220000224>.

⁶³ “Android Market: 10,000+ Applications Strong Today,” Robin Wauters, Washington Post (Sept. 7, 2009), <http://www.washingtonpost.com/wp-dyn/content/article/2009/09/08/AR2009090802799.html> (last visited Sept. 25, 2009).

⁶⁴ “App World,” <http://appworld.blackberry.com/webstore/>.

⁶⁵ Even two years ago, wireless applications were in their nascent stages. Comparing Q2 2007 to Q2 2009, the differences are astounding. In Q2 2007, approximately 13 million mobile consumers downloaded a mobile application on their phone. *See* Press Release, “Increased Availability of GPS on Mobile Phones Drives Consumption of Navigation and Other Location-Based Services, Telephia Says,” *available at* <http://www.marketwire.com/press-release/Telephia-779241.html> (last visited Sept. 24, 2009). Q2 2007 also brought in \$118 million in revenue from mobile applications. *Id.* Two years later, Apple alone earns between \$60 million to \$110 million in quarterly revenue from its App Store. *See* Nick Wingfield, “Sizing Up Apple’s App Store,” Wall Street Journal (Sept. 24, 2009), *available at* http://blogs.wsj.com/digits/2009/09/24/sizing-up-apple%e2%80%99s-app-store/?mod=rss_WSJBlog?mod= (last visited Sept. 25, 2009).

arrangements, and access to millions of browsing consumers. Because barriers to entry are low and the potential for returns is high, smaller developers generally stand on equal footing with larger ones. The venture capital industry has recognized this opportunity for growth in independent companies and has begun to invest heavily in the next wave of innovative applications. The \$140 million BlackBerry® Partners Fund, for example, focuses on companies developing practical applications, like e-mail management software and business-travel guides.⁶⁶ Similarly, the \$100 million iFund run by California-based Kleiner Perkins Caufield & Byers focuses on companies designing iPhone applications for location-based services, social networking, mCommerce, communications, and entertainment.⁶⁷ Notably, this open environment for application development was accomplished without regulatory intervention.

Customers of Verizon Wireless have particularly benefited from progress in application development and now enjoy a wide variety of applications focused on user-driven content. Visual VoiceMail, for example, is available on many different devices and allows customers to see a list of all of their voicemail messages with important information, such as date and time of receipt, as well as message duration, in order to prioritize and efficiently manage their voicemail messages directly from their devices. The SocialLife application enables users to manage various social-networking sites, including MySpace, PhotoBucket, MTV's Tr3s, AsianAve, BlackPlanet, FaithBase, FLEE, LiveJournal, MiGente, and Rabble.⁶⁸ Users can view messages,

⁶⁶ "BlackBerry Fund Looks Beyond '99-Cent' Programs," Hugo Miller, Bloomberg.com (Sept. 23, 2009), <http://www.bloomberg.com/apps/news?pid=20601204&sid=aSF9UERzYUOs> (last visited Sept. 25, 2009).

⁶⁷ *Id.* See also Press Release, Kleiner Perkins Caufield & Byers, "Kleiner Perkins Caufield & Byers Launches \$100 Million iFund for iPhone Application Developers" (March 6, 2008), <http://www.kpcb.com/initiatives/ifund/pressrelease.html> (last visited Sept. 25, 2009).

⁶⁸ "SocialLife," http://products.vzw.com/index.aspx?id=fnd_toolsapps_detail&appId=3121296 (last visited September 22, 2009). "Verizon Wireless Gets a Social Life," CNET, http://reviews.cnet.com/8301-12261_7-10035719-51.html (last visited Sept. 22, 2009).

approve or deny friend requests, post comments, and update profiles right from their phones. In addition, users can upload any camera-phone image to their social-networking site of choice with one click.

Additional cutting-edge applications loom over the horizon. Commercial wireless carriers are introducing remarkable new wireless services and applications, including products that allow M2M communications, remote monitoring, and telemetry. Verizon Wireless sees significant promise in these applications, in which automated systems, like alarms or temperature gauges, report observations to control centers. These applications, discussed in detail in Section II below, will enhance wireless capabilities and enable entities to monitor conditions in a variety of areas, including oil and gas, transportation, healthcare, public safety, prison safety, education, and manufacturing.⁶⁹ In addition to M2M communications, advanced people-to-people applications – such as advanced videoconferencing, “virtual meeting” services, and multiplayer portable gaming – will open up a wide range of possibilities, including alternative telephony systems and location-based systems for personal and business use.

Commercial wireless IP networks are best positioned to provide these new services and applications. Previously, monitoring and M2M systems were often task-specific, operated over private networks, and required separate spectrum.⁷⁰ But Verizon Wireless anticipates that commercial wireless carriers will be at the forefront in offering the next generation of these services. Verizon Wireless, for its part, heavily invested in acquiring 700 MHz spectrum and

⁶⁹ Further, M2M reporting and sensing devices can be very effective in rural areas in notifying distant users of the status or condition of a certain facility or installation.

⁷⁰ See, e.g., *NOI*, n. 52; “Velocita, SkyTel Set to Tackle M2M Space,” RCR Wireless (Sept. 23, 2009) (explaining that competition in the M2M industry is increasing as traditional wireless service providers venture for new business ideas outside of the saturated core voice/data market: “Mainstream operators and mobile virtual network operators are now targeting the M2M market directly and publicly”).

developing its 4G network for just this reason. Now Verizon Wireless intends to utilize its open LTE network to introduce new and novel advanced applications.

Ultimately, the wireless operator's goal is to ensure that consumers enjoy the best opportunity to make their own choices about services, applications and content. If consumers determine that they are not getting the choices they want, they can and will move to competitors. As the Commission has found, vigorous competition in the wireless industry has brought consumers extraordinary benefits, including the providers' massive pro-consumer investments in broadband 3G and 4G networks, which have led to rapid advances in wireless applications.⁷¹ There is simply no evidence either that this effort to improve wireless users' Internet choices is abating or that regulatory intervention might somehow be needed.

3. Network Advances Foster New Devices for Consumers.

The U.S. market for wireless handsets is characterized by significant competition among many well-established and newer manufacturers, including Apple, Motorola, Nokia, LG, Samsung, Research In Motion ("RIM"), Palm, Sony Ericsson, Kyocera, Sanyo, and HTC.⁷² U.S. consumers have access to more than 600 different wireless handsets and devices, compared to, for example, less than 150 in the United Kingdom.⁷³

⁷¹ As recently as January 2009, the Commission provided more than 150 pages of data to support its central findings that there is "effective competition" in the industry, and that "U.S. consumers continue to reap substantial benefits – including low prices, new technologies, improved service quality, and choice among providers" from that competition. *Thirteenth Annual CMRS Competition Report*, ¶ 1.

⁷² See, e.g., M. Lowenstein, "The Evolving Role of Handsets in the U.S. Wireless Industry," at 7-8, Attachment A to Comments of Verizon Wireless Requesting Dismissal or Denial of Petition, RM-11497 (filed Feb. 2, 2009).

⁷³ See Letter from Christopher Guttman-McCabe, Vice President, CTIA, to Marlene H. Dortch, Secretary, FCC, RM-11361, at 2 and accompanying charts (filed May 12, 2009).

Wireless service providers use handsets and handset features as a means to differentiate themselves in the fiercely competitive wireless market.⁷⁴ In the current wireless market, penetration is over 80 percent and the difference in coverage among operators has decreased.⁷⁵ Service providers still use many features to differentiate themselves from each other, but handsets offer a rich opportunity for competitive marketing of new designs, technologies, features and applications linked to the burgeoning market for application stores.⁷⁶ Therefore, the handset has become one of the most important factors in the selling of a specific CMRS brand and in a customer's purchasing decision.⁷⁷ According to one study, the number of consumers choosing a wireless carrier based on handsets has grown by 51 percent since 2004.⁷⁸

This competition among service providers and manufacturers to offer consumers the latest and greatest handset has repeatedly produced innovations in technology and features that benefit consumers and the wireless industry generally. For years, the cell phone was essentially a portable analog of the table-top phone that appeared in every household. The user could make and receive calls, get voicemail, and obtain enhanced services such as call waiting and call forwarding. First gradually, and then at a faster clip, cell phones added features like cameras,

⁷⁴ The *NOI* asks: "How have such devices affected development of innovation in wireless applications and services?" *NOI*, ¶ 55.

⁷⁵ Lowenstein, *supra* n. 72, at 4-6.

⁷⁶ On a granular level, advancements in user experience have been delivered through a combination of innovations in displays (*e.g.*, gray scale to color, improved resolution and sharpness), input mechanisms (*e.g.*, touch and voice recognition) and sensor technologies (*e.g.*, touch, light, proximity, accelerometer, compass, biometric). Sensor technologies include capabilities like light detection to modify display intensity (providing visual and energy benefits), proximity sensors to turn displays on and off when phones are placed to ear and motion sensors to change the screen orientation of displays to provide more intuitive usage of devices. Voice recognition also has become a more useful mechanism for interacting with the device in a mobile environment, primarily driven by improvements in accuracy.

⁷⁷ Lowenstein, *supra* n. 72, at 4.

⁷⁸ *Id.* at 6.

address books, email, music players, games, text messaging, and access to digital content distributed over the Internet.⁷⁹

As notable as the sheer number of devices is the accelerating pace at which devices are being introduced. Carriers and manufacturers have sped up the pace of launch of new devices to ensure that new, often cutting edge handsets hit the market at the faster pace demanded by consumers. This is graphically shown in *Figure 1* below, which illustrates the original equipment grants per year by the FCC for broadband PCS handsets.⁸⁰

⁷⁹ The wireless industry's drastic reduction in the size of wireless devices has facilitated increased capabilities of devices. For example, in addition to cellular technology, other technologies such as Bluetooth connectivity, GPS connectivity, WiFi connectivity, USB connectivity, cameras, and music players are now available to users in smaller form factors than existed 5-10 years ago. Increased integration of functionality in integrated circuits as well as advancements in packaging technology (*e.g.*, stack die and stacked package configurations) have driven these innovations.

⁸⁰ Data based on OET Equipment Authorization Search, *available at* <https://fjallfoss.fcc.gov/oetcf/eas/reports/GenericSearch.cfm>. Search results limited to applications for "Original Grant," equipment class "PCE," "PCT," or "PCF," and in the frequency range 1850-1990 MHz. Duplicate FCC IDs based on multi-band filings were eliminated.

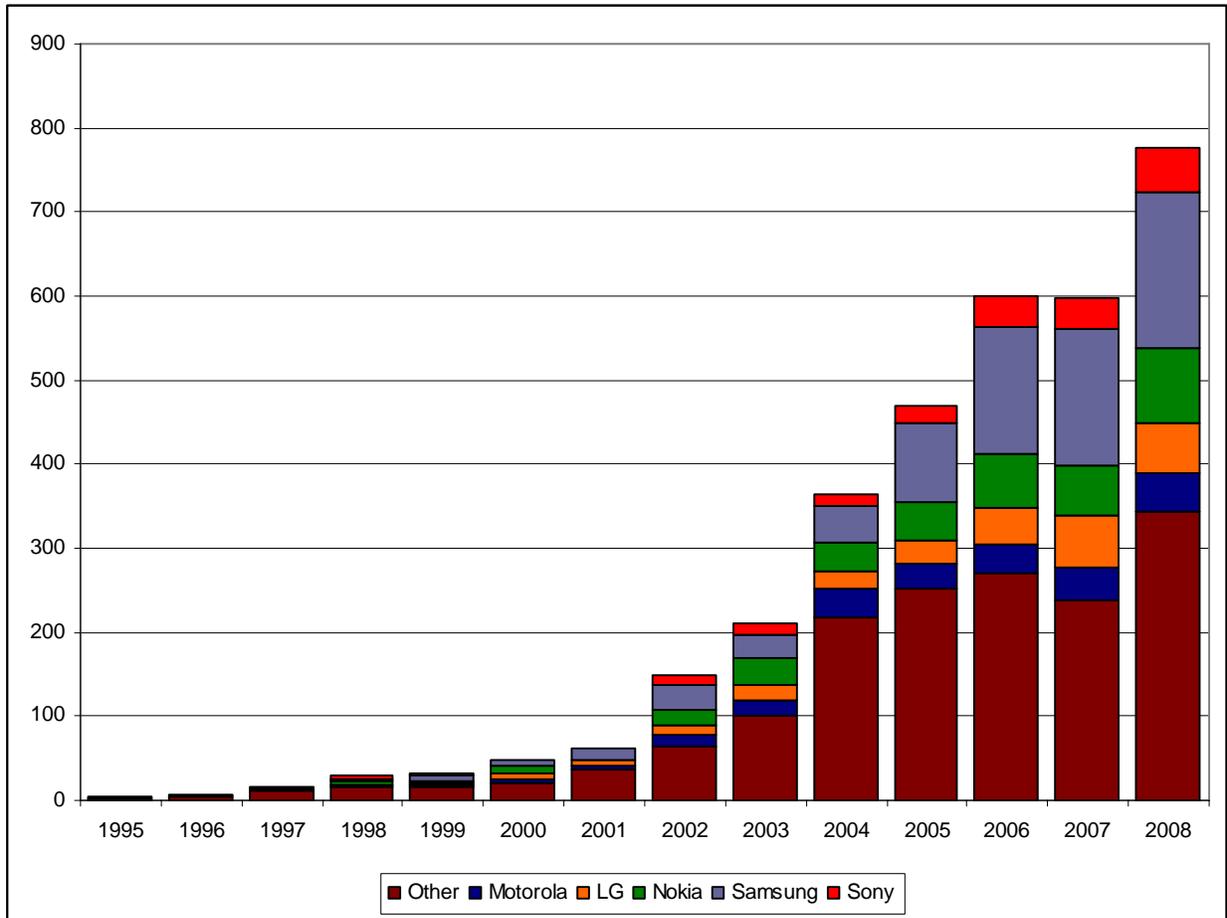


Figure 1: Broadband PCS Handset Equipment Authorization Grants by FCC (Original Grant only)

This focus on innovative devices is also reflected in the emergence of popular web sites and blogs devoted to reviewing and providing news coverage of the newest and best wireless devices.⁸¹ In addition, there have been a variety of non-voice related devices coming to market, including aircards for wireless Internet access, music players, netbooks, and specialized devices like the Amazon Kindle and the upcoming iRex⁸² with access to a library of e-books.

⁸¹ Internet web logs that specialize in mobile technologies, or include a heavy mobile technology component, include sites like www.howardforums.com, www.phonescoop.com, www.gizmodo.com, www.engadget.com, <http://www.hothandset.com/>, <http://www.theiphoneblog.com/>, and <http://cellphones.techfresh.net/>.

⁸² Verizon Wireless plans to support the soon-to-be released iRex e-reader. See “Best Buy and Verizon Jump Into E-Reader Fray,” Brad Stone, NY Times (Sept. 22, 2009), available at http://www.nytimes.com/2009/09/23/technology/internet/23ebooks.html?_r=1.

The fastest growing segment of the handset market is smartphones.⁸³ These devices not only handle voice and data but also serve as compact full-function computers that allow users to surf the Internet and run non-branded applications and services just as though they were sitting in front of a desktop computer.⁸⁴ Smartphones enable the possibility of increasing the growth of mobile broadband subscribers. Indeed, one source recently predicted that mobile broadband subscribers will represent one-third of all mobile subscribers worldwide by 2013.⁸⁵ And, to fuel this shift, there is no shortage of competing smartphones from multiple manufacturers. Some examples introduced in 2008 and 2009 include:

- Verizon Wireless: BlackBerry® Tour 9630; Samsung Omnia, HTC TouchPro
- AT&T: Apple iPhone 3GS; Motorola Karma QA1; BlackBerry® Bold
- T-Mobile: Motorola Cliq; myTouch 3G; G1; BlackBerry® Pearl Flip
- Sprint: HTC Touch Pro2; Palm Pre; HTC Hero; Samsung Exclaim
- Leap: Cricket TXTM8; Motorola Evoke QA4; Samsung JetSet
- MetroPCS: Motorola Hint; Samsung Finesse; Samsung Messenger
- U.S. Cellular: LG Tritan; Samsung TwoStep; LG Rhythm

⁸³ See, e.g., Steve Lohr, "Smartphone Rises Fast from Gadget to Necessity," NY Times, B1 (June 10, 2009), available at <http://www.nytimes.com/2009/06/10/technology/10phone.htm>.

⁸⁴ M. Perez, "U.S. Smartphone Sales Grew 47% in Q2," Information Week, (Aug. 20, 2009), available at <http://www.informationweek.com/news/mobility/business/showArticle.jhtml?articleID=219400891&subSection=Mobility>. See "Why the iPhone Won't Last Forever and What the Government Should Do to Promote its Successor," Robert Hahn and Hal J. Singer, 20 (Sept. 1, 2009), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1477042.

⁸⁵ See Lynette Luna, *Informa: Mobile Broadband Will by Growth Engine by 2013*, Fierce Wireless (Mar. 26, 2009), <http://www.fiercebroadbandwireless.com/story/informa-mobile-broadband-subs-will-make-one-third-worldwide-subs-2013/2009-03-26>.

Smaller wireless carriers offer similar products. A recent analysis found that, among 51 members of the Rural Cellular Association researched, “all offer one or more phones with Internet access, and 38 offer one or more phones with touch screens.”⁸⁶

In this competitive marketplace, there are no impediments to established or new manufacturers finding themselves with the best selling or most popular device at any given time.⁸⁷ During the middle of the decade, the Motorola RAZR, including its many variants and models, was the top-selling handset model in the United States.⁸⁸ About a year after its introduction in mid-2007, the Apple iPhone overtook the RAZR by at least some accounts.⁸⁹ Motorola has a long history in the U.S. cellular market, including the StarTac clamshell phone, which revolutionized handset design and was a top-seller long before the RAZR.⁹⁰ Meanwhile, Apple is a new entrant with multiple versions of the iPhone introduced in less than two years. Such shifts are based not on market dominance but on the competitive introduction of new and innovative technology and services that attract consumers as well as wireless providers who want to offer those handsets. Historical trends further illustrate the lack of market power in the handset industry. In the second quarter of 1999, the top five mobile handset manufacturers in the

⁸⁶ Michael Katz, “An Economic Analysis of the Rural Cellular Association’s Petition for Rulemaking Regarding Exclusivity Agreements,” attached to Comments of AT&T on RCA Petition, RM-11497, filed February 20, 2009 (“Katz Economic Analysis of RCA Petition”), at 20.

⁸⁷ See Hahn and Singer, *supra* n. 84, at 12 (“[W]e conclude that no firm, including Apple, had a dominant share of the handset market – either in the United States or globally – over our study period (2005-2009), and that shares are not stable over time due to innovations among new handset manufacturers.”).

⁸⁸ See “Wirefly Announces the Ten Most Popular Cell Phones of 2006,” (Jan. 12, 2007) available at <http://www.prweb.com/releases/2007/01/prweb496771.htm>.

⁸⁹ See L. Graham, “The NPD Group: “iPhone 3G Leads U.S. Consumer Mobile Phone Purchases in the Third Quarter of 2008,” (Nov. 10, 2008) available at http://www.npd.com/press/releases/press_081110.html.

⁹⁰ “Retro: Motorola StarTAC,” *Mobile Gazette* (Oct. 20, 2008), <http://www.mobilegazette.com/motorola-startac.htm> (last visited Sept. 26, 2009).

U.S., by sales, were Motorola (32 percent), Nokia (22 percent), QUALCOMM (12.2 percent), Audiovox (10.3 percent) and Ericsson (10.2 percent).⁹¹ Less than 10 years later, only two of those companies – Motorola and Nokia – remain significant handset vendors, and their market share has dropped from a collective 54 percent to only 30 percent.⁹²

Similarly, there are no impediments to new entrants coming into the handset market. For example, MetroPCS recently turned to Chinese manufacturer ZTE to introduce a new smartphone.⁹³ And, Apple had never sold a wireless handset before introducing the iPhone through AT&T in mid-2007. It has now captured 13.3 percent of the worldwide smartphone market, an increase of 10.5 percent from its 2.8 percent market share one year ago.⁹⁴

Consumers also benefit from competing channels of distribution for wireless handsets. Equipment manufacturers offer their products to consumers through many channels, including big box stores like Best Buy and Wal-Mart, wireless provider stores, manufacturer websites, and independent wireless superstores. Even rural wireless customers have access to a variety of smartphones and phones with Internet access.⁹⁵ Many websites offer hundreds of basic phones,

⁹¹ “GartnerGroup's Dataquest Says U.S. Mobile Handset Sales Exceeded 10 Million Units in Second Quarter 1999,” (Sept. 28, 1999), http://www.gartner.com/5_about/press_room/pr19990928c.html.

⁹² “The NPD Group: U.S. Consumer Mobile Phone Unit-Sales Declined 13 Percent Year-over-Year in Q2 2008,” (Aug. 19, 2008), available at: http://www.npd.com/press/releases/press_080819.html (showing 2Q08 market shares as follows: Motorola, 21 percent; Samsung, 20 percent; LG, 20 percent; Nokia, 9 percent; and RIM BlackBerry, 7 percent).

⁹³ See Brad Smith, “The Changing U.S. Handset Market,” *Wireless Week* (Mar. 1, 2008), available at <http://www.wirelessweek.com/Articles/2008/03/The-Changing-U-S--Handset-Market/>.

⁹⁴ “Gartner Says Worldwide Mobile Phone Sales Decline 6 Percent and Smart Phones Grew 27 Percent in Second Quarter of 2009” (August 12, 2009) available at <http://www.gartner.com/it/page.jsp?id=1126812>.

⁹⁵ As noted above, 51 members of the Rural Cellular Association, “all offer one or more phones with Internet access, and 38 offer one or more phones with touch screens.” Katz Economic Analysis of RCA Petition at 20.

smartphones, and service plans.⁹⁶ In short, consumers have many handset choices, and they can and do make selections of handsets and providers based on what handsets and/or handset features and functions they find attractive.

The next generation of devices will benefit greatly from the transition to 3G and 4G technologies. As wireless service providers upgrade network speed and capabilities, wireless device functionality will increase. Wireless service providers, including Verizon Wireless, will continue to work closely with device manufacturers to ensure that the next generation of devices fully leverages the unique characteristics of wireless networks.⁹⁷ Given the extent of competition and innovation in the handset marketplace, Commission intervention is unnecessary.⁹⁸

4. Network Innovation and Investment Has Driven the Recent Trend Toward Open Wireless Networks.

The development and deployment of 4G networks has driven the recent trend towards open wireless networks. Wireless carriers recognize that tapping the collective talents and ideas of third-party application developers is critical to retaining and attracting customers. Thus, wireless carriers are developing and deploying the networks that make such collaboration

⁹⁶ J&R, <http://www.jr.com/category/office/cellular-phones/>; Wirefly, <http://www.wirefly.com/>; TMIWireless, <http://www.tmiwireless.com/>.

⁹⁷ In July 2009, Verizon Wireless and Qualcomm Incorporated formed a joint venture, called nPhase, that will provide end-to-end M2M solutions to enable “Smart Services” initiatives in a variety of industries, including healthcare, manufacturing, utilities, distribution and consumer products. Smart Services are new offerings and transformative business models that become possible whenever an enterprise connects its physical products or assets to a communications network. M2M provides the technology behind the solution. *See* Press Release, Verizon Wireless, “nPhase Selected as Name for Qualcomm and Verizon Wireless Joint Venture to Provide Advanced M2M Solutions” (Aug. 20, 2009), available at <http://news.vzw.com/news/2009/08/pr2009-08-19c.html>.

⁹⁸ A recent report concludes that “regulators should be very reluctant to intervene in the mobile handset market given the pace of innovation . . .” Hahn and Singer, *supra* n. 84, at 36.

possible.⁹⁹ Such wireless network innovation furthers and expedites the delivery of new and cutting-edge applications to consumers. As Verizon’s CEO recently noted, “the market is pressing the wireless industry towards openness and compatibility,” and the “new business model [that] is emerging” will lead to “growth and innovation” that will be “hugely beneficial to the U.S. economy.”¹⁰⁰ In contrast, restricting access to desired applications will drive customers to other carriers.

Many national and regional wireless network operators have embraced the concept of openness in recent years. Verizon Wireless, as detailed in Section II below, instituted its ODI to pave the way for third-party devices and services to access Verizon Wireless’ networks.¹⁰¹ To date, 60 devices have been certified for use on the Verizon Wireless network – with the approval process for new devices just three weeks currently.¹⁰² At least two independent test facilities – Intertek and PCTEST – are certified by Verizon Wireless to perform ODI testing.¹⁰³

⁹⁹ See Thomas W. Hazlett, “Wireless *Carterfone*: An Economic Analysis,” at 14-15, attached to Comments of Verizon Wireless, RM No. 11361 (Apr. 30, 2007) (“competitive forces organize markets in innovative ways, discovering and satisfying consumer demands”) (“Wireless *Carterfone*”).

¹⁰⁰ “Verizon’s Seidenberg: Wireless Industry Innovation Can Help Put Economy Back on Path to Growth,” <http://newscenter.verizon.com/press-releases/verizon/2009/verizons-seidenberg.html> (April 1, 2009).

¹⁰¹ See www.verizonwireless-opendevelopment.com. Verizon’s announcement of ODI was met with great praise within the industry. For example, Microsoft applauded Verizon Wireless’s ODI as “a bold move to satisfy the demands of wireless consumers. As people’s mobile needs become more sophisticated and varied, they will require smarter and more adaptable mobile devices. We are proud to support any open access that puts more power in people’s hands to connect them to the information they want when and where they want it.” “Media Alert: Microsoft Announces Support for Verizon Wireless Open Development Initiative,” Microsoft News (Nov. 27, 2007), <http://www.microsoft.com/presspass/press/2007/nov07/11-27VerizonWirelessMA.mspx>.

¹⁰² See “Compliant Devices,” <https://www22.verizon.com/opendev/dcnew.aspx> (last visited Sept. 24, 2009).

¹⁰³ Press Release, Verizon Wireless, “PCTEST LAB Becomes Third Party Testing Lab for Verizon Wireless’ Open Development Program” (Mar. 2, 2009), available at <http://news.vzw.com/news/2009/02/pr2009-03-02a.html>; Press Release, Verizon Wireless, “Intertek Becomes First Approved Testing Lab For Verizon Wireless’ Open Development Devices,” (Oct. 21, 2008), available at <http://news.vzw.com/news/2008/10/pr2008-10-21.html>.

In addition to ODI, Verizon Wireless is now engaged in several additional initiatives to allow for third-party innovation on its networks. Verizon Wireless recently launched an open development project for its soon-to-be-built LTE network using the 700 MHz C Block spectrum.¹⁰⁴ Additionally, as discussed in Section II, Verizon Wireless has announced that, together with China Mobile, SOFTBANK and Vodafone, it would join the Joint Innovation Lab, and has created the Verizon Wireless LTE Innovation Center – an “incubator” to assist third-party device and application developers to create innovative new products and services for Verizon Wireless’ upcoming 4G network.¹⁰⁵ More recently, Verizon Wireless announced that it would encourage developers that use Java technology to develop new applications that will run on Verizon Wireless’ broadband networks.

Other wireless network operators also are responding to consumer demand for increased openness. For example, AT&T has stated that it already allows customers to use any GSM handset on its network.¹⁰⁶ On its website, AT&T commits to customers that they can bring any GSM phone for connection to the network, and it explains how customers can access and download applications.¹⁰⁷ Additionally, CLEAR and its owners – Sprint, Google, Comcast, Time Warner Cable, Intel Capital, and Bright House Networks – have committed that CLEAR’s WiMAX broadband technology “will permit consumers to use any lawful device so long as it is

¹⁰⁴ See Press Release, Verizon Wireless, “Verizon Wireless Drives 4G LTE Innovation with Open Device Development Specifications” (Apr. 17, 2009), available at <http://news.vzw.com/news/2009/04/pr2009-04-16c.html>.

¹⁰⁵ See “Verizon Wireless Establishes LTE Development Center”, Information Week, (April 1, 2009), <http://www.informationweek.com/news/mobility/business/showArticle.jhtml?articleID=216402321>.

¹⁰⁶ See The Engadget Interview: Ralph de la Vega, CEO of AT&T Mobility, <http://www.engadget.com/2007/11/26/the-engadget-interview-ralph-de-la-vega-ceo-of-atandt-mobility/> (last visited Sept. 17, 2009).

¹⁰⁷ See <http://choice.att.com/flash/customersdevices.aspx>.

compatible with and not harmful to the network, and to download any applications or content subject only to reasonable network management practices and law enforcement and public safety considerations.”¹⁰⁸

Wireless industry members have also formed the Open Handset Alliance.¹⁰⁹ The group’s focus has been on the creation of the Android system, which is a set of operating software developed by Google that promotes openness.¹¹⁰ Google and T-Mobile unveiled the first Android device, the G1, in September 2008, and the following month T-Mobile became the first U.S. provider to launch a handset that uses the Android operating system. Like T-Mobile, Sprint Nextel endorsed Android and plans to launch the HTC Hero, an Android device, in October 2009.¹¹¹ Similarly, non-network operators, such as Nokia,¹¹² Qualcomm,¹¹³ and Ericsson,¹¹⁴ offer platforms for developers to market their applications for mobile devices.

¹⁰⁸ Sprint Nextel Corp. and Clearwire Corp., Joint Opposition to Petitions to Deny and Reply to Comments, WT Docket. No. 08-94, at 36 (Aug. 4, 2008).

¹⁰⁹ In November 2007, the Open Handset Alliance was formed by an alliance of 34 handset makers, wireless providers and other technology companies led by Google, T-Mobile, High Tech Computer Corporation, Qualcomm, and Motorola. Press Release, Open Handset Alliance, “Industry Leaders Announce Open Platform for Mobile Devices” (Nov. 5, 2007), available at http://www.openhandsetalliance.com/press_110507.html.

¹¹⁰ Android provides a platform to support a marketplace for applications made by other companies. The Android system also allows wireless service providers to customize the Android software to promote their own data services and content. The Android operating software is available free of charge to handset manufactures and wireless service providers in order to encourage the development and deployment of handsets based on Android.

¹¹¹ Press Release, Sprint Nextel, “The Innovation and Openness of a True Mobile Internet Experience Coming Soon to America’s Most Dependable 3G Network from Sprint on HTC Hero with Google” (Sept. 3, 2009), available at http://newsreleases.sprint.com/phoenix.zhtml?c=127149&p=irol-newsArticle_newsroom&ID=1327394&highlight=Android.

¹¹² See <https://store.ovi.com/>.

¹¹³ See Press Release, Qualcomm Incorporated, “App Store Pioneer to Take Mobile Retailing to Any Device of Any Network with Plaza Retail” (May 18, 2009), available at http://www.qualcomm.com/news/releases/2009/090518_App_Store_Pioneer_to_Take_Mobile.html (last visited Sept. 30, 2009)..

Notwithstanding the momentum toward openness, the wireless marketplace also shows that many consumers prefer a managed network environment for their wireless devices, such as the one generally available using popular BlackBerry® devices.¹¹⁵ Wireless providers should be permitted to continue to respond to these consumer choices as well. In short, imposing intrusive new regulatory requirements would limit consumer choice and impair the efficiency of wireless broadband networks.

B. Innovation Is Also Evident in Rapidly Evolving Service Plans that Provide Choices for Consumers.

Competition drives wireless providers to develop innovative business models that rely on different technologies and that appeal to specific segments of the population. Among other things, carriers differentiate themselves by offering different types of individual and bundled services, targeting different types of users, and by operating on a facilities-based or resale basis. Competitive pressures have only intensified with the recent push toward “unlimited” plans, the increased popularity of prepaid services and resold services provided by mobile virtual network operators (“MVNOs”). The existing business models and available service options are as varied as the customers the wireless industry serves.

1. Consumers Benefit from the Large Selection of Voice Plans.

Through varied business models, wireless providers engage in intense price and non-price rivalry, all to the benefit of consumers. As the Commission recently recognized in the *Thirteenth Annual CMRS Competition Report*, the continued rollout of differentiated pricing plans

¹¹⁴ See “Ericsson rolling out mobile app store without Sony,” Telephony OnLine (June 26, 2009), available at <http://telephonyonline.com/wireless/news/ericsson-app-store-0625/> (last visited Sept. 30, 2009).

¹¹⁵ See also Comments of Verizon and Verizon Wireless on a National Broadband Plan, GN Docket No. 09-51, at Declaration of Professor Michael C. Katz, ¶¶ 59-60 (June 8, 2009). See Mark Lowenstein, “Implications of the Skype Petition for Wireless Carriers and Consumers,” at 6-9, attached to Comments of Verizon Wireless, RM No. 11361 (Apr. 30, 2007) (“Lowenstein Skype Analysis”).

“indicates a competitive marketplace” with “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.”¹¹⁶ Today, for example, all nationwide operators and some smaller operators offer one or more national rate pricing plans in which customers purchase a bucket of minutes (varying in size) to use on a nationwide or nearly nationwide network without incurring roaming or long-distance charges.¹¹⁷ Additionally, the four national wireless providers and a large number of regional providers and MVNO/resellers offer unlimited national flat-rate calling plans. How innovation and competition interact is illustrated by the industry’s introduction of these plans.¹¹⁸ Analysts view this disruptive and “game changing” behavior as pro-competitive.¹¹⁹

¹¹⁶ *Thirteenth Annual CMRS Competition Report*, ¶ 111.

¹¹⁷ See, e.g., Verizon Wireless, “Nationwide Basic Plans,” available at <http://www.verizonwireless.com/b2c/store/controller?item=planFirst&action=viewPlanList&sortOption=priceSort&typeId=1&subTypeId=19&catId=323> (last visited Sept. 18, 2009); T-Mobile, “Individual Plans,” available at http://www.t-mobile.com/shop/plans/Cell-Phone-Plans.aspx?catgroup=Individual-cell-phone-plan&WT.mc_n=Individual_Plan; FirstTile1&WT.mc_t=OnsiteAd (last visited Sept. 18, 2009); Airlink Mobile, “Airlink Mobile Rate Plans,” available at <https://www.airlinkmobile.com/rates.php> (last visited Sept. 18, 2009); CloseCall America, “Plans,” http://www.closecall.com/wireless_res/voice_plans.php (last visited Sept. 18, 2009); Corr Wireless, <http://www.corrwireless.com/PlansIndividual.aspx> (last visited Sept. 22, 2009); CellularSouth, “Total Unlimited,” https://www.cellularsouth.com/cscommerce/products/plans/product_plan_details.jsp?navAction=push&navCount=0&id=prod7010058 (last visited Sept. 22, 2009); Union Wireless, “Talk and Text,” <http://www.unionwireless.com/pdf/GSMBrochure.pdf> (last visited Sept. 22, 2009); Sprint Nextel, “Plans,” available at <http://nextelonline.nextel.com/NASApp/onlinestore/en/Action/DisplayPlans> (last visited Sept. 18, 2009); AT&T, “Individual Cell Phone Plans,” available at <http://www.wireless.att.com/cell-phone-service/cell-phone-plans/individual-cell-phone-plans.jsp?requestid=141708> (last visited Sept. 18, 2009).

¹¹⁸ Verizon Wireless made the first move by offering an unlimited nationwide flat-rate calling plan in February 2008. See Press Release, Verizon Wireless, “Verizon Wireless Introduces New Unlimited Plans That Are As Worry Free As The Guarantee” (Feb. 19, 2008), available at <http://news.vzw.com/news/2008/02/pr2008-02-19.html> (last visited Sept. 17, 2009). AT&T quickly responded with a similar offer, and T-Mobile followed soon after with a nationwide flat-rate calling plan that it differentiated by including unlimited voice bundled together with unlimited text messaging. See Elena Malykhina, Information Week, “AT&T, Verizon Wireless Offer Unlimited, Flat-rate, Wireless Voice Calling Plans” (Feb. 19, 2008), available at <http://www.informationweek.com/news/mobility/showArticle.jhtml?articleID=206800434> (last visited Sept. 17, 2009); see also AT&T, “Nation Unlimited Plan,” available at http://www.wireless.att.com/cell-phone-service/cell-phone-plan-details/?q_sku=sku3830293&q_planCategory=cat1370011 (last visited Sept. 17, 2009). Sprint Nextel also began offering a nationwide flat-rate that includes unlimited voice, text messages, and various premium data

Many wireless service providers also offer calling plans that provide for unlimited free calling to and from a set of designated numbers, which often include family, friends, or other customers of the same wireless provider. For example, Verizon Wireless' "Friends and Family" plan offers "[u]nlimited calling to any 10 out-of-network numbers" and "[u]nlimited mobile-to-mobile to more than 80 million Verizon Wireless numbers."¹²⁰ Nex-Tech Wireless's "Calling Circle" plan allows subscribers to choose 5, 10 or 20 wireless or landline numbers that can be called without using monthly plan minutes.¹²¹ And T-Mobile's "myFaves" plan offers "unlimited nationwide calls to your five favorite people on any network, even landlines."¹²² Corr

services such as e-mail and Web surfing. See Sprint, "Simply Everything Plan," available at http://nextelonline.nextel.com/NASApp/onlinestore/en/Action/DisplayPlans?filterString=Individual_Plans_Filter&d12=UHP_PlansTab_Link_IndividualPlans (last visited Sept. 17, 2009). In March 2009, MetroPCS launched its first BlackBerry® with an unlimited plan, which includes unlimited voice, texting, web-browsing, and BlackBerry® email access. See "MetroPCS Launches the BlackBerry® Curve 8330 Smartphone with Industry First Rate Plans," Press Release (Mar. 10, 2009), available at <http://investor.metropcs.com/phoenix.zhtml?c=177745&p=irol-newsArticle&ID=1264549&highlight=> (last visited Sept. 17, 2009). The following month, Virgin Mobile USA announced a new service offering for unlimited calling, text plus unlimited text and messaging web-browsing. See "Virgin Mobile USA Combines New Unlimited Nationwide Prepaid Voice Plan Under \$50 With Unemployment Assistance Program," News Release (Apr. 9, 2009), available at http://virginmobileusa.marketwire.com/easyir/customrel.do?easyirid=13135DE328B72AB2&version=live&prid=489916&releasejsp=custom_124 (last visited Sept. 17, 2009). Other providers also offer unlimited plans. See, e.g., "Cellular South Hangs Up On Overage Charges," News Release (Oct. 3, 2007), available at <https://www.cellularsouth.com/news/2007/20071003.html> (last visited Sept. 17, 2009); "Cricket Wireless, \$60 Plan," available at http://www.mycricket.com/cricketplans/details/60plan_rnews (last visited Sept. 17, 2009); Corr Wireless, "Corr-As-U-Go Prepaid," <http://www.corrwireless.com/CorrAsUGoPrepaid.aspx> (last visited Sept. 17, 2009); CellularSouth, "Total Unlimited," https://www.cellularsouth.com/cscommerce/products/plans/product_plan_details.jsp?navAction=push&navCount=0&id=prod7010058 (last visited Sept. 22, 2009); Union Wireless, "Talk and Text," <http://www.unionwireless.com/pdf/GSMBrochure.pdf> (last visited Sept. 22, 2009).

¹¹⁹ See Mickey Alam Khan, Mobile Marketer, "Game Changes With Verizon, AT&T, T-Mobile Flat-rate Voice Plans" (Feb. 20, 2008), available at <http://www.mobilemarketer.com/cms/news/carrier-networks/565.html> (last visited Sept. 17, 2009).

¹²⁰ See Verizon Wireless, "Friends & Family," available at <http://phones.verizonwireless.com/friendsandfamily> (last visited Sept. 17, 2009).

¹²¹ See Nex-Tech Wireless, "Rate Plans and Coverage Area," available at http://www.nex-techwireless.com/applicationdata/1/Documents/Residential_temp_brochure.pdf (last visited Sept. 17, 2009).

¹²² See T-Mobile, "myFaves 300," available at <http://www.t-mobile.com/shop/plans/cell-phone-plans-detail.aspx?tp=tb1&rateplan=myFaves-300> (last visited Sept. 17, 2009).

wireless also offers free unlimited calls between Corr customers.¹²³ Similarly, AT&T's "FamilyTalk" plans include "unlimited calling to other AT&T wireless customers with Mobile to Mobile."¹²⁴ The diversity in voice plans also extends to Verizon Wireless's commitment to older customers. Specifically, Verizon Wireless offers a "65 Plus" plan, which provides customers aged 65 and older with 200 anytime minutes for \$29.99.¹²⁵

2. Consumers Benefit from the Large Selection of Data Plans.

Wireless providers also offer a wide variety of data packages. Consumers may subscribe to monthly data packages, *a la carte* pricing for each use or download of an application, or pricing based on kilobytes consumed. Generally, providers price monthly data packages in two ways: based on unlimited monthly data use or a limited amount of usage per month. Nielsen Mobile reports that a growing number of consumers are turning to unlimited or "all-you-can-eat," data plans that give unlimited access to mobile Web browsing, e-mail, video and television for an upfront fixed cost.¹²⁶ Moreover, providers have begun offering unlimited bundled service

¹²³ Corr Wireless, <http://www.corrwireless.com/PlansIndividual.aspx> (last visited Sept. 22, 2009).

¹²⁴ See AT&T, "FamilyTalk Cell Phone Plans," available at <http://www.wireless.att.com/cell-phone-service/cell-phone-plans/family-cell-phone-plans.jsp> (last visited Sept. 17, 2009).

¹²⁵ See Verizon Wireless, "Nationwide 65 Plus Plan," available at <http://www.verizonwireless.com/b2c/store/controller?item=planFirst&action=viewPlanList&sortOption=priceSort&typeId=1&subTypeId=53&catId=1029> (Sept. 17, 2009).

¹²⁶ Nielsen Mobile estimates that 14 percent of U.S. wireless subscribers had a wireless plan that provided unlimited access to the mobile Internet as of the first quarter of 2008. Critical Mass – The Worldwide State of the Mobile Web, Nielsen Mobile, July 2008, at 4. Examples include Verizon Wireless' "Mobile Broadband" Plans, available at <http://www.verizonwireless.com/b2c/mobilebroadband/?page=plans> (last visited Sept. 17, 2009); Corr Wireless, <http://www.corrwireless.com/PlansIndividual.aspx> (last visited Sept. 22, 2009); SouthernLinc, "Unlimited Wireless Data Access Plan," <http://www.southernlinc.com/wdspricing.asp?type=Consumer> (last visited Sept. 22, 2009); Union Wireless, "Talk, Text, and Internet" <http://www.unionwireless.com/pdf/GSMBrochure.pdf> (last visited Sept. 22, 2009); Sprint's "Mobile Broadband Connection" Plans, available at http://nextelonline.nextel.com/NASApp/onlinestore/en/Action/DisplayPlans?filterString=Mobile_Broadband_Cards_Filter&id12=UHP_PlansTab_Link_DataPlans (last visited Sept. 17, 2009); Boost Mobile's "Monthly Unlimited" Plan, available at <http://plans.boostmobile.com/monthlyunlimited.aspx> (last visited Sept. 17, 2009); and PlatinumTel's "Unlimited Talk and Text" Plan, available at <http://www.platinumtel.com/plans/unlimitedtalk> (last visited Sept. 17, 2009); CellularSouth, "Total Unlimited,"

plans that combine unlimited nationwide calling with unlimited data services such as Web browsing, email, GPS navigation, mobile television, and text, picture and video messaging. Sprint Nextel, for example, recently announced its “Everything Data Plan,” which offers unlimited mobile-to-mobile calling to any network, text messages, 3G data, and MMS.¹²⁷ Verizon Wireless offers its “Nationwide Connect” and “Nationwide Premium” plans, which offer similar unlimited features.¹²⁸ And Cellular South’s “Total Unlimited Plan” provides unlimited calls, text, e-mail and Internet access anywhere in the country.¹²⁹ As the Commission recognized in the *Thirteenth Annual CMRS Competition Report*, these unlimited voice and data bundles were “introduced as a competitive response to the prior launch of unlimited voice-only plans.”¹³⁰

As noted above, providers also allow mobile subscribers to use mobile data applications on a “pay-per-use” basis without subscribing to a monthly data package. Two common pay-per-use pricing options are: (1) a distinct fee for each use or download of an application¹³¹ and (2) a

https://www.cellularsouth.com/cscommerce/products/plans/product_plan_details.jsp?navAction=push&navCount=0&id=prod7010058 (last visited Sept. 22, 2009).

¹²⁷ See “Sprint Unveils Unlimited Mobile Calling, Data, Text, MMS for \$70”, ZDNet, <http://blogs.zdnet.com/BTL/?p=24099> (last visited Sept. 17, 2009).

¹²⁸ See Verizon Wireless, “Nationwide Premium Plan,” available at <http://www.verizonwireless.com/b2c/store/controller?item=planFirst&action=viewPlanList&sortOption=priceSort&typeId=1&subTypeId=19&catId=323> (last visited Sept. 17, 2009) (plan includes unlimited text, picture, video & instant messaging, mobile email, V CAST videos on demand, VZ Navigator, unlimited data for mobile web and Get it Now/Media Center, unlimited calling to all 80 million Verizon Wireless customers, unlimited night & weekend minutes, and no domestic long distance charges).

¹²⁹ CellularSouth, “Total Unlimited,” https://www.cellularsouth.com/cscommerce/products/plans/product_plan_details.jsp?navAction=push&navCount=0&id=prod7010058 (last visited Sept. 22, 2009).

¹³⁰ *Thirteenth Annual CMRS Competition Report*, ¶ 120.

¹³¹ See, e.g., MetroPCS, “Fox Sports Mobile Pro,” <http://www.metropcs.com/announcements/promotions/atmetro/> (last visited Sept. 22, 2009) (selling sports application for \$4.99); Cincinnati Bell Wireless,

per-kilobyte fee.¹³² As the Commission recognized, differentiated rates for pay-per-use and monthly data packages allow high-volume users to save on data services by subscribing to monthly data packages while affording low volume users the option of cheaper “pay-per-use” plans. Indeed, volume discounts applied to monthly messaging packages result in a lower unit price per message than the flat pay-as-you-go rate for messaging services.¹³³

http://www.cincinnati-bell.com/consumer/wireless/media_center/games/ (selling games for fixed prices) (last visited Sept. 22, 2009); Cellular South, <https://www.cellularsouth.com/cscommerce/landing/downloads.jsp?id=cat720005> (last visited Sept. 22, 2009) (selling various applications for fixed prices); T-Mobile, “Services,” available at <http://www.t-mobile.com/shop/addons/> (last visited Sept. 17, 2009) (explaining that subscribers can download various types of games and ringtones for a range of flat fees apiece); AT&T Wireless, “Messaging FAQs,” available at <http://www.wireless.att.com/learn/messaging-internet/messaging/faq.jsp> (last visited Sept. 17, 2009) (noting that AT&T customers with text-messaging capable phones are pre-activated to send and receive messages for \$0.20 per message with no monthly charge); Sprint, “Music,” available at http://www.nextel.com/en/services/power_vision/music.shtml (last visited Sept. 17, 2009) (noting that the price for downloading music from the Sprint Music Store is \$0.99 per song with the purchase of various monthly data plans or packages).

¹³² See, e.g., Corr Wireless, <http://www.corrwireless.com/PlansIndividual.aspx> (last visited Sept. 22, 2009) (charging \$.0029 per kb); AT&T Wireless, “MEdia™ NetMEdia™ Net Frequently Asked Questions,” available at <http://www.wireless.att.com/learn/messaging-internet/media-entertainment/faq.jsp#pricing> (last visited Sept. 17, 2009) (noting that the pricing options available for MEdia Net wireless data services include pay-as-you-go for \$0.01 per kilobyte); See Cincinnati Bell Wireless, http://www.cincinnati-bell.com/consumer/wireless/rate_plans/ (last visited Sept. 22, 2009) (providing option of data for \$.05 for i-wireless Prepaid Plans); Sprint PCS Vision Guide, available at <http://www1.sprintpcs.com/media/Assets/ueContent/Sprint-PCS-Vision-Guide.pdf> (last visited Sept. 18, 2009) (indicating that to experience the benefits of Sprint PCS Vision, users must purchase a Vision enabled phone and a Sprint PCS Service Plan with Vision, or pay a per-kilobyte fee for casual usage); Verizon Wireless, “Select a Plan,” available at <http://www.verizonwireless.com/b2c/store/controller?item=planFirst&action=viewPlanList&sortOption=priceSort&typeId=1&subTypeId=44&catId=929> (last visited Sept. 18, 2009).

¹³³ For messaging services – which are a distinct type of data service and are frequently billed separately than other data services – consumers may subscribe to “unlimited” packages, a set number of messages per month, or “pay per use” messaging. In the Washington D.C. market, for example, Verizon Wireless offers a “pay per use” messaging for \$.20 per message and picture and video messaging for \$.25 per message. Verizon also offers unlimited text, picture, and video messaging as part of other plans. See Verizon Wireless, “Individual Plans,” <http://www.verizonwireless.com/b2c/splash/plansingleline.jsp?lid=//global/plans/voice+plans/individual> (last visited Sept. 18, 2009). See also AT&T’s “Messaging 1500” plan, which offers “1500 text, picture, video, and Instant Messaging (IM) messages per month,” available at <http://www.wireless.att.com/cell-phone-service/services/serviceDetails.jsp?LOSGId=&skuId=sku1160054&catId=cat1470003> (last visited Sept. 18, 2009); and AT&T’s “Messaging Unlimited” plan, which offers “[u]nlimited text, picture, video, and instant messaging (IM) messages,” available at <http://www.wireless.att.com/cell-phone-service/services/serviceDetails.jsp?LOSGId=&skuId=sku1160055&catId=cat1470003> (last visited Sept. 18, 2009).

3. Prepaid Service Offers Consumers a Valuable Alternative to Traditional Service Options.

The overwhelming majority of U.S. wireless subscribers pay their phone bills after they have incurred charges, an approach known as postpaid service. Prepaid service, in contrast, enables customers to pay for a fixed amount of minutes prior to making calls.¹³⁴ Frequently, prepaid plans appeal to segments of the market that do not want or cannot get a traditional cellular plan. In addition, many MVNOs offer prepaid plans rather than standard monthly billing.¹³⁵ The recent rise in interest in these plans – from both a consumer and wireless service provider perspective – has been dramatic. As the Commission recognized in the *Thirteenth Annual CMRS Competition Report*, prepaid subscriber growth is “three times higher than postpaid subscriber growth.”¹³⁶ Moreover, prepaid plans increasingly compete directly against postpaid plans, as witnessed by the recent spread of unlimited national calling options from postpaid to prepaid service.¹³⁷

¹³⁴ See, e.g., Verizon Wireless, “Prepaid Plans,” available at <http://www.verizonwireless.com/b2c/splash/prepay.jsp> (last visited Sept. 18, 2009); Corr Wireless, <http://www.corrwireless.com/CorrAsUGoPrepaid.aspx> (last visited Sept. 17, 2009) (offering unlimited prepaid minutes); http://www.cincinnatiatbell.com/consumer/wireless/rate_plans/; AT&T, “GoPhone® - Prepaid Cell Phones,” available at <http://www.wireless.att.com/cell-phone-service/go-phones/> (last visited Sept. 18, 2009); U.S. Cellular, “Prepaid Wireless Plans,” available at http://www.uscc.com/uscellular/SilverStream/Pages/x_page.html?p=b_prepaid (last visited Sept. 18, 2009); PlatinumTel, “Dot10 Plan,” available at <http://www.platinumtel.com/plans/dot10> (last visited Sept. 18, 2009).

¹³⁵ For example, AirLink Mobile offers customers “access to service anywhere on the Nationwide Sprint PCS Network ... [o]n a pay-as-you-go basis, without credit checks and long-term contracts.” “Why Airlink Mobile,” available at https://www.airlinkmobile.com/why_airlink.php (last visited Sept. 18, 2009).

¹³⁶ *Thirteenth Annual CMRS Competition Report*, ¶ 117.

¹³⁷ As the Commission stated in the *Thirteenth Annual CMRS Competition Report*, in July 2008 MVNO Virgin Mobile “responded to the introduction of unlimited national flat-rate calling plans across the nationwide facilities-based providers by unveiling a prepaid version of an unlimited national flat-rate calling plan.” *Thirteenth Annual CMRS Competition Report*, ¶ 118. Net10, a prepaid service provider and subsidiary of Tracfone, followed by offering unlimited calling and text messaging for a flat monthly charge. *Id.* Additionally, Cricket Communications offers several unlimited anytime local, long distance and text messaging without a service commitment. “Cricket Plans,” available at <http://www.mycricket.com/cricketplans/> (last visited Sept. 15, 2009). MetroPCS also offers an unlimited, nationwide calling plan with no contract requirement. “Cellular Phones, Plans, and Services from

4. Wireless Resellers Offer Consumers Unique Wireless Plans.

Not all competitors in the provision of wireless service own their own network. Some providers purchase airtime from facilities-based carriers and resell service to the public for profit.¹³⁸ These resellers – often referred to as MVNOs – compete vigorously to serve consumers, frequently tailoring services, handsets, and applications to specific demographic or discrete interest groups by appealing to various lifestyles and consumer sectors, including the young, the elderly, differing ethnicities, and the hip and trendy.¹³⁹ The *Thirteenth Annual CMRS Competition Report* explains that MVNOs “distinguish themselves via content but, like facilities-based providers, they experiment with a number of business models, such as pre paid and

MetroPCS,” available at <http://www.metropcs.com/ZipCode.aspx?referringpage=plans> (last visited Sept. 15, 2009). Similarly, MVNO Boost Mobile announced a \$50/month plan that includes unlimited nationwide talk, text and multimedia messaging, web use, and walkie-talkie. “\$50 means \$50 – Unlimited Nationwide Talk, Text, Web & Walkie-Talkie,” available at http://plans.boostmobile.com/whyboost.aspx?cid=wasgt_ppc_go_why_B_boost+mobile (last visited Sept. 15, 2009). Cincinnati Bell Wireless also offers unlimited prepaid plans. See Cincinnati Bell Wireless, http://www.cincinnati-bell.com/consumer/wireless/rate_plans/ (last visited Sept. 22, 2009).

¹³⁸ Over 40 resellers offer service across the United States. See the CTIA – The Wireless Association® (“CTIA”) Wireless Industry Indices: Semi-Annual Data Survey Results: A Comprehensive Report from CTIA Analyzing the U.S. Wireless Industry, Year-End 2008 Results (rel. May 26, 2009) (“CTIA’s Wireless Industry Indices Report”) at 4. See also Nick Jotischky, *et al.*, “Global MVNO Operations – A study of current business models and emerging opportunities,” Informa Telecoms and Media, May 2009, on-line summary available at <http://www.telecomsmarketresearch.com/research/TMAAAQPN-WCIS-Insight--Global-MVNO-Operations---A-study-of-current-business-models-and-emerging-opportunities.shtml> (last accessed Sept. 16, 2009) (“The MVNO market remains competitive in USA with 43 such companies in operation” as of 3Q 2008”); see also MVNO List, <http://www.mvnolist.com/> (last accessed Sept. 17, 2009).

¹³⁹ Boost Mobile, for example, targets young consumers, while Jitterbug “is a phone service aimed exactly at the elderly user with a range of services and devices that make using a mobile phone easy for those not technically inclined.” Shane McGlaun, “Jitterbug services now on Verizon Wireless network,” available at <http://www.phonemag.com/jitterbug-services-now-on-verizon-wireless-network-0810312.php> (last visited Sept. 18, 2009). MVNO Movida Wireless targets the U.S. Hispanic population. Hispanic PR Wire, “Movida Communications Expanding Rapidly Across the US: Launching Hispanic Wireless Phone Service in Florida and 20 More States” (September 15, 2005), available at <http://www.hispanicprwire.com/news.php?l=in&id=4816> (last visited Sept. 18, 2009). Firefly, kajeet and Bratz Mobile offer kid-friendly phones and extensive parental controls with special online features. Firefly, <http://www.fireflymobile.com/>; kajeet, <http://www.kajeet.com/>; Bratz Mobile, <http://www.bratzmobile.com/> (all last accessed Sept. 17, 2009). And Credo Mobile targets supporters of social-change groups. Credo Mobile, <http://www.credomobile.com/Mission/History.aspx> (last accessed Sept. 17, 2009). Other MVNOs include PlatinumTel (<http://www.platinumtel.com/>), Verizon’s Pure Mobile (<http://www.puremobile.com/>), Jolt Wireless (<http://www.joltwireless.com/>), and Lucky Wireless (<http://luckywireless.com/>).

unlimited plans.”¹⁴⁰ According to information provided to the Commission in its ongoing local competition and broadband data gathering program, the resale sector accounted for 7 percent of all mobile telephone subscribers, or 18.4 million subscribers, at the end of December 2007.¹⁴¹

5. The Provision of Bundled Service Packages Continues to Increase.

The intense competition in the wireless industry has driven wireless providers to differentiate themselves by offering comprehensive bundling packages – often referred to as triple or quadruple plays – to meet the changing communications preferences of consumers. These packages enable customers to purchase a selection of wireless, wireline voice, Internet, and cable services for a single price. Consumers have flocked to these bundled plans, which frequently save customers money and provide convenient and straightforward billing options.

Verizon, for example, offers a Flex Double Play bundle, which satisfies consumers who want to use Verizon Wireless’ phone service for their home voice service, but want broadband Internet service from Verizon Communications via their landline.¹⁴² FiOS TV service can also be added to create a triple-play bundle. AT&T also offers a triple play bundle that includes wireline voice, high speed Internet, and wireless voice with unlimited texting.¹⁴³ Similarly, Comcast recently launched a 4G high-speed wireless data service – through CLEAR – which the

¹⁴⁰ *Thirteenth Annual CMRS Competition Report*, ¶ 17.

¹⁴¹ *Id.*

¹⁴² Press Release, Verizon, “Verizon Home Broadband and Wireless Combination Now Easy for Consumers,” (June 17, 2008), available at <http://newscenter.verizon.com/press-releases/verizon/2008/verizon-home-broadband-and.html> (last visited Sept. 18, 2009).

¹⁴³ Press Release, AT&T, “AT&T Lets Customers ‘Talk, Text & Surf’ With Greater Savings” (Sept. 21, 2009), available at <http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=27151>.

company plans to bundle with one or more of its Internet, phone and television products.¹⁴⁴ In July, Comcast announced a \$50 teaser rate for unlimited 4G data over the CLEAR network, with 13 Mbps cable-modem service included.¹⁴⁵ Cox Communications also plans to offer bundled service packages, and is currently building out the wireless part of its potential triple play with AWS spectrum it won at auction.¹⁴⁶

C. The Wireless Industry Is Innovative Under Other Metrics as Well.

As discussed, the most direct measurement of wireless innovation is an analysis of investment to revolutionize the wireless networks, and the concomitant innovation that network upgrades and redesigns have spurred in devices, services, content and pricing plans. At the same time, rapid innovation is also shown by other proxies and metrics, including the impact of wireless change in the context of the overall U.S. economy, the extent of research and development activities in the wireless space, and consumer satisfaction with wireless services. By any metric, the wireless industry stands as a model of investment and innovation.

1. Wireless Industry Innovation and Investment Is a Driving Factor for the U.S. Economy and the Productivity of the U.S. Workforce.

The growth and success of the wireless industry has not only resulted in substantial benefits in the form of innovative communications networks, services, devices and applications, but it has also contributed greatly to the U.S. economy. While the U.S. economy in *general* averaged less than 3 percent growth per year from 1992 to 2007, the wireless services industry

¹⁴⁴ Press Release, Comcast, "Comcast Begins National Rollout of High-Speed Wireless Data Service" (June 29, 2009), available at <http://www.comcast.com/About/PressRelease/PressReleaseDetail.aspx?PRID=887> (last visited Sept. 29, 2009).

¹⁴⁵ *Id.*

¹⁴⁶ Marguerite Reardon, "Cox Readies Wireless Network," CNET, April 8, 2009, available at http://news.cnet.com/8301-1035_3-10215445-94.html (last visited Sept. 18, 2009).

has grown at a rate of more than 16 percent per year during that time period.¹⁴⁷ To feed this expansion, carriers have expended significant resources to upgrade their networks, reporting an average combined investment of \$22.8 billion per year from 2001 to 2008.¹⁴⁸ Indeed, aggregate industry expenditures for infrastructure and equipment from 1998 to 2007 totaled more than \$217 billion,¹⁴⁹ with the cumulative capital expenditures by wireless carriers since 1985 topping \$264 billion.¹⁵⁰ And, as *Figure 2* shows, as of December 2008, wireless carriers had deployed over 240,000 cell sites throughout the country.¹⁵¹

¹⁴⁷ Letter from Christopher Guttman-McCabe, Vice President, Regulatory Affairs, CTIA, to Marlene H. Dortch, Secretary, Federal Communications Commission, GN Docket No. 09-51, WT Docket Nos. 08-165, 09-66, at 18 (July 9, 2009) (“CTIA Economic Contributions Ex Parte”), citing Attachment A, Harold Furchtgott-Roth, “The Wireless Services Sector: A Key to Economic Growth in America,” at 4 (Jan. 2009) (“Furchtgott-Roth Wireless Services Sector Report”).

¹⁴⁸ Letter from Christopher Guttman-McCabe, Vice President, Regulatory Affairs, CTIA to Marlene H. Dortch, Secretary, Federal Communications Commission, RM-11361, GN Docket No. 09-51, WC Docket No. 07-52 at 14 (filed May 12, 2009) (“CTIA May 12 Letter”); Press Release, AT&T, “AT&T to Make Faster 3G Technology Available in Six Major Cities This Year” (Sept. 9, 2009), available at <http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=27068>; Press Release, Verizon Wireless, “Verizon Reports Sustained Revenue Growth and Continued Strong Cash Flows for 4Q and Full-Year 2008” (Jan. 27, 2009), available at <http://news.vzw.com/news/2009/01/pr2009-01-27.html> (last visited Sept. 30, 2009) (“More than 65 percent of the company’s retail customers – 45.5 million – had 3G broadband-capable devices by year-end. The company continued to extend the reach of the nation’s largest and most reliable 3G (third generation) network, which now covers more than 274 million people after the Alltel acquisition.”).

¹⁴⁹ CTIA Economic Contributions Ex Parte At 3.

¹⁵⁰ *Id.* at 4.

¹⁵¹ *Id.* at 5.

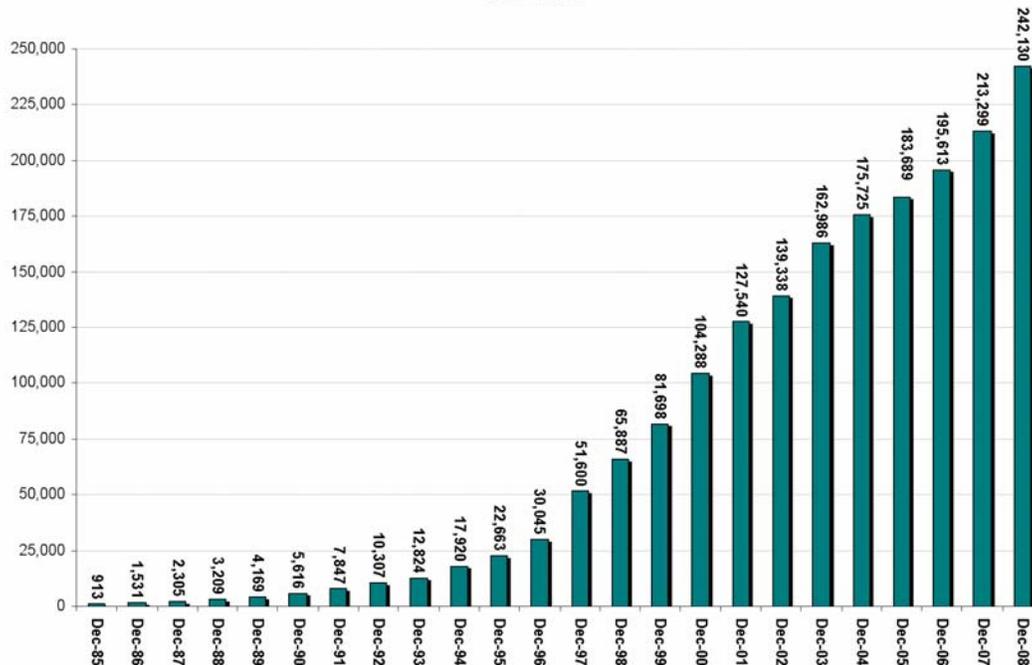


Figure 2: Cell Sites in Service (CTIA)¹⁵²

While these expenditures have been used to improve the quality of service for customers throughout the country, they also represent direct investments in the U.S. economy, with those payments going to infrastructure manufacturers, construction workers, real estate lessors, engineering firms, construction workers, retail stores, and many other businesses.

The wireless industry has also consistently contributed to the U.S. economy by providing solid employment opportunities. Wireless carriers directly provide employment to more than 268,000 people.¹⁵³ As Figure 3 shows, wireless job growth year after year has been impressive, particularly when that growth has continued over the past two years despite the dramatic economic downturn during this period.

¹⁵² CTIA Semi-Annual Wireless Industry Survey, Year-End 2008 Top-Line Survey Results at 10, available at http://files.ctia.org/pdf/CTIA_Survey_Year-End_2008_Graphics.pdf (“CTIA Year-End 2008 Survey”).

¹⁵³ Furchtgott-Roth Wireless Services Sector Report at 4.

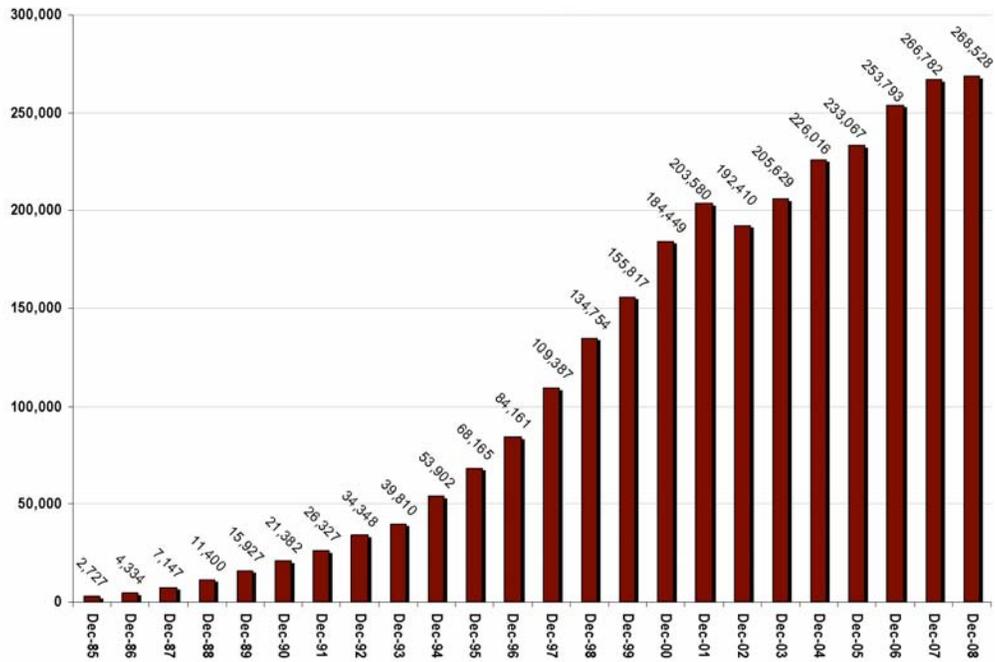


Figure 3: Direct Carrier Employees (CTIA)¹⁵⁴

Over the last four years, the number of people employed by carriers has steadily grown at a rate of about 6 percent per year.¹⁵⁵ In addition, more than 2.4 million jobs are either directly or indirectly dependent on the wireless industry.¹⁵⁶ As the industry continues to grow, opportunities for employment are likely to expand as well.

Verizon Wireless itself contributes substantial value to the U.S. economy, particularly by reinvesting profits into network expansion, upgrades and improvements, customer care and distribution platforms, industry-leading employee compensation and benefits, and massive payments to the U.S. Treasury for spectrum auctions. As shown in *Figure 4* below, since 2000,

¹⁵⁴ CTIA Year-End 2008 Survey at 9.

¹⁵⁵ CTIA Economic Contributions Ex Parte at 18.

¹⁵⁶ *Id.* In addition, employment within the wireless sector provides compensation that is more than 50% higher than the national average of other production workers. Furchtgott-Roth Wireless Services Sector Report at 8, Tbl. 13.

Verizon Wireless has invested over *one hundred billion dollars* on network infrastructure and spectrum acquisition.

\$100B+ Network Investment since 2000

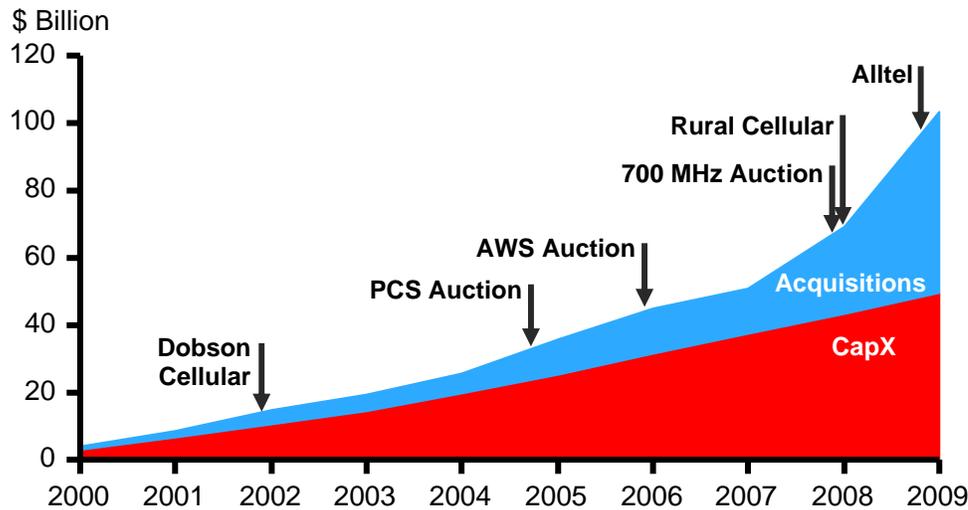


Figure 4: Verizon Wireless Network Investment

Verizon Wireless has deployed over 43,000 cell sites throughout the country. The company employs 88,000 employees, every one of whom is based in the United States, and 17.5 percent of the company’s expense budget is devoted to compensating these employees. In 2008 alone, Verizon Wireless spent approximately \$486 million on health care payments for employees.

In addition to having a substantial direct impact on the U.S. economy through investment and employment, the wireless industry has an even more far-reaching impact through the productivity gains the technology fosters. Indeed, wireless voice and data services play a central role in improving U.S. productivity. According to a 2008 study conducted by the economic analysis firm Ovum, consumers in the United States enjoyed welfare gains of approximately \$157 billion in 2004 as a result of the improved efficiencies provided by wireless voice

services.¹⁵⁷ This number does not even include the gains from data services. The health care industry, in particular, has benefited from improvements in the wireless industry. In 2005, productivity improvements due to use of mobile broadband solutions across the U.S. health care industry were worth almost \$6.9 billion, an amount expected to more than triple by 2016 to \$27.2 billion.¹⁵⁸

The wireless sector also creates substantial benefits by providing digital technology that bridges the divide to lower income families. Statistics have long shown that lower income individuals and families are slow to adopt broadband services.¹⁵⁹ Wireless broadband services, however, offer the promise to bridge this gap. A recent National Center for Health Statistics (“NCHS”) study concluded that, in the period from June 2008 to December 2008, adults living in poverty (30.9 percent) and adults living near poverty (23.8 percent) were more likely than higher income adults (16.0 percent) to be living in households with only wireless telephones.¹⁶⁰ Similarly, a report by comScore in late 2008 determined that certain smartphone sales rose 48 percent among those earning between \$25,000 and \$50,000 in the third quarter of 2008, three times the growth rates of those earning more than \$100,000 per year. A comScore senior analyst noted this data indicates that “lower-income mobile subscribers are increasingly turning to their

¹⁵⁷ CTIA Economic Contributions Ex Parte at 15, citing Roger Entner, “The Increasingly Important Impact of Wireless Broadband Technology and Services on the U.S. Economy,” Ovum, Sept. 2005, at 6.

¹⁵⁸ Roger Entner, “The Increasingly Important Impact of Wireless Broadband Technology and Services on the U.S. Economy,” Ovum, Sept. 2005, at 2.

¹⁵⁹ See, e.g., John Horrigan, Home Broadband 2008, Pew Internet & American Life Project, at 4 (July 2008) available at <http://www.pewinternet.org/Reports/2008/Home-Broadband-2008.aspx?t=1> (last visited Sept. 18, 2009) (noting that 25 percent of low-income Americans reported having broadband at home in April 2008 while 55 percent of all Americans reported having broadband at home).

¹⁶⁰ Stephen J. Blumberg, Ph.D., and Julian V. Luke, Division of Health Interview Statistics, National Center for Health Statistics, *Wireless Substitution: Early Release of Estimates From the National Health Interview Survey*, July-December 2008, available at <http://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless200905.htm>.

mobile devices to access the Internet, email and their music collections.”¹⁶¹ The wireless industry thus appears to play a vital role in increasing opportunities – economic and otherwise – for this sector of the public.

2. The Wireless Industry Reinvests Substantial Resources in Research and Development.

To compete successfully in the dynamic wireless marketplace, wireless carriers are required to invest continuously in research and development. In addition to its landmark Open Development Initiative, discussed in Section II.C. below, Verizon Wireless recently opened the LTE Innovation Center, which is designed to drive innovation and help foster creative solutions connecting people, places and things wirelessly using LTE technology. The Center includes a lab for product testing and development, as well as home and business environments designed to simulate usage of products in real-life situations.¹⁶² Verizon Wireless also entered into a joint venture with QUALCOMM named “nPhase” to provide advanced M2M wireless communications and smart services offerings to a wide variety of market segments, including healthcare, manufacturing, utilities, distribution, and consumer products. ODI, the LTE Innovation Center, nPhase, as well as Verizon Wireless’ participation in the Joint Innovation Lab

¹⁶¹ comScore, *In Tough Economy, Lower Income Mobile Consumers Turn to iPhone As Internet & Entertainment Device*, Oct. 27, 2008, available at [http://www.comscore.com/Press_Events/Press_Releases/2008/10/Lower_Income_Mobile_Consumers_use_Iphone/\(language\)/eng-US](http://www.comscore.com/Press_Events/Press_Releases/2008/10/Lower_Income_Mobile_Consumers_use_Iphone/(language)/eng-US) (According to comScore senior analyst Mark Donovan, “[s]martphones. . . are appealing to a new demographic and satisfying demand for a single device for communication and entertainment, even as consumers weather the economy by cutting back on gadgets.”).

¹⁶² Press Release, Verizon Wireless, “Verizon Wireless LTE Innovation Center to Drive 4G Next Generation Wireless Product Development” (April 1, 2009), available at <http://news.vzw.com/news/2009/04/pr2009-03-31d.html>. AT&T recently opened a new lab facility dedicated to emerging device certification in order to accelerate the entry of innovative consumer electronics. Press Release, AT&T, “AT&T Launches Dedicated Certification Lab for Emerging Devices, Reinforces 'Open Innovation' Leadership” (Sept. 2, 2009), available at <http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=27080>.

(“JIL”) and LiMo Foundation, are discussed in more detail in Section II.¹⁶³ Indeed, Verizon Wireless is particularly well-positioned with respect to research and development, due to its relationship with Vodafone, one of the largest wireless carriers in the world and 45 percent owner of Verizon Wireless. This relationship allows Verizon Wireless to have a uniquely global perspective on network advances and the direction of innovation.

Other wireless carriers are also substantially invested in similar research and development efforts. For example, Sprint has its Applied Research & Advanced Technology Labs (“AR&ATL”), where the company conducts research in the areas of emerging wireless technology, security, multimedia and services.¹⁶⁴ AT&T is reported to have spent \$892 million on research and development in 2008.¹⁶⁵

Carriers also indirectly invest huge sums in R&D activities by supporting network equipment manufacturers through their purchases. Those vendors include a wide range of niche players beyond the major telecommunications suppliers that develop software or hardware targeted at optimizing particular network characteristics or facilitating interaction between the network and other resources. In fact, at CTIA’s last major industry event – CTIA Wireless 2009 – held in April of 2009 during the height of the economic crisis, there were well over 800 exhibitors present, including content producers, application developers, hardware inventors,

¹⁶³ Verizon Wireless also is a member of, and contributor to, a number of other joint industry research and development efforts including 3GPP and 3GPP2, ETSI (European Standards Institute), TIA (Telecommunications Industry Association), ATIS, CDMA Development Group (CDG), GSM Association, Open Mobile Alliance (OMA), Global Certification Forum (GCF), CDMA Certification Forum (CCF), and Rutgers WinLAB.

¹⁶⁴ Sprint, Sprint Applied Research & Advanced Technology Labs, available at <http://www.sprintlabs.com>.

¹⁶⁵ AT&T Inc., SEC Form 10-K, at 8 (filed Feb. 25, 2009), available at <http://www.sec.gov/Archives/edgar/data/732717/000073271709000007/ye10k08.htm> (last visited Sept. 22, 2009) (includes company-wide research and development spending, which is not restricted to wireless).

software optimizers, and algorithm creators that translate innovative ideas into real world products.

The accelerating pace of research and development activities in the wireless industry, in some manner, can be measured by reference to intellectual property rights, which reflect innovation advances in the state-of-the-art in the industry. A review of patents pertaining to wireless technology granted by the U.S. Patent and Trademark Office reveals not only a record of continual innovation by the wireless industry, but also that the pace of innovation is sharply rising:

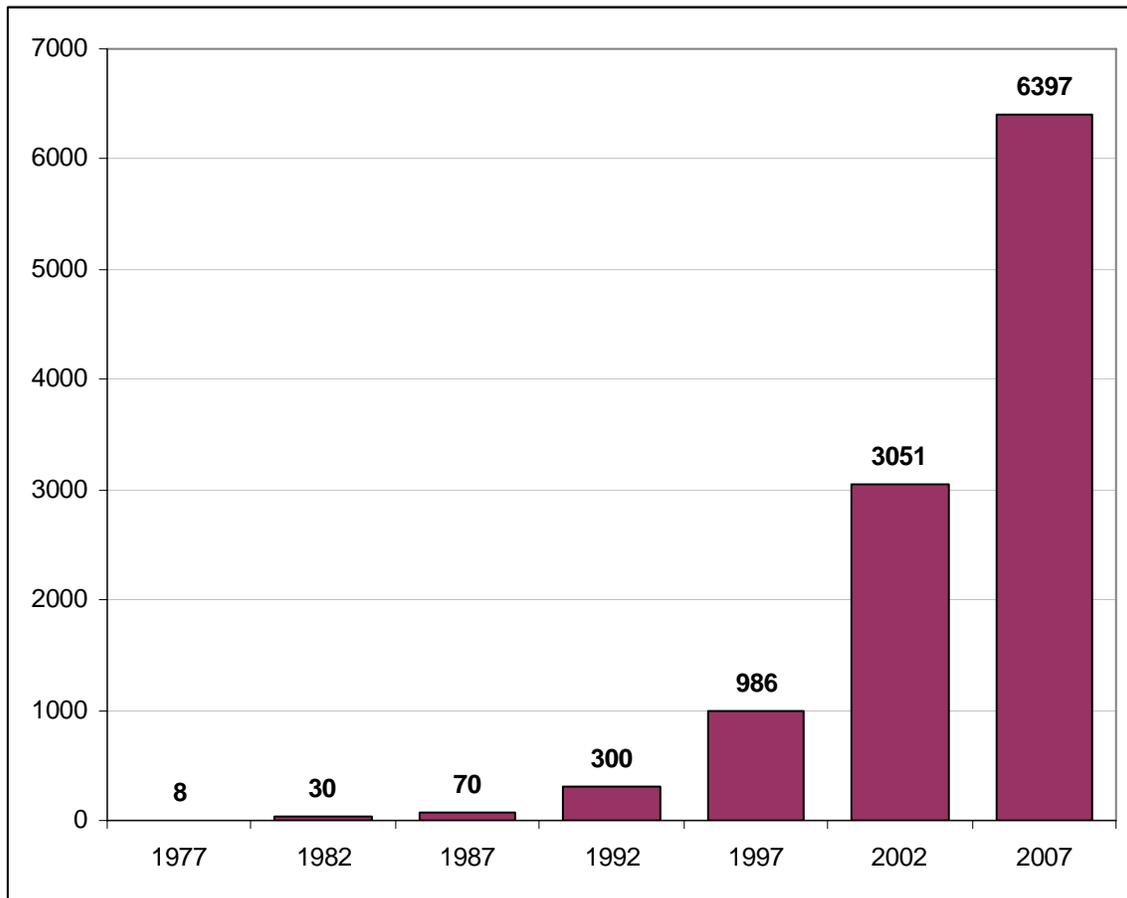


Figure 5: Annual Wireless Patent Grants, 1977-2007¹⁶⁶

¹⁶⁶ Data provided by CTIA based upon keyword searches of the U.S. Patent and Trademark Office database of granted patents, as well as a review of retrieved patents for relevancy.

These statistics clearly demonstrate that the wireless industry is engaged in extraordinary efforts to fully develop the capabilities of the nation's wireless infrastructure.

Moreover, as shown in *Figure 6*, the industry's efforts relative to the growth of patent filings generally shows disproportionate, exponential growth:

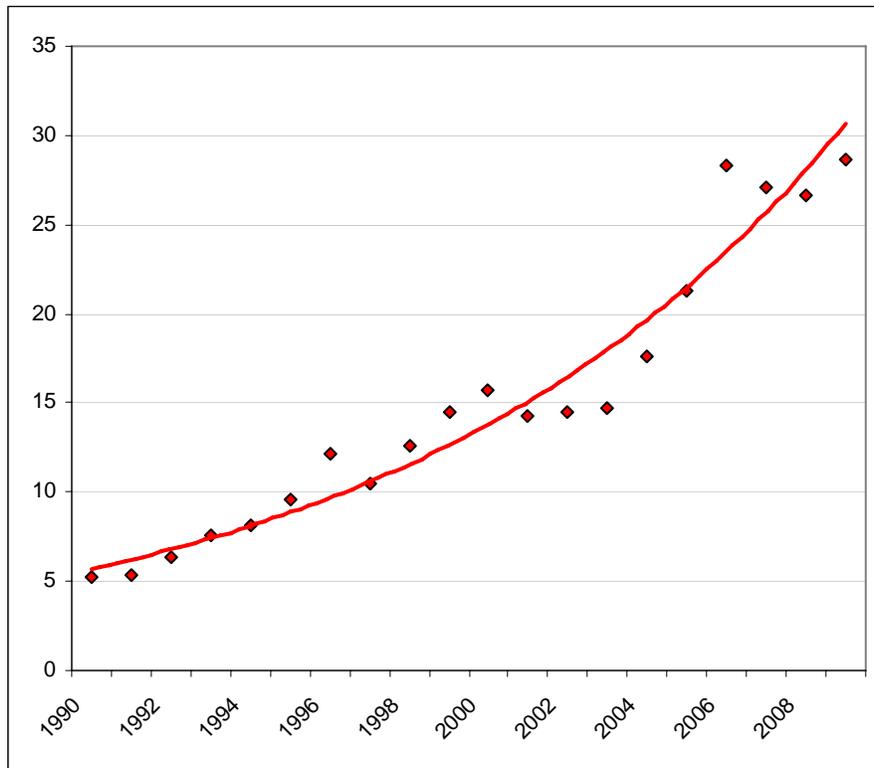


Figure 6: Radiotelephony Patents Granted per 1,000 Granted Patents

Figure 6 compares data for the PTO CCL code 455, which corresponds with radiotelephony, versus all patent grants. By comparing the number of wireless patents granted per thousand patents generally, it clearly demonstrates disproportionate growth in innovation in wireless services.

3. Customer Satisfaction Metrics Demonstrate that Wireless Subscribers Are Being Well Served by the Rapidly Evolving Mobile Market

Another important metric for Commission consideration is consumer satisfaction. In 2009, the wireless industry received its highest marks for customer satisfaction ever in the

American Customer Satisfaction Index survey.¹⁶⁷ The U.S. Government Accountability Office (“GAO”) recently submitted testimony to the United States Senate on its study that found an overwhelming 84 percent of American adult wireless consumers are either “very or somewhat satisfied” with the service they receive.¹⁶⁸ *Consumer Reports* noted a “surge” in customer satisfaction in its most recent annual survey of wireless consumers, and acknowledged that “cell-phone service has become significantly better.”¹⁶⁹ Verizon Wireless had particularly high scores in this survey and led the industry in customer satisfaction for the sixth consecutive year.¹⁷⁰ Verizon Wireless also ranked at the top of the wireless industry for customer care in a J.D. Power and Associates survey¹⁷¹ and led the industry in customer loyalty for the 19th consecutive

¹⁶⁷ Press Release, Verizon Wireless, “Once Again, Survey Says Verizon Wireless Customers Are the Most Satisfied, Verizon Wireless” (May 19, 2009), available at <http://news.vzw.com/news/2009/05/pr2009-05-19e.html>.

¹⁶⁸ Testimony of Mark Goldstein, Director, Government Accountability Office, to the Senate Committee on Commerce Science and Transportation, June 17, 2009, available at <http://commerce.senate.gov/public/files/GoldsteinTestimonyConsumerWireless.pdf> (“According to our survey results, overall, wireless phone service consumers are satisfied with the service they received. Specifically, we estimate that 84 percent of adult wireless phone users are very or somewhat satisfied with their wireless phone service.”).

¹⁶⁹ Consumer Reports, Best Cell-Phone Service, (January 2009), available at <http://www.consumerreports.org/cro/electronics-computers/phones-mobile-devices/phones/cell-phone-service-providers/cell-phone-service/overview/cell-phone-service-ov.htm> (“Sixty percent of readers were completely or very satisfied with their service”). See also *Thirteenth Annual CMRS Competition Report*, ¶ 1 (“U.S. consumers continue to reap significant benefits – including low prices, new technologies, improved service quality, and choice among providers – from competition in the CMRS marketplace.”).

¹⁷⁰ Press Release, Verizon Wireless, “Once Again, Survey Says Verizon Wireless Customers Are the Most Satisfied, Verizon Wireless” (May 19, 2009), available at <http://news.vzw.com/news/2009/05/pr2009-05-19e.html>.

¹⁷¹ Press Release, Verizon Wireless, “J.D. Power and Associates Ranks Verizon Wireless as a Leader in Customer Care,” (Aug. 13, 2009), available at <http://news.vzw.com/news/2009/08/pr2009-08-13.html>.

quarter.¹⁷² In addition, Verizon Wireless has received numerous awards from other groups and customers for its continued provision of high quality service.¹⁷³

Verizon Wireless has also taken aggressive steps to preserve the privacy of its customers by bringing lawsuits against those who seek to obtain its customer's personal information through pretexting and other illegal means, as well as against telemarketers and spammers who make unsolicited calls or send unauthorized text messages to customers. Verizon Wireless was the first carrier to initiate such suits. Since 2004, the company has filed nearly two dozen such lawsuits, which have resulted in the courts issuing permanent injunctions stopping these illegal activities. In addition, Verizon Wireless has recovered over \$137,000 as part of the resolution of these suits, which it has donated to charities across the country.

¹⁷² Press Release, Verizon Wireless, "For 19th Consecutive Quarter, Verizon Wireless Leads Wireless Industry in Customer Loyalty" (Aug. 6, 2009), available at <http://news.vzw.com/news/2009/08/pr2009-08-06.html>.

¹⁷³ See also, e.g., Press Release, Verizon Wireless, "U.S. Army Recognizes Verizon Wireless' Tina Stec for Excellent Customer Service in North Carolina" (Aug. 5, 2009), available at <http://news.vzw.com/news/2009/08/pr2009-08-06d.html> (announcing that Tina Stec, an account manager at Verizon Wireless, was awarded the Commander's Award for Excellence, which is reserved for civilians who exemplify excellence in service to the United States Army, by A Co, 2nd Battalion, 1st Special Warfare Training Group (Airborne)); Press Release, Verizon Wireless, "Cisco Recognizes Verizon Wireless for Operational Excellence" (Apr. 1, 2009), available at <http://news.vzw.com/news/2009/04/pr2009-03-31b.html> (announcing that Verizon Wireless was named winner of the inaugural Cisco Joint Operational Excellence Quality Award, which recognizes the service provider that best demonstrates excellence in operational metrics, cost management, and product and service performance).

II. VERIZON WIRELESS EXEMPLIFIES THE ACCELERATING PACE OF WIRELESS INNOVATION.

Like its competitors, Verizon Wireless' business has evolved from providing exclusively analog voice services to offering an ever-growing panoply of 2G, then 3G, and soon 4G, data services. Today, among other things, users can: (1) respond remotely and while in transit to e-mail; (2) stream music and video; (3) get directions to their destination from their current location; (4) identify a nearby restaurant or retail outlet; or (5) purchase movie tickets – with new applications and capabilities available daily. Moreover, specific services and applications are available that are tailored to the needs of particular groups of consumers, such as Americans with disabilities, seniors, and children.

Yet, consumers are not the only beneficiaries of wireless innovation. Government agencies and businesses in various sectors utilize M2M and other commercial wireless services and applications designed to respond to their unique needs. Innovative wireless services have also been created to further certain important social welfare goals, including promoting energy conservation, improving healthcare, increasing educational opportunities, and improving public safety and homeland security. These are revolutionary wireless uses that were unimaginable just a few short years ago.

This section documents the innumerable innovations Verizon Wireless has made in its networks and services to serve the rapidly evolving needs of its customers. This innovation has occurred in a breathtakingly short period of time, unbowed by two economic recessions in the past eight years. And, as demonstrated in *Figure 7* below, which shows selected Verizon Wireless innovations in 2009, the pace of innovation has been dramatically accelerating.

Selected 2009 Year to Date Verizon Wireless Innovations

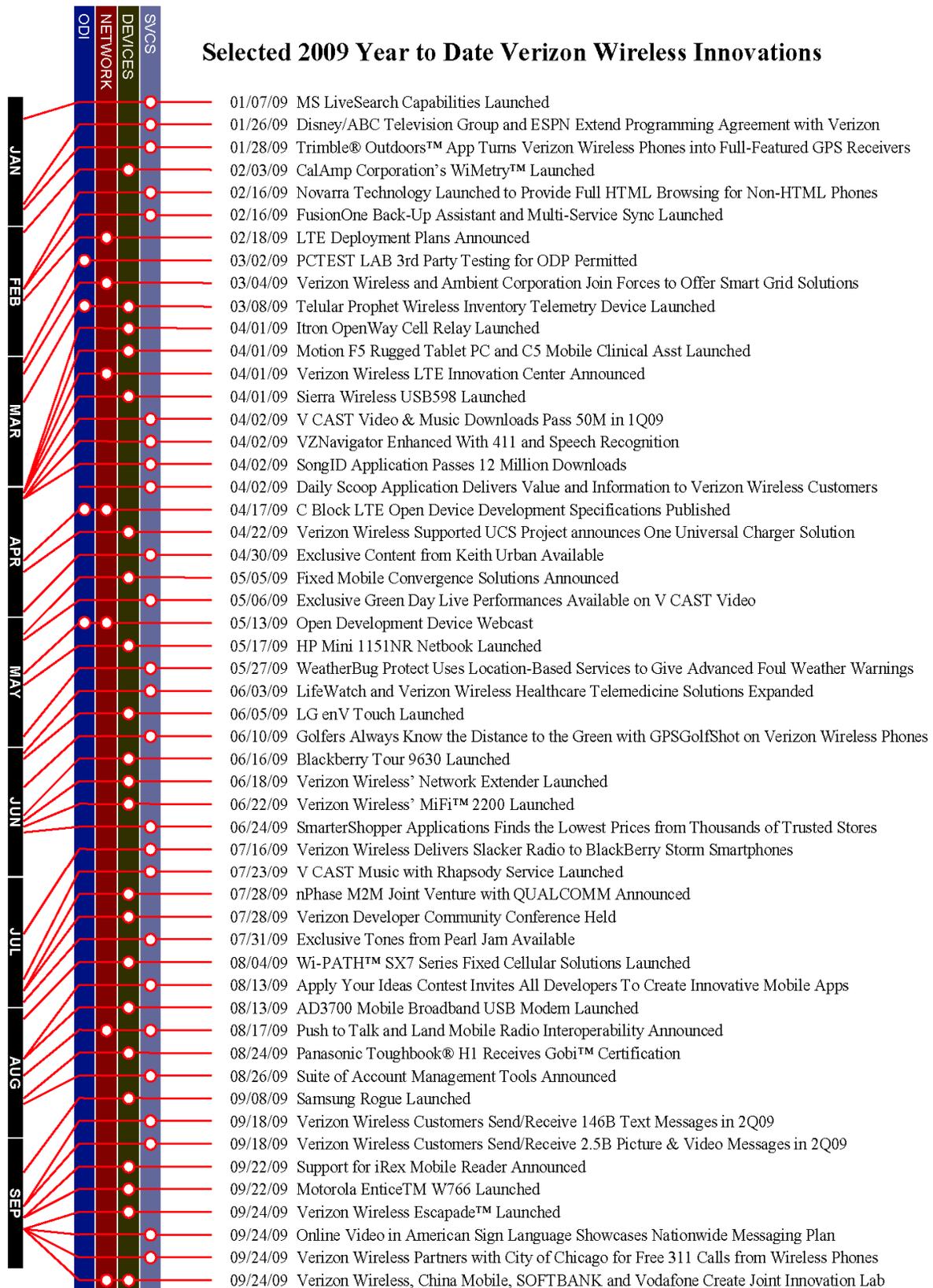


Figure 7: Selected Verizon Innovation

A. Verizon Wireless Provides a Wide Variety of Innovative Wireless Services and Products Directly to Consumers.

Customers of Verizon Wireless today have access to an enormous assortment of innovative services, devices, applications, and content. These include an array of high-speed wireless data services, including video, music, and GPS navigation. They also include unique services and applications designed to address the needs of particular types of users, such as seniors, children, and Americans with disabilities. Many of these services, devices, and applications have been introduced in just the past few years.

1. Wireless Broadband Services.

Verizon Wireless was the first wireless carrier to build a national wireless broadband network, launching Mobile Broadband in October 2003 and announcing a national rollout in January 2004.¹⁷⁴ The company's history shows a relentless focus on investing in its network – effectively rebuilding it not once but twice to deploy three successive generations of wireless technology over a period of only a few years. As a result, Verizon Wireless' 3G network now covers approximately 284 million people, including those living in 1,977 rural counties.¹⁷⁵ Now, the company is embarking on yet another upgrade to provide state-of-the-art 4G technology.¹⁷⁶

¹⁷⁴ Press Release, Verizon Wireless, "Verizon Wireless Announces Roll Out of National 3G Network" (Jan. 8, 2004), available at <http://news.vzw.com/news/2004/01/pr2004-01-07.html>.

¹⁷⁵ Verizon Wireless is currently licensed in 2,193 rural counties. For purposes of these calculations, a county is considered rural if there are fewer than 100 persons per square mile. In addition, a county is considered served if more than 20 percent of the POPS in that county are able to receive service. If coverage of 50 percent of POPS is used to deem a county served, Verizon Wireless' 3G network serves 1886 rural counties.

¹⁷⁶ For example, in February 2007, Verizon Wireless launched its next-generation high-speed wireless broadband network, based on EVDO Rev. A technology, in cities throughout the country. This upgrade gave customers the ability to upload files eight to nine times faster than before, giving them faster access to e-mail, everyday corporate data, the Internet and more. Mobile broadband customers in enhanced broadband wireless coverage areas can expect average download speeds of 600 kbps to 1.4 mbps and average upload speeds of 500-800 kbps. As of June 2007, Rev. A technology was available throughout the company's entire EVDO network.

Verizon Wireless' existing 3G network allows the company to offer users a variety of data services, including text, picture, and video messaging, mobile TV and music services, and high-speed Internet access that allows subscribers access to other innovative applications and content. In the second quarter of 2009, Verizon Wireless customers sent and received more than 146 billion text messages.¹⁷⁷ In addition, between April and June 2009, customers exchanged 2.5 billion picture and video messages over its nationwide network.¹⁷⁸ The price for these services also has dropped dramatically over the last few years.¹⁷⁹ While these services may not seem innovative today, they were unheard of just a few years ago. For example:

- Verizon Wireless' V CAST, introduced in 2006 as the nation's first wireless broadband multimedia service and updated throughout the years to include music and Mobile TV, provides users in all markets where Mobile Broadband is offered with access to high-quality video, 3D games, and music on select handsets.¹⁸⁰ V CAST customers receive unlimited basic video with their monthly or daily subscription. There are no airtime or per-megabyte charges to download, stream, or watch V CAST content with any V CAST subscription. V CAST subscribers also may download 3D games, premium video, and music for an additional fee. In the first quarter of 2009, there were nearly 50 million downloads and streams of V CAST video and music.¹⁸¹ V CAST service is available on approximately 30 handsets.¹⁸²

¹⁷⁷ Verizon Wireless, Best Network, Network Facts, http://aboutus.vzw.com/bestnetwork/network_facts.html (last visited Sept. 18, 2009).

¹⁷⁸ *Id.*

¹⁷⁹ In December 2006, the average price paid by Verizon Wireless' customers was about three cents (\$0.03) per text message. As of April 2009, the average price per message had dropped by two-thirds, to about one cent (\$0.01) per text message.

¹⁸⁰ Press Release, Verizon Wireless, "Video That Is in Demand is 'On Demand' from Verizon" (June 9, 2009), available at <http://news.vzw.com/news/2009/06/pr2009-06-08b.html> (last visited Sept. 24, 2009).

¹⁸¹ *Id.*

¹⁸² Press Release, Verizon Wireless, "Mobile Content Is a Star at Verizon Wireless" (Apr. 2, 2009), available at <http://news.vzw.com/news/2009/04/pr2009-04-01c.html> (last visited Sept. 24, 2009) (noting that more than 30 phones give customers access to V CAST video and games; 20 phones give customers access to V CAST music; nearly 30 phones give customers access to the Media Center; and approximately 10 of these phones offer customers access to all V CAST services).

- Verizon Wireless also offers customers with certain handsets a V CAST Music with Rhapsody service.¹⁸³ Launched in June 2008, V CAST Music with Rhapsody is a monthly subscription service that gives customers access to millions of songs on their mobile devices and home computers for a single monthly fee. Customers with V CAST Music-capable phones can download music over the air using the Verizon Wireless broadband network directly to their wireless phones and to their Windows XP PCs, and can transfer new and existing digital music from the PC to their wireless phone. Subscribers also can create and access playlists; view playlists of other users, including celebrities; burn, import, and convert CDs to play anywhere; and manage an existing digital music collection for free and sync it to their mobile phones.
- Verizon Wireless' VZ NavigatorSM service, which was launched in 2006, allows subscribers to find locations and access turn-by-turn directions in North American and Western Europe.¹⁸⁴ VZ NavigatorSM allows subscribers to connect to 14 million points of interest to find restaurants, gas stations, banks/ATMs, and other popular spots in these countries using Local Search. Automatic speech recognition also is available on VZ NavigatorSM, making searching for destinations hands-free easier than ever.¹⁸⁵
- Verizon Wireless is also constantly working to improve its customers' wireless Internet experience in innovative ways. For example, Verizon Wireless has recently implemented technology from Novarra into its Mobile Web that allows customers to access the majority of websites in full HTML view, regardless of whether their mobile device supports a full HTML web browser.¹⁸⁶ With this technology, customers can visit the same websites on their mobile phones as they do on their PCs, including email, social networking, news, sports, e-commerce, and blog sites, allowing customers to enjoy more functionality and a more complete view of those sites. Web pages typically will load on 3G devices in an average of less than 10 seconds. Similarly, Verizon Wireless incorporated Microsoft's Live Search capabilities into its wireless data services earlier this year.¹⁸⁷ As a result, Verizon

¹⁸³ Press Release, Verizon Wireless, "Verizon Wireless Customers Can Get the Latest Applications, Ringtones, Music and More on their BlackBerry Tour Smartphones" (July 23, 2009), *available at* <http://news.vzw.com/news/2009/07/pr2009-07-23d.html> (last visited Sept. 24, 2009).

¹⁸⁴ Press Release, Verizon Wireless, "Verizon Wireless' VZ Navigator Goes Global" (Apr. 30, 2009), *available at* <http://news.vzw.com/news/2009/04/pr2009-04-29a.html> (last visited Sept. 24, 2009).

¹⁸⁵ Press Release, Verizon Wireless, "Verizon Wireless' VZ Navigator and 411 Search Work Together as a One-Stop Shop for Destination Information" (Apr. 2, 2009), *available at* <http://news.vzw.com/news/2009/04/pr2009-04-01h.html> (last visited Sept. 24, 2009).

¹⁸⁶ Press Release, Verizon Wireless, "Mobile Web from Verizon Wireless Now Optimized to Give Customers Access to More Full-HTML Web Sites on their Wireless Phones" (Feb. 16, 2009), *available at* <http://news.vzw.com/news/2009/02/pr2009-02-16.html> (last visited Sept. 24, 2009).

¹⁸⁷ Press Release, Verizon Wireless, "Verizon Wireless Selects Microsoft for Mobile Search and Advertising" (Jan. 7, 2009), *available at* <http://news.vzw.com/news/2009/01/pr2009-01-07a.html> (last visited Sept. 24, 2009).

Wireless customers now have easier access to context-relevant search results that will help improve their mobile experience. Specifically, customers now can use voice commands, typed queries, and/or location information to receive highly relevant search results, including maps, directions, traffic information, information on local businesses, movie theatres and show times, gas prices and weather.

The innovative broadband services and products Verizon Wireless offers to its customers will expand even more once it upgrades its network to LTE technology beginning in 2010.¹⁸⁸ Among other things, LTE technology promises faster e-mail and Internet access, better quality video services, and the ability to connect a full range of consumer electronic devices to each other. To accomplish this broad network upgrade, Verizon Wireless has teamed up with Ericsson and Alcatel-Lucent to build the underlying infrastructure, which will enable the company to become one of the first wireless companies to offer commercial LTE-based service in the world.¹⁸⁹ Verizon Wireless has also selected Nokia Siemens Networks and Alcatel-Lucent as key suppliers for the IP Multi-Media Subsystem network, which will enable consumers to access rich multimedia applications regardless of access technology.

2. Account Management Tools.

Verizon Wireless has implemented a number of innovative tools that allow customers to manage their accounts effectively and efficiently from anywhere. For example, customers can check key account information, such as the current month's unbilled airtime usage, account balance, and current monthly usage of text, picture, and video messages, from their wireless phone at any time, airtime free.¹⁹⁰ Customers also can make a payment at any time directly from

¹⁸⁸ Press Release, Verizon Wireless, "Verizon Wireless Fosters Global LTE Ecosystem as Verizon CTO Dick Lynch Announces Deployment Plans" (Feb. 18, 2009), available at <http://news.vzw.com/news/2009/02/pr2009-02-18.html> (last visited Sept. 24, 2009).

¹⁸⁹ *Id.*

¹⁹⁰ Press Release, Verizon Wireless, "Free Services and Features Make Verizon Wireless a Great Value" (Aug. 26, 2009), available at <http://news.vzw.com/news/2009/08/pr2009-08-26.html> (last visited Sept. 24, 2009).

their handset.¹⁹¹ Subscribers with mobile web-enabled handsets can access their web-based My Verizon account online.¹⁹² As such, these customers can make changes to billing addresses; make, manage, and review payments; manage Friends & Family® lists; check to see if friends are part of the Verizon Wireless calling family; view current plan and features; change voicemail passwords; change price plans; upgrade their equipment; purchase accessories; activate content filters and usage controls for their children’s handsets; locate the nearest Verizon Wireless store; and find answers to frequently asked questions about billing, using voicemail, roaming, and traveling.¹⁹³

Verizon Wireless has also recently implemented a number of other innovative tools to assist subscribers. For example, customers can set up personal alerts at “My Verizon” so that they receive free text messages when their bill is ready for review and when a payment has been received.¹⁹⁴ Subscribers’ address books are automatically safeguarded against phone loss, damage or theft by FusionOne’s Backup Assistant so the need to manually transfer contacts when a phone is replaced or upgraded is eliminated.¹⁹⁵ FusionOne’s multi-service sync technology additionally allows Verizon Wireless customers to sync contact and other information across Verizon services, including mobile, wireline, and FiOS services.¹⁹⁶

¹⁹¹ *Id.*

¹⁹² *Id.*

¹⁹³ *Id.*

¹⁹⁴ Press Release, Verizon Wireless, “Away this Summer? No Problem for Verizon Wireless Customers” (May 20, 2008), available at <http://news.vzw.com/news/2008/05/pr2008-05-20.html> (last visited Sept. 24, 2009).

¹⁹⁵ Press Release, Verizon Wireless, “Verizon and FusionOne Team Up for Multi-Service Sync” (Feb. 16, 2009), available at <http://news.vzw.com/news/2009/02/pr2009-02-15.html> (last visited Sept. 24, 2009).

¹⁹⁶ *Id.*

Subscribers also can obtain directions to locations in their address book without ever leaving FusionOne's Network Address Book or Network in Motion's AtlasBook™ Navigator (depending on which application the subscriber is in),¹⁹⁷ making navigation to these locations much easier.¹⁹⁸

3. Applications.

Customers can access a wide and growing range of applications on Verizon Wireless' network. These applications do everything from track exercise information, offer recipes, locate nearby restaurants, and provide personalized news information to afford access to social networking and banking sites. A few of the more innovative applications offered on Verizon Wireless' network are described below:

- The Daily Scoop, a free application available on Get It Now-capable phones, offers Verizon Wireless customers customized sports scores, weather, trivia, local gas prices and more, along with offers and discounts from local and national retailers.¹⁹⁹ Customers may choose to enter their age, gender and zip code and Daily Scoop will deliver relevant information and offers from retailers located in the customer's geographic area.²⁰⁰

¹⁹⁷ Press Release, Verizon Wireless, "FusionOne Partners with Networks in Motion" (Apr. 1, 2009), available at <http://news.vzw.com/news/2009/04/pr2009-03-31f.html> (last visited Sept. 24, 2009).

¹⁹⁸ In addition, customers can access their My Verizon account from any computer to pay their bills, set up automatic payments, view and reprint current and past bills, change billing or email addresses, add or change services (including setting parental controls or adding Friends & Family to calling plans), upgrade phones, and find equipment guides and demos for their wireless devices. Press Release, Verizon Wireless, "Traveling? Keep Your Cool This Summer with Verizon Wireless Account Management Tools" (May 20, 2009), available at <http://news.vzw.com/news/2009/05/pr2009-05-19f.html> (last visited Sept. 24, 2009).

¹⁹⁹ Press Release, Verizon Wireless, "Daily Scoop Delivers Value and Information to Verizon Wireless Customers" (Apr. 2, 2009), available at <http://news.vzw.com/news/2009/04/pr2009-04-01i.html> (last visited Sept. 24, 2009).

²⁰⁰ Much of the information is delivered as a graphically rich banner when the handset is not in use. For example, local weather reports can arrive at 8 am, and offers from restaurants may arrive later in the day when customers may be making decisions about what to do for dinner. *Id.*

- City ID displays the city and state where an incoming call is registered, allowing subscribers to more easily identify unknown callers.²⁰¹
- Loopt allows Verizon Wireless customers to share location information, status messages, and geo-tagged photos with their community of friends.²⁰²
- The Pill Phone provides critical information on a wide range of medications, including indications, dosing, side effects, drug interactions, and photos of medications. The Pill Phone also has a Medication Reminder feature that allows consumers to schedule automatic reminders to ensure that doses are taken at the appropriate time.²⁰³
- With Verizon Wireless' mobile banking offering powered by Firethorn, customers can access and manage their financial relationships while on-the-go for a seamless, real-time, and secure user experience, including checking bank account balances, transferring funds between accounts within the same bank, and reviewing and paying bills.²⁰⁴
- Bones in Motion records running, cycling, and walking activities using GPS with maps, speed, distance, elevation, splits, and calories.²⁰⁵
- Slacker Radio provides customers one-click access to free, personalized radio stations. Consumers also can purchase a song they are listening to on Slacker Radio from the V CAST Music with Rhapsody catalog.²⁰⁶

²⁰¹ Press Release, Verizon Wireless, "Verizon Wireless Introduces City ID, Providing Customers with City and State Information for Incoming Calls" (Sept. 9, 2008), available at <http://news.vzw.com/news/2008/09/pr2008-09-08e.html> (last visited Sept. 24, 2009).

²⁰² Press Release, Verizon Wireless, "Verizon Wireless and Loopt Announce Relationship to Deliver Social Mapping Service to Mobile Phones" (Mar. 28, 2008), available at <http://news.vzw.com/news/2008/03/pr2008-03-28.html> (last visited Sept. 24, 2009).

²⁰³ Press Release, Verizon Wireless, "Verizon Wireless Offers Healthy Applications to Turn a Mobile Phone into a Personal Trainer" (Aug. 12, 2009), available at <http://news.vzw.com/news/2009/08/pr2009-08-12b.html> (last visited Sept. 24, 2009).

²⁰⁴ Press Release, Verizon Wireless, "Verizon Wireless Launches Mobile Banking Services from Leading Financial Institutions" (Jan. 3, 2008), available at <http://news.vzw.com/news/2008/01/pr2008-01-03.html> (last visited Sept. 24, 2009).

²⁰⁵ Press Release, Verizon Wireless, "Verizon Wireless Offers Healthy Applications to Turn a Mobile Phone into a Personal Trainer" (Aug. 12, 2009), available at <http://news.vzw.com/news/2009/08/pr2009-08-12b.html> (last visited Sept. 24, 2009).

²⁰⁶ Press Release, Verizon Wireless, "Verizon Wireless Delivers Slacker Radio to BlackBerry Storm Smartphones" (July 16, 2009), available at <http://news.vzw.com/news/2009/07/pr2009-07-16a.html> (last visited Sept. 24, 2009).

- SmarterShopper finds the lowest prices from thousands of trusted stores, allowing consumers to save time and money.²⁰⁷
- GPSGolfShot, using GPS technology, provides real-time yardage readings on nearly 10,000 professionally-mapped golf courses across the U.S.²⁰⁸
- WeatherBug Protect incorporates location-based services to give advanced warning of lightening, tornadoes, extreme temperatures, flash flooding, high winds, hurricanes, and more via alerts.²⁰⁹
- Trimble® Outdoors™ allows Verizon Wireless customers to turn their phones into full-featured GPS receivers to be used during outdoor recreational activities such as hiking, backpacking, fishing, and hunting.²¹⁰
- Mayo Clinic InTouch provides first aid tips, helps customers evaluate symptoms, and locates the closest emergency room.²¹¹

Many of these applications, including The Daily Scoop, City ID, Loopt, Slacker Radio, GPS GolfShot, WeatherBug Protect, and Trimble® Outdoors™, were introduced within the last year.

In July 2009, Verizon Wireless hosted its first Verizon Developer Community conference, in San Jose, California, to foster the development of new mobile applications. The conference provided developers with information on the company's applications platform and programming interfaces, billing, and revenue sharing to enable developers to bring applications

²⁰⁷ Press Release, Verizon Wireless, "Plan the Menu for Your Summer Barbeques Using Your Verizon Wireless Phone" (June 24, 2009), available at <http://news.vzw.com/news/2009/06/pr2009-06-24.html> (last visited Sept. 24, 2009).

²⁰⁸ Press Release, Verizon Wireless, "Golfers Always Know the Distance to the Green with GPSGolfShot on Verizon Wireless Phones" (June 10, 2009), available at <http://news.vzw.com/news/2009/06/pr2009-06-10a.html> (last visited Sept. 24, 2009).

²⁰⁹ Press Release, Verizon Wireless, "Whatever the Weather, Verizon Wireless Phones Have You Covered this Summer" (May 27, 2009), available at <http://news.vzw.com/news/2009/05/pr2009-05-26f.html> (last visited Sept. 24, 2009).

²¹⁰ Press Release, Verizon Wireless, "Verizon Wireless Customers Can Go Off Road and Into the Wild with Trimble Outdoors" (Jan. 28, 2009), available at <http://news.vzw.com/news/2009/01/pr2009-01-28g.html> (last visited Sept. 24, 2009).

²¹¹ Verizon Wireless, Tools & Applications: Details, http://products.vzw.com/index.aspx?id=fnd_toolsapps_detail&appId=2033505 (last visited Sept. 18, 2009).

to market quickly. The company plans to debut its applications store by the end of the year, for developers to take advantage of the company's scale and distribution to market their applications to Verizon Wireless customers.

To encourage creation of even more innovative applications on RIM devices, Verizon Wireless has created the Apply Your Ideas contest.²¹² Mobile application developers are encouraged to submit applications in five categories – Connect, Entertain, Guide, Save Time, and Enhance Living – that highlight the wide range of activities, information, entertainment, and other innovative things that developers can bring to mobile phones. Verizon Wireless expects this contest will yield even more imaginative applications for its customers.

4. Telematics.

Verizon Wireless services are extensively used by auto manufacturers and their telematics subsidiaries to provide telematics services to American consumers. These companies offer a wide array of services through equipment installed in automobiles. In addition to traditional voice services, telematics service providers offer consumers safety and security services, such as airbag deployment notification, a service which notifies the telematics provider when an air bag deploys in a crash and also notifies the appropriate public safety answering point giving the location of the vehicle; crisis assistance, which provides information about weather-related and other disasters; road-side assistance, automatic door unlock, and stolen vehicle recovery assistance. Telematics providers also provide concierge-type services such as turn-by-turn directions, news and other information, access to e-mail, and recommendations on restaurants and other businesses in the area of the vehicle.

²¹² Press Release, Verizon Wireless, "Apply Your Ideas Contest from Verizon Invites All Developers to Create Innovative Mobile Applications" (Aug. 13, 2009), available at <http://news.vzw.com/news/2009/08/pr2009-08-13a.html> (last visited Sept. 24, 2009).

5. Devices.

Verizon Wireless also offers a wide range of other handsets and devices for consumers, including the Motorola Entice™ W766, which was introduced just last week.²¹³ For example, Verizon Wireless offers a number of handsets that can operate internationally. The Verizon Wireless Escapade™ and the BlackBerry® Tour allow customers to place voice calls in more than 220 global destinations.²¹⁴ The BlackBerry® Tour also allows customers to access e-mail in more than 180 destinations, of which more than 70 destinations offer 3G speeds. In addition, the AD3700, a Mobile Broadband USB modem, allows consumers to access high-speed networks in more than 175 global destinations, including those with EVDO, GSM/GPRS/EDGE, and HSPA/UMTS wireless platforms.²¹⁵

Verizon Wireless additionally offers a host of devices with different capabilities and looks. For example, customers can choose between a number of touch screen (*e.g.*, BlackBerry® Storm, Verizon Wireless XV6900, Samsung Omnia™, Samsung Saga, HTC Touch Diamond™, HTC Touch Pro™), Qwerty-style (*e.g.*, Motorola Rival™, BlackBerry® Tour 9630), slider (*e.g.*, Verizon Wireless SMT5800), and flip (*e.g.*, BlackBerry® Pearl Flip) smartphones. Customers also can choose between different platforms: Windows® Mobile and BlackBerry®. Certain handsets have Wi-Fi capabilities and access to a variety of Verizon Wireless' signature services, including VZ NavigatorSM, Visual Voice Mail, and V CAST Music with Rhapsody. All of

²¹³ Press Release, Verizon Wireless, "Verizon Wireless and Motorola Introduce the Motorola Entice W766" (Sept. 22, 2009), available at <http://news.vzw.com/news/2009/09/pr2009-09-22.html>.

²¹⁴ Press Release, Verizon Wireless, "Stay Close to Home When Touring the World This Semester" (Aug. 26, 2009), available at <http://news.vzw.com/news/2009/08/pr2009-08-25.html> (last visited Sept. 24, 2009); Press Release, Verizon Wireless, "Escape Around the Globe with New Verizon Wireless Escapade" (Aug. 20, 2009), available at <http://news.vzw.com/news/2009/08/pr2009-08-20e.html> (last visited Sept. 24, 2009).

²¹⁵ Press Release, Verizon Wireless, "Verizon Wireless and ZTE USA Introduce AD3700" (Aug. 13, 2009), available at <http://news.vzw.com/news/2009/08/pr2009-08-12c.html> (last visited Sept. 24, 2009).

Verizon Wireless' handsets have very different looks as well, some with a rugged exterior that are designed for adventure seekers (*e.g.*, Casio® EXILIM) and some in a wide range of colors (*e.g.*, BlackBerry® Curve 8330 in Pink, Samsung Saga in Blue, Motorola MOTO™ W755 in Purple, Verizon Wireless Escapade in Burgundy). Customers also can get small netbooks from Verizon Wireless, such as the HP Mini 1151NR, that provide access to the Internet and e-mail in a laptop-style package that weighs less than 2.5 pounds.²¹⁶ Verizon Wireless also will support a new touch-screen e-reader through a partnership with iRex Technologies and Best Buy. The reader, which will operate on Verizon Wireless' 3G network, will link to Barnes & Noble's e-bookstore and NewspaperDirect's newspaper download service.²¹⁷

Further, Verizon Wireless offers a variety of devices that allow subscribers to access Verizon Wireless' network in more remote locations. For example, Verizon Wireless' Network Extender allows customers to enhance their wireless coverage inside a home where location, geography, or structural conditions may interfere with wireless reception.²¹⁸ Through Verizon Wireless' ODI, Telular Corporation also has released its Wi-PATH™ SX7 series of fixed cellular solutions, which can be installed in a subscriber's home (or any other location) to extend cellular services to that location.

²¹⁶ Press Release, Verizon Wireless, "Help Dad Stay Connected from the Campsite to the Beach" (June 11, 2009), available at <http://news.vzw.com/news/2009/06/pr2009-06-11.html> (last visited Sept. 24, 2009); Press Release, Verizon Wireless, "Netbooks Hit Verizon Wireless Communications Stores May 17" (May 14, 2009), available at <http://news.vzw.com/news/2009/05/pr2009-05-14.html> (last visited Sept. 24, 2009).

²¹⁷ Brad Stone, *Best Buy and Verizon Jump into E-Reader Fray*, N.Y. Times (Sept. 22, 2009), available at http://www.nytimes.com/2009/09/23/technology/internet/23ebooks.html?_r=1.

²¹⁸ Press Release, Verizon Wireless, "Pack the Sunscreen, Bug Spray, and Verizon Wireless Network Extender on Your Next Summer Getaway" (June 18, 2009), available at <http://news.vzw.com/news/2009/06/pr2009-06-18a.html> (last visited Sept. 24, 2009).

Similarly, Verizon Wireless' MiFi™ 2200 lets customers create a personal Wi-Fi cloud and connect to a notebook, camera, or MP3 player via the reliability and high-speed Internet connectivity of the Verizon Wireless network, anywhere within the Verizon Wireless Mobile Broadband coverage area.²¹⁹ Customers can share this connection with family and friends because the MiFi™ 2200 supports up to five Wi-Fi enabled devices.

Since 1995, Verizon Wireless has been dedicated to domestic violence awareness and prevention through its HopeLine program. What began as voice mailboxes for victims of domestic violence developed into a cell phone recycling and refurbishing program launched in 2001. Exclusive to Verizon Wireless, HopeLine collects no-longer used wireless phones, batteries and accessories and recycles or refurbishes them for re-use. Proceeds from the sale of the refurbished phones are used for wireless phones for victims of domestic violence or cash grants for non-profit organizations focused on domestic violence awareness and prevention. HopeLine is a national program that gives back on a local level; therefore donated phones benefit participating shelters in the same geographic area where the phone donation was made. Thanks to community support, in 2008, HopeLine collected more than 1 million phones, enabling Verizon Wireless to give nearly \$1.5 million in cash grants and nearly 21,000 HopeLine phones with airtime and other features to approximately 350 domestic violence agencies and organizations nationwide.

Finally, Verizon Wireless supports and has been an active participant in CTIA's Universal Charging Solution ("UCS") project. In April of this year, CTIA announced the

²¹⁹ Press Release, Verizon Wireless, "Verizon Wireless' Mobile Broadband Devices Make the Connection" (June 22, 2009), available at <http://news.vzw.com/news/2009/06/pr2009-06-22a.html> (last visited Sept. 24, 2009); Press Release, Verizon Wireless, "Take Your Wi-Fi Hotspot on the Road with the New Verizon Wireless MiFi 2200 Intelligent Mobile Hotspot from Novatel Wireless" (May 7, 2009), available at <http://news.vzw.com/news/2009/05/pr2009-05-06g.html> (last visited Sept. 24, 2009).

wireless industry's commitment to support a common format for wireless phone chargers based on the Open Mobile Terminal Platform industry standards group. The UCS will reduce energy consumption and enhance the consumer experience by adopting a standardized charger interface and by using energy efficient chargers in compliance with U.S. "Energy Star" requirements that will reduce energy consumption by 50 percent. The goal is to bring universal chargers to the market by January 1, 2012.²²⁰ The universal charger will benefit consumers by eliminating the need to purchase new chargers for new devices, and will benefit the environment by reducing energy consumption and disposal of old chargers.

6. Services and Products for Americans with Disabilities.

Verizon Wireless provides a wide range of innovative solutions and technologies that increase accessibility to its products and services by customers with disabilities. For example, the company supports Voice Commands and Menu readout on a majority of its devices.²²¹ Voice Command provides customers the ability to hear information that appears on their phone screen as well as to dial the phone by saying either a name contained in their phone book or the specific digits to be dialed. Menu readout, in turn, allows the customer to hear the menu label and information under that menu instead of having to look at it. The company also offers TALKS for Verizon Wireless on certain handsets, which converts displayed text on a mobile handset into highly intelligible speech.²²² TALKS for Verizon Wireless has audio feedback for writing and

²²⁰ Press Release, CTIA, "CTIA—The Wireless Association® Announces One Universal Charger Solution to Celebrate Earth Day" (April 22, 2009), available at <http://ctia.org/media/press/body.cfm/prid/1817>.

²²¹ See Verizon Wireless, Accessibility Products & Services Overview, <http://aboutus.vzw.com/accessibility/index.html> (last visited Sept. 11, 2009).

²²² Verizon Wireless, TALKS™ for Verizon Wireless, at <http://aboutus.com/vzw.com/accessibility/talks.html> (last visited Sept. 11, 2009).

reading text messages, emails, and notes, allowing blind and low-vision users to take advantage of most features available on a handset, including contact directories and caller ID.

Verizon Wireless additionally offers a number of handsets that can be used by the disabled community. These handsets include the Knack, which employs a “large font” easy-to-use-menu and dialing keypad.²²³ The Knack also has voice commands and dedicated colored keys for ease of use and navigation. Verizon Wireless further offers 28 handsets and 13 smartphones that are hearing aid compatible.²²⁴ Verizon Wireless’ digital network and handsets that accept a 2.5 mm plug-in also support TTY devices.

Finally, Verizon Wireless offers customers with disabilities a number of innovative ways to learn about Verizon Wireless’ services. For example, the company offers information about its Nationwide Messaging plans in online videos in American Sign Language.²²⁵ Free 411 assistance is provided to all customers who are blind, have low vision, a dexterity disability, or a cognitive disability, or whose disability significantly inhibits their ability to read a phone directory, dial a phone number, read a 411 text message response to an inquiry, or remember a phone number.²²⁶ Bills, product and service brochures, and some handset manuals also are available in Braille and large print formats as well as on a 3.5 diskette or a CD-ROM.²²⁷ Verizon

²²³ See Verizon Wireless, Accessibility Products & Services Overview, <http://aboutus.vzw.com/accessibility/index.html> (last visited Sept. 11, 2009).

²²⁴ Verizon Wireless Accessibility Hearing Aid Compatible Products, <http://aboutus.vzw.com/accessibility/products.html> (last visited Sept. 11, 2009).

²²⁵ Press Release, Verizon Wireless, “Online Video in American Sign Language Showcases Verizon Wireless’ Nationwide Messaging Plan” (July 21, 2008), available at <http://news.vzw.com/news/2008/07/pr2008-07-21a.html> (last visited Sept. 24, 2009).

²²⁶ Verizon Wireless, Accessibility Products & Services Overview, <http://aboutus.vzw.com/accessibility/index> (last visited Sept. 11, 2009).

²²⁷ *Id.*

Wireless has developed an online newsletter, Forward Access, that addresses the unique needs and interests of consumers with disabilities.²²⁸ Forward Access serves as a community Internet resource for all types of important information for people with disabilities, including calendar listings, special offers, original articles, timely reprints or excerpts from publications, pertinent news, and opportunities to question industry experts.

7. Services and Products for Children

Verizon Wireless also has developed a number of tools that parents can use to monitor and control their children's use of wireless services. The company has created an enhanced website that allows parents to manage how their children use Verizon Wireless' service.²²⁹ From this website, parents can create content filters that block materials that may be inappropriate for their children, limit access to applications they do not want their children to see, and designate specific times when the Internet or certain functions cannot be used. Parents can also elect a monthly Usage Control subscription for \$4.99 per month that enables parents to set a usage allowance for voice minutes and messages, time restrictions to control children's use of the phone during a specific time or day, and restrict calls or messaging from certain numbers.²³⁰ Verizon Wireless also offers a Family Locator service, which was introduced in 2006, for \$9.99 per month that allows users to locate their family members from their PC or Verizon Wireless

²²⁸ Verizon Wireless, Accessibility Telecom Resources, <http://aboutus.vzw.com/accessibility/resources.html> (last visited Sept. 11, 2009).

²²⁹ Press Release, Verizon Wireless, "Verizon Enhances Parental Control Resource Center for TV, Wireless and Online Services" (Dec. 11, 2008), available at <http://news.vzw.com/news/2008/12/pr2008-12-11.html> (last visited Sept. 24, 2009).

²³⁰ Press Release, Verizon Wireless, "Back to School Can Mean Selecting a Young Person's First Phone" (Aug. 7, 2009), available at <http://news.vzw.com/news/2009/08/pr2009-08-06l.html>.

phone.²³¹ Verizon Wireless, through its V CAST service, also offers a variety of content appropriate for children. For example, Discovery Kids on V CAST offers 24-hour entertainment that challenges kids to explore the world around them.²³²

8. Services and Products for Seniors

For its senior customer base, Verizon Wireless offers specific products tailored to these individuals' needs and prevalent desire for less complexity. For example, Jitterbug, a simple-to-use cell phone with large, easily readable keys, operates on the Verizon Wireless network.²³³ Verizon Wireless also offers the Samsung Knack, a device with a large home screen, easy-to-see fonts, as well as a distinctive keypad that offers one-touch dialing, dedicated hot keys for 911 and In Case of Emergency ("ICE"), speakerphone, and Speech recognition.²³⁴ In addition, Verizon Wireless provides a "Nationwide 65 Plus" calling plan designed for customers 65 and older.²³⁵

²³¹ Verizon Wireless, Family Locator Overview, http://products.vzw.com/index.aspx?id=fnd_chaperone&lid=//global//features+and+downloads//maps+and+location+services//chaperone+family+locator (last visited Sept. 29, 2009).

²³² Verizon Wireless, V CAST Videos: Browse, http://products.vzw.com/index.aspx?id=video_browse&cat=kids (last visited Sept. 18, 2009).

²³³ Press Release, Verizon Wireless, "Jitterbug's Easy-to-Use Services Are Now Available on the Verizon Wireless Network" (Aug. 27, 2009), available at <http://news.vzw.com/news/2009/08/pr2009-08-26d.html> (last visited Sept. 24, 2009).

²³⁴ Verizon Wireless, Samsung Knack, <http://www.verizonwireless.com/b2c/store/controller?item=phoneFirst&action=viewPhoneDetail&selectedPhoneId=4117> (last visited Sept. 24, 2009).

²³⁵ Verizon Wireless, Nationwide 65 Plus Calling Plans, <http://www.verizonwireless.com/b2c/store/controller?item=planFirst&action=viewPlanList&sortOption=priceSort&typeId=1&subTypeId=53&catId=1029> (last visited Sept. 29, 2009).

B. Verizon Wireless Is Investing in Machine-to-Machine Technologies, Services to Meet Enterprise Customer Needs, and Services to Advance Social Welfare Goals.

In addition to considering the needs of consumers, Verizon Wireless has also been working to craft services and products that meet the unique needs of enterprise customers, such as businesses and government agencies. In many cases, the company has entered into ventures with manufacturers or with certain businesses themselves to test and refine unique solutions – such as M2M technologies – that have the promise to offer benefits to a broad industry sector or across types of businesses. Verizon Wireless also offers a variety of services and products to advance important social welfare goals, from public safety/homeland security to energy conservation to health care to education.

1. Machine-to-Machine.

Verizon Wireless has entered into a 50/50 joint venture with Qualcomm, called nPhase, to provide advanced M2M wireless communications and smart services offerings to a wide variety of market segments, including healthcare, manufacturing, utilities, distribution, and consumer products.²³⁶ Smart services are new offerings and transformative business models that become possible whenever an enterprise connects its physical products or assets to a communications network, allowing M2M communications. Among other things, smart services can enable utilities to connect wirelessly to their grid assets, such as circuit breakers, transformers, and other sub-station equipment. The wireless monitoring capability, in turn, can

²³⁶ Press Release, Verizon Wireless, “Verizon Wireless and Qualcomm Announce Joint Venture to Provide Advanced M2M Solutions” (July 28, 2009), available at <http://news.vzw.com/news/2009/07/pr2009-07-28.html> (last visited Sept. 24, 2009). nPhase leverages the global leadership in advanced connectivity technologies provided by Qualcomm and the world’s largest and most reliable 3G network provided by Verizon Wireless to deliver the most reliable end-to-end M2M solutions with the best coverage globally.

allow utilities to develop interactive networks that are more intelligent, resilient, reliable, and self-balancing.

Verizon Wireless also offers a variety of other M2M devices. For example, the first device to take advantage of Verizon Wireless' ODI was the Prophet wireless inventory telemetry device from Telular (formerly SupplyNet), which alerts customers when connected storage containers are low. The Itron OpenWay® Cell Relay, which is also ODI-certified, allows utilities to more quickly collect, measure, and manage energy data. In addition, CalAmp Corporation's WiMetry™ network platform, another ODI device, enables smart grid functions such as demand response, peak demand reduction, and other advanced metering infrastructure applications. All of these products have debuted within the last 15 months.

2. Enterprise Customer Solutions.

Verizon Wireless provides its enterprise customers, such as business and government users, with a variety of innovative wireless services. For example, business and government users can easily mobilize their workers by using Verizon Wireless' wireless solutions in combination with the BlackBerry® Mobile Voice System ("MVS") from RIM.²³⁷ This service allows mobile workers to move seamlessly between cell phones and desk phones to maintain calls in progress, conduct real-time conference calls, and initiate mass notifications, enabling businesses to respond quickly to urgent situations. The service features a single phone number that simultaneously or sequentially rings on up to four devices. In addition, if a user cannot immediately answer a call, this service uses a company's existing voicemail system to provide a unified voice mailbox, eliminating the inefficiencies of multiple voicemail systems.

²³⁷ Press Release, Verizon Wireless, "Verizon Fixed Mobile Convergence Solutions Help Improve Business Efficiencies for a Mobile Workforce" (May 5, 2009), available at <http://news.vzw.com/news/2009/05/pr2009-05-05.html> (last visited Sept. 24, 2009).

Verizon Wireless also offers an enterprise solution that lets customers communicate more securely and consistently with their wireless devices by using a combination of Private IP addressing and dedicated connectivity.²³⁸ The new Private Network Static IP feature gives enterprise and government customers enhanced administrative control over employees' access by allowing them to assign a unique IP address to identify each mobile device accessing the network. By using Static IP, enterprise customers can request data on demand from a specific device, such as a wireless router, whenever and wherever needed. As such, this service enhances the protection and reliability of wireless data transmission by avoiding the security risks associated with the public Internet. Companies operating business-critical wireless applications, such as telemetry-based applications or ATM transactions, also can benefit from enhanced security through encrypted traffic.

3. Public Safety/Homeland Security.

Verizon Wireless' services are critical tools used by the public safety community on both a day-to-day basis and in the aftermath of natural/man-made disasters. First responders use Verizon Wireless' voice and data communications products and services to communicate with each other in the field, to access important information contained in local, state and federal crime database systems, to manage their field forces through fleet monitoring capabilities, and many other applications that help first responders do their jobs securely and effectively. Commercial wireless services are a key tool used by local, state, and federal governments to reduce operational costs, increase productivity, and ensure public safety responsiveness. Here are just a

²³⁸ Press Release, Verizon Wireless, "Private Network Static IP from Verizon Wireless Gives Enterprise and Government Customers More Options for Securely Managing Mobile Devices" (Oct. 23, 2008), *available at* <http://news.vzw.com/news/2008/10/pr2008-10-23.html> (last visited Sept. 24, 2009).

few examples of how the public safety community benefits from the use of advanced wireless communications services:

- A large east coast police department recently supplied every officer in the field with a BlackBerry® smartphone equipped with PocketCop® and GPS tracking capability. PocketCop® is an application developed by Bio-Key, a leader in biometric security, that provides law enforcement with a fully integrated and secure mobile data system. It allows patrol officers to remotely access a variety of law enforcement databases to do such things as check vehicle registrations, run warrant checks and access prior criminal history, etc. The built-in GPS capability assists police dispatchers in responding to incidents by tasking nearby officers.
- A medium-sized city police department uses 1,800 Windows Mobile devices equipped with Watson software that enables access to a host of information over the Internet without using a web browser. With the device, police officers can access information in the National Crime Information Center database, literally putting criminal records in the palm of their hand. GPS is used to map out potential crime patterns and to stimulate proactive policing.
- A small midwest police department has supplied their field officers with ruggedized PTT devices that are equipped with VZ NavigatorSM and Verizon Wireless' custom Field Force Management application. These devices support the department's command and control and task force dispatch functions. They are used to schedule and dispatch jobs, receive job and task force reports, as well as to locate remote employees. Using these devices and Verizon Wireless' advanced EVDO network, the department has improved coordination and communications, increased productivity and efficiency, and ensured the safety and performance of its task force.

In addition, Verizon Wireless offers a variety of innovative tools that allow public safety entities to perform their duties more effectively and efficiently. For example, Verizon Wireless just last month launched an interoperability tool that allows organizations, including many public safety entities, to integrate Verizon Wireless' PTT service with their existing land mobile radio ("LMR") systems to create a broader LMR footprint that includes Verizon Wireless' network.²³⁹

This solution can help public safety entities reduce the costs associated with expanding LMR

²³⁹ Press Release, Verizon Wireless, "Verizon Wireless Introduces Interoperability for Push to Talk and Land Mobile Radio" (Aug. 17, 2009), available at <http://news.vzw.com/news/2009/08/pr2009-08-14h.html> (last visited Sept. 24, 2009).

systems for more effective use of budget dollars; free up capacity on the radio network by moving certain user groups to the push-to-talk service; implement a back-up solution in case of an LMR outage; and introduce additional Verizon Wireless productivity tools such as Field Force Manager for mobile resource management, VZ NavigatorSM for turn-by-turn navigation, and mobile e-mail.

Verizon Wireless also has partnered with various community governments and organizations to provide specialized services to those communities. For example, through a partnership with the City of Chicago, Verizon Wireless provides free 311 non-emergency public service calls to customers using its service within the city limits.²⁴⁰

4. Energy Conservation.

Verizon Wireless has been helping to advance energy conservation goals, including by providing wireless communications services to the utility industry for more than a decade. These services, among other things, facilitate automated meter reading and Supervisory Control and Data Acquisition (“SCADA”) solutions, as well as enable communications to and from devices specifically designed for utilities, such as pole-top reclosures and fault circuit indicators. In particular, Verizon Wireless has developed innovative means of using more efficient smart grid technology to generate significant energy and cost savings. By using a smart grid, suppliers can provide electricity to consumers using digital technology, which saves energy, reduces cost and increases reliability and transparency. Verizon Wireless also works with third party developers and vendors to provide field force management applications and other solutions to its utility customers that enable them to better manage their workforce and enhance productivity.

²⁴⁰ Press Release, Verizon Wireless, “Verizon Wireless Partners with City of Chicago for Free 311 Calls from Wireless Phones” (Apr. 9, 2008), available at <http://news.vzw.com/news/2008/04/pr2008-04-09.html> (last visited Sept. 24, 2009).

Verizon Wireless also is working with certain application providers and utilities to develop solutions that monitor real-time electric usage. Through these partnerships, utilities will be able to quickly collect, measure, and manage their energy data without having to build and operate proprietary communications networks. Once deployed, the data derived from these solutions could be used for demand response by the utility or for energy conservation and cost savings benefits by the consumer. For example, Verizon Wireless and Itron Inc. have entered into a joint marketing agreement related to secure, two-way communications that support utilities' access to energy usage data and advance their smart grid projects.²⁴¹ Operating on Verizon Wireless' network, the Itron OpenWay® Cell Relay allows utilities to more quickly collect, measure, and manage energy data by acting as a router that can access both Itron's radio frequency local-area network and Verizon Wireless' wide-area network, while providing a reliable and affordable supply of power without having to build and operate proprietary communications networks. Ultimately, this provides utilities with a secure approach to data collection and communications with the meter or other smart grid devices.

Verizon Wireless and Ambient Corporation have also entered into a joint marketing agreement that is intended to facilitate the deployment of a host of smart grid projects around the country.²⁴² The projects will allow utilities to transmit data from both residential and commercial meters over Verizon Wireless' network to the utility companies' in-house systems. Ambient's X-3000 node, running on Verizon Wireless' network, provides the communications

²⁴¹ Press Release, Verizon Wireless, "Verizon Wireless and Itron Combine Forces to Harness the Power of Wireless Technology in Advanced Metering and Smart Grid Market" (Apr. 1, 2009), *available at* <http://news.vzw.com/news/2009/04/pr2009-04-01a.html> (last visited Sept. 24, 2009).

²⁴² Press Release, Verizon Wireless, "Verizon Wireless and Ambient Corporation Join Forces to Offer Utilities Smart Grid Communications Solution" (Mar. 4, 2009), *available at* <http://news.vzw.com/news/2009/03/pr2009-03-04.html> (last visited Sept. 24, 2009).

platform that enables data from residential and commercial smart meters, appliances, and other applications to be transported via IP-based technologies over a utility's smart grid system. The platform allows for two-way efficient collection, analysis and management of energy data to promote more reliable, affordable and environmentally friendly operations.

Similarly, CalAmp Corp.'s WiMetry™ next generation networking platform for wireless meter reading and smart grid communications is certified to run on the Verizon Wireless network. CalAmp's WiMetry platform is an IP-based, bidirectional wireless data concentrator designed for applications in the utility sector.²⁴³ WiMetry enables smart grid functions such as demand response, peak demand reduction and other advanced metering infrastructure applications via wireless networks.

nPhase, the joint venture between Verizon Wireless and Qualcomm discussed previously, has entered into a series of ongoing pilot Smart Grid programs with ABB Inc., a leader in power and automation technologies, for ABB's utility customers.²⁴⁴ nPhase is providing real-time wireless network connectivity and services coupled with technology from ABB Inc., which together are enabling program participants to improve their performance while lowering environmental impact. The pilot programs demonstrated positive results with some of the country's largest electric utilities, such as Con Edison of New York, utilizing ABB's asset monitoring solution for high voltage circuit breakers. The ABB solution, Circuit Breaker Sentinel, gathers critical information from the utility asset to determine the health of the

²⁴³ Press Release, Verizon Wireless, "CalAmp's WiMetry™ Platform for Meter Reading and Smart Grid Communications Certified for Use on the Verizon Wireless Network" (Feb. 3, 2009), *available at* <http://news.vzw.com/news/2009/02/pr2009-02-03b.html> (last visited Sept. 24, 2009).

²⁴⁴ Press Release, Verizon Wireless, "nPhase Powers ABB's Asset Monitoring Solution" (Sept. 1, 2009), *available at* <http://news.vzw.com/news/2009/08/pr2009-08-31.html> (last visited Sept. 24, 2009).

electricity transmission equipment. nPhase extracts the crucial data via a secure cellular wireless network and forwards the data to ABB's Asset Insight hosted web platform, providing the utilities with feedback on their current equipment status and forecasted maintenance needs. With nPhase solutions, companies like ABB can prevent power outages, provide advanced condition-based maintenance, maintain environmental compliance standards, and reduce costs by wirelessly monitoring dispersed assets such as circuit breakers.

Most recently, IBM and Consert completed a smart grid pilot project in partnership with the Fayetteville Public Works Commission in Fayetteville, North Carolina.²⁴⁵ Using the Verizon Wireless 3G network, participants can set their daily use profiles, check their energy consumption from an Internet connection, select a target monthly bill amount, and authorize the Public Works Commission to cycle their appliances off for brief periods during peak energy consumption events. Each participant's residence was equipped with small controllers placed on high consumption devices, and a gateway was added to the meter enabling two-way communications between the participant and the Fayetteville Public Works Commission. Participants in the pilot program could log onto a Web site from their laptop to check on and adjust their energy consumption, and those participants with limited or no Internet connectivity could take advantage of the program's wireless broadband Internet connection. Through real-time energy monitoring programs such as this, the typical consumer can save an average of 15 percent or more of their normal energy use with no change in lifestyle.

Further, Verizon Wireless is committed to furthering its use of renewable energy and other "green" technology to make its network more energy efficient. The wireless sector

²⁴⁵ Press Release, Verizon Wireless, "IBM and Consert Help North Carolinians Reduce Energy Consumption With Smart Grid Technology" (Sept. 21, 2009), available at <http://news.vzw.com/news/2009/09/pr2009-09-21.html> (last visited Sept. 30, 2009).

continues to look for new ways that green technology can help generate energy savings, such as considering how new energy sources such as wind turbines and solar panels can be used to power cell towers.²⁴⁶ Indeed, Verizon Wireless has several solar powered cell sites in the western U.S.²⁴⁷

Additionally, Verizon Wireless' voice and data services promote energy conservation by enabling its customers' telecommuting. Telecommuting is one of the key ways businesses and individuals can preserve the environment and conserve energy.²⁴⁸ Innovative wireless technology and, in particular, the expansion of voice and broadband services will play a key role in allowing an increasing number of companies to incorporate telecommuting as part of their business strategies. Verizon Wireless is enabling telecommuting by providing employees with the same products and services that they traditionally could only access at the office. Specifically, Verizon Wireless recently announced its Wireless Office, a suite of services that brings calling features previously available only on the desktop phone to Verizon Wireless mobile phones.²⁴⁹

Even in the office, Verizon Wireless is using innovation to reduce energy and save costs. Specifically, it has rolled-out energy-saving solutions on employee desktops across the country,

²⁴⁶ Wireless Industry Goes Green, March 9, 2008, http://www.redorbit.com/news/technology/1288319/wireless_industry_goes_green/ (last visited Sept. 30, 2009).

²⁴⁷ See Press Release, Verizon Wireless, "Still Images of Verizon Wireless' Solar Powered Cell Sites Available" (Apr. 21, 2008), available at <http://news.vzw.com/news/2008/04/pr2008-04-21.html> (last visited Sept. 30, 2009).

²⁴⁸ Ways To Create An Earth Friendly Business, Nov. 22, 2008, <http://greenliving.lifetips.com/cat/65916/telecommuting-and-green-technology> (last visited Sept. 30, 2009).

²⁴⁹ Press Release, Verizon Wireless, "Verizon Fixed Mobile Convergence Solutions Help Improve Business Efficiencies for a Mobile Workforce" (May 5, 2009), available at <http://newscenter.verizon.com/press-releases/verizon/2009/verizon-fixed-mobile.html> (last visited Sept. 30, 2009).

resulting in reductions in operating costs, emissions, and energy usage. Over the past year, Verizon Wireless has deployed 1E WakeUp, which ensures that all PCs, whether on or off, can receive software patches immediately, and NightWatchman®, which significantly reduces the power consumed by PCs. This power management software is now available on 63,000 managed desktops company-wide, resulting in a 24 percent reduction in both PC power consumption and CO2 emissions. The initiative reduces annual energy costs by \$1.3 million and carbon emissions by an estimated 7,700 tons.²⁵⁰ Verizon Wireless also has deployed Sun Ray thin client workstations throughout its call centers, thereby reducing its total energy usage at each facility by 30 percent.

5. Health Care.

Federal Chief Technology Officer Aneesh Chopra has emphasized that “[w]e cannot move forward in advancing our nation’s healthcare reform goals without the appropriate use of technology in health care and telemedicine is a key component.”²⁵¹ Wireless has a significant role to play in this effort. Indeed, Verizon Wireless’ services have already improved health care providers’ ability to respond quickly and effectively to medical situations both inside and away from their core medical facilities.

Specifically, Verizon Wireless’ services provide the means for health care providers to use a variety of innovative services, including electronic delivery of medical records, e-prescribing, patient monitoring, home health care reporting, and other work flow solutions.

²⁵⁰ Press Release, Verizon Wireless, “Green Technology Helps Verizon Wireless Save Energy, CO2 Emissions And Costs” (Apr. 18, 2008), available at <http://news.vzw.com/news/2008/04/pr2008-04-18.html> (last visited Sept. 30, 2009).

²⁵¹ “U.S. Healthcare Goals Require More Use of Telemedicine, Federal CTO Says,” *Communications Daily*, at 1 (Sept. 16, 2009).

Health care providers also have access to a wide variety of devices with wireless communications capabilities that help them perform their day-to-day responsibilities more effectively and efficiently, including computer terminals, PDAs, smartphones, specialized medical monitoring equipment, barcode scanners, wireless RFID scanners, and wireless reading devices.

Through an agreement with LifeWatch Services, Inc., a leading company for health care technologies and solutions, Verizon Wireless' wireless communications services are used to provide critical remote monitoring services to cardiac patients around the county.²⁵²

LifeWatch's rapidly expanding LifeStar™ ACT Ambulatory Cardiac Telemetry service has been used by more than 60,000 patients since its introduction in January 2007. The service is routinely selected by the top 50 heart centers in the U.S. As noted by the Chairman of Card Guard AG, the parent company of LifeWatch, "[t]his strategic agreement underscores the common vision shared by LifeWatch and Verizon Wireless in the evolving telemedicine industry by combining our applications for timely patient diagnoses with the most reliable wireless telecommunication platform providing the highest quality transmissions of critical data."²⁵³

Motion Computing®'s C5 Mobile Clinical Assistant also is available for use on Verizon Wireless' network.²⁵⁴ This device, the industry's first mobile clinical assistant developed in collaboration with Intel®, is a hospital-grade device that has been well tested in health care

²⁵² Press Release, Verizon Wireless, "LifeWatch and Verizon Wireless to Expand Healthcare Telemedicine Solutions" (June 3, 2009), available at <http://news.vzw.com/news/2009/06/pr2009-06-05e.html> (last visited Sept. 24, 2009).

²⁵³ *Id.*

²⁵⁴ Press Release, Verizon Wireless, "Motion's F5 Rugged Tablet PC and C5 Mobile Clinical Assistant Now Available with Integrated Access to Verizon Wireless' Mobile Broadband Network" (Apr. 1, 2009), available at <http://news.vzw.com/news/2009/04/pr2009-03-31c.html> (last visited Sept. 24, 2009).

environments. The C5, which has been deployed in more than 4,000 health care organizations worldwide, has been proven to enhance clinician satisfaction, improve point of care documentation, increase clinician productivity, and improve clinical documentation accuracy, allowing health care providers to more effectively and efficiently serve their patients. Panasonic Computer Solutions Company also offers a Mobile Clinical Assistant, the Toughbook H1, for use on the Verizon Wireless network.²⁵⁵ This device can be used for mobile health care environments, including EMS, mobile blood banks, and home health workers, as well as by health care professionals that travel between offices, patient homes, and hospitals.²⁵⁶

Finally, Verizon Wireless offers its service, OnCare, to the home health care and hospice market. OnCare uses location-based services to efficiently dispatch and route personnel to patients in the greatest need at that particular moment. This service also helps ensure the safety of personnel by tracking their movements throughout the course of the day.

6. Education.

Educational institutions regularly utilize Verizon Wireless' innovative services to improve students' and teachers' access to information and educational materials. Various educational institutions have issued students netbooks and other devices that use Verizon Wireless' services so the students may access information about the school and curriculum. For example, a large university is about to kick off a pilot program in which incoming freshmen students are supplied with a MiFi device that will allow them to wirelessly check e-mail and access the school's online educational tools, such as class grades and homework results.

²⁵⁵ Press Release, Verizon Wireless, "Panasonic Toughbook® H1 Receives Gobi™ Certification on the Verizon Wireless Network" (Aug. 24, 2009), available at <http://news.vzw.com/news/2009/08/pr2009-08-21i.html> (last visited Sept. 24, 2009).

²⁵⁶ *Id.*

Verizon has also helped launch the Education-Enterprise Zone (“EEZ”), which consists of a network of museums, cultural institutions, libraries, government organizations, businesses and schools.²⁵⁷ All EEZ participants share resources via a two-way audio/video network. Verizon is working with these institutions to assist in the development of educational content. Through this tool, museum curators can become an integral part of a teacher’s lesson plan by coming into the classroom via a two-way, interactive video network.

In addition, using Verizon Wireless’ communications services and an application from a third party vendor, colleges and universities can effectively transmit messages to students, staff, faculty and parents in minutes using a host of methods including text messaging, e-mail, and instant messaging. This multi-prong approach significantly increases the likelihood that messages will be received by those located on and off campus at any hour of the day or night. In addition, a large inner city school bus company uses Verizon Wireless’ services to provide GPS-based bus routing, thereby increasing student safety. This bus company also utilizes software that allows bus drivers to identify hazardous locations, student walk boundaries, and the homes of registered sexual offenders along their bus routes. Parents also can check a web portal that allows them to see their children’s location.

C. Verizon Wireless’ Participation in a Variety of Open Development Initiatives Is Encouraging Innovation.

As the Commission is well aware, there has been increasing demand for openness to non-licensee provided devices and applications in the past few years and the wireless market has responded accordingly, with Verizon Wireless’s ODI leading the way. Verizon Wireless also has been actively participating in a several other nationwide and international open development

²⁵⁷ Verizon, Education, <http://www22.verizon.com/about/externalaffairs/alliances/education/> (last visited Sept. 24, 2009).

initiatives. ODI and these other initiatives have spurred innovation, expanding the choice of products and applications available to all wireless users.

1. Verizon Wireless' Open Development Initiative

Verizon Wireless launched ODI in November 2007 with its announcement that it would provide customers the option to use any device that meets the company's published technical standards, which includes the ability to physically connect to the Verizon Wireless network, and to use any application the customer chooses on such devices.²⁵⁸ The company moved quickly to implement the ODI program. It published the technical standards in April 2008, began certifying ODI devices in the summer of 2008, and has appeared at multiple conferences to discuss the program with various potential partners and device developers.²⁵⁹ As part of ODI, Verizon Wireless also has held multiple conferences to encourage the development of a wide range of devices and applications.²⁶⁰

²⁵⁸ See Press Release, Verizon Wireless, "Verizon Wireless to Introduce 'Any Apps, Any Device' Option for Customers in 2008" (Nov. 27, 2007), available at <http://news.vzw.com/news/2007/11/pr2007-11-27.html> (last visited Sept. 30, 2009).

²⁵⁹ Verizon Wireless also announced that it would encourage developers that use Java technology to develop new applications that will run on Verizon Wireless' broadband networks. As the Verizon Wireless CEO, Lowell McAdam, explained while announcing this decision at the JavaOne conference: "What we've decided to do is open up our network elements." See Mike Dano, Wireless, "Verizon Embraces Java" (June 9, 2009), available at <http://www.fiercemobilecontent.com/story/verizon-wireless-embraces-java/2009-06-02> (last visited Sept. 30, 2009). This step increases the openness of Verizon Wireless' networks, and encourages innovation over the platforms.

²⁶⁰ See, e.g., Press Release, Verizon Wireless, "Verizon Wireless to Host Open Development Conference March 19-20, 2008 in New York City" (Jan. 22, 2008), available at <http://news.vzw.com/news/2008/01/pr2008-01-22b.html> (last visited Sept. 24, 2009); Press Release, Verizon Wireless, "Registration Open for Verizon Wireless' 700 MHz C-Block LTE Device Specifications Web Conference" (May 6, 2009), available at <http://news.vzw.com/news/2009/05/pr2009-05-06a.html> (last visited Sept. 24, 2009); Press Release, Verizon Wireless, "Registration Now Open for the Verizon Developer Community Conference" (June 16, 2009), available at <http://news.vzw.com/news/2009/06/pr2009-06-15h.html> (last visited Sept. 24, 2009).

To date, 60 devices have been certified for use on the Verizon Wireless network.²⁶¹ The ODI team continues to meet with manufacturers and other interested parties to pursue opportunities for new devices that can be used on the network. The entire process takes approximately three weeks from submission to approval and Verizon Wireless continually approves new devices.

The devices that come through ODI represent the varied and innovative uses that mobility offers for personal and business services. The first device to take advantage of the initiative was a wireless device from Telular (formerly SupplyNet), a 21-employee firm in Schaumburg, Illinois, that allows suppliers of bulk materials to monitor inventory levels at remote customer locations.²⁶² This battery-powered modem connects to a sensor that dips into large storage containers, like construction-site diesel tanks or tanks of shortening at a food factory. When a tank runs low, the modem sends a text message to Telular, which alerts the customer that it needs a refill. This device is an example of a M2M application where an automated system, like an alarm or a temperature gauge, reports its observations to a control center.

Other devices that have completed the ODI process include:

- An M2M device that electronically monitors offenders' location, allowing corrections officials to manage offender compliance on a reliable and secure basis;
- A self-contained, industrial strength wireless router that will provide always available broadband network connectivity for applications such as public safety, data center backup, and disaster recovery;

²⁶¹ See Verizon Wireless Open Development, Compliant Devices, at <https://www22.verizon.com/opendev/dcnew.aspx> (last visited Sept. 29, 2009).

²⁶² See "SupplyNet's Wireless Telemetry Device for Vendor Managed Inventory is First Certified Under New Open Development Program From Verizon Wireless," SupplyNet Company News (July 1, 2008), http://www.supplynetsolutionsonline.com/news_details.aspx?id=448 (last visited Sept. 30, 2009).

- Various broadband routers that will offer remote device management for enterprise primary and backup wireless LAN connectivity;
- A wireless meter reader for fixed telemetry that will be packaged in a standard utility meter housing that can be positioned wherever the cellular signal strength is best; and,
- A small, consumer-oriented tracking device that will connect with a home computer to allow personal tracking and location of vehicles, children and pets.

Other devices that have been certified or are in the pipeline include fleet tracking systems, portable gaming devices, health status tracking meters, senior citizen phones, mobile wallets, and high-end smartphones.

All these devices offer connections, whether people-to-people or M2M. M2M reporting and sensing devices can be very effective in rural areas at notifying distant users of the status or condition of a certain facility or installation. Such devices save resources, time, and fuel by pinpointing the facility that needs attention. People-to-people connecting devices range from alternative telephony devices to location-based systems for personal and business use.

The ODI program offers many benefits to innovators, consumers, and the wireless industry. For example, ODI allows developers to focus on what they do best – imagining and creating innovative devices and applications – rather than what networks their devices and applications will ultimately use. Developers also receive the benefit of working with other developers outside the commercial wireless company environment. Consumers, in turn, receive the opportunity to use non-Verizon Wireless handsets and devices, onto which they can load applications of their choice. Businesses also are able to receive the benefit of devices, particularly M2M devices, that may not otherwise be offered for sale in Verizon Wireless’s retail stores. Finally, ODI pushes the wireless marketplace to create more open development projects that will compete with ODI.

2. LTE Innovation Center

Verizon Wireless has also developed the LTE Innovation Center.²⁶³ This effort is intended to drive innovation and help foster creative solutions connecting people, places, and things wirelessly using LTE technology. The LTE Innovation Center leverages Verizon Wireless' experience to help developers assess what types of new products and services may best succeed in the marketplace. Based in Waltham, Massachusetts, the LTE Innovation Center includes a lab for product testing and development, as well as home and business environments designed to simulate usage of products in real-life situations. The LTE Innovation Center is expected to see significant activity across three product areas: consumer electronics and appliances; M2M products in the areas of healthcare, security and utility metering; and telematics. As with Verizon Wireless' ODI, the LTE Innovation Center supports early stages of product development, including concept validation, usability studies, product design analysis, prototyping, and lab and field trials. Once a product is proven through the development process and is ready to come to market, Verizon Wireless can help the developer quickly access the most appropriate sales channels for a given products.

On April 17, 2009, Verizon Wireless published its initial set of specifications based on a 3GPP standard for devices accessing the C Block LTE network.²⁶⁴ These specification were

²⁶³ Press Release, Verizon Wireless, "Verizon Wireless LTE Innovation Center to Drive 4G Next Generation Wireless Product Development" (Apr. 1, 2009), available at <http://news.vzw.com/news/2009/04/pr2009-03-31d.html> (last visited Sept. 24, 2009).

²⁶⁴ See Press Release, Verizon Wireless, "Verizon Wireless Drives 4G LTE Innovation with Open Device Development Specifications" (Apr. 17, 2009), available at <http://news.vzw.com/news/2009/04/pr2009-04-16c.html> (last visited Sept. 30, 2009).

updated on August 21, 2009.²⁶⁵ Over 700 people registered to participate in an interactive session on the device specifications, which was held on May 17, 2009.

3. Joint Innovation Lab

Verizon Wireless has additionally joined the Joint Innovation Lab (“JIL”) established by China Mobile, SOFTBANK (a Japanese wireless carrier) and Vodafone to help accelerate the uptake of innovative mobile technologies on a mass-market scale.²⁶⁶ JIL is initially focusing on “on creating a single global platform for developers to encourage the creation of a wide range of innovative and useful mobile widgets . . . capable of enhancing the mobile Internet experience on a variety of smartphones as well as mid- and low-cost handsets on multiple operating systems.”²⁶⁷ JIL’s mobile widgets specification will enhance wireless providers’ services by enabling developers to access both handset and network functionality, such as the address book, camera, location information, and billing, in a secure environment. As part of this initiative, JIL plans to launch later this year a range of tools to encourage innovation among global mobile developers, including a common mobile widgets specification; easy-to-use developer kits; and an online repository, distribution and payment mechanism to ensure developers can roll out their products to customers in more than 70 countries across North America, Asia, Europe, and Africa.

²⁶⁵ *Id.* The specifications are available at the Verizon Wireless Open Development website, www.verizonwireless-opedev.com (last visited Sept. 30, 2009).

²⁶⁶ Press Release, Verizon Wireless, “Verizon Wireless to Join China Mobile, SOFTBANK and Vodafone in Creating the Largest Global Platform for Mobile Developers,” (Apr. 1, 2009), *available at* <http://news.vzw.com/news/2009/04/pr2009-04-01b.html> (last visited Sept. 24, 2009).

²⁶⁷ Mobile widgets are capable of boosting handset functionality as well as transforming the look and feel of a device to give customers quick and easy access to valued content. They are personalized, always-accessible mini applications that sit on a handset to retrieve relevant information from the Web such as weather reports, sports updates and travel timetables. *Id.*

4. LiMo Foundation

Verizon Wireless is a Core member of the LiMo Foundation, a global consortium of mobile leaders delivering an open handset platform for the whole mobile industry.²⁶⁸ The LiMo Foundation is open to all vendors and service providers in the mobile communications marketplace, including device manufacturers, operators, chipset manufacturers, integrators and independent software vendors. Working with the Foundation's other 39 members, Verizon Wireless is shaping the evolution of the LiMo Platform™, while remaining entirely free to deliver its own compelling and differentiated services to mobile customers. Launched in January 2007 by six mobile industry leaders – Motorola, NEC, NTT DoCoMo, Panasonic Mobile Communications, Samsung Electronics, and Vodafone – LiMo was formed to deliver an open and globally consistent software platform based upon Mobile Linux for use by the whole industry to catalyze next-generation mobile consumer experiences.

Like the JIL, LiMo is a global forum that enables Verizon Wireless to partner with the best and brightest around the world to help lead wireless innovation. Indeed, JIL and LiMo are significant not only for the cutting-edge products they are expected to generate, but because they demonstrate that American wireless providers are partnering with other companies around the world to take the industry everywhere to the limits of its technological capabilities.

²⁶⁸ Press Release, Verizon Wireless, "Verizon Joins LiMo Foundation" (May 14, 2008), *available at* <http://news.vzw.com/news/2008/05/pr2008-05-14.html> (last visited Sept. 24, 2009).

III. THE COMMISSION’S LONGSTANDING SPECTRUM POLICY TO GRANT LICENSES FOR EXCLUSIVE, FLEXIBLE USE PROMOTES INNOVATION, AND SHOULD BE MAINTAINED.

The NOI requests comment on a variety of issues as to the relationship between innovative wireless service and access to spectrum resources.²⁶⁹ As the Commission correctly observes, as wireless is increasingly used as a broadband platform, the demand for spectrum will continue to rise significantly. Spectrum is a “unique and scarce national resource” that the Commission has recognized plays a critical role in fostering innovation and investment in the mobile industry.²⁷⁰ Moreover, this resource must accommodate a constantly fluctuating number of users who move into and out of the coverage area of particular cell sites, and must successfully hand off voice calls or data sessions as users move across different coverage areas. This scarce spectrum resource and the fluctuating demand it must address make wireless networks fundamentally different from wireline networks.²⁷¹ Thus, any policymaking in this area must begin and end with the fundamental nature of spectrum as both a unique and scarce resource. Verizon Wireless strongly believes that the key to the development of new services and technologies has been – and will continue to be – access to unfettered, exclusive use spectrum that allows flexible use to best serve customers.²⁷² Further, more exclusive use

²⁶⁹ NOI, ¶ 20.

²⁷⁰ Chairman Julius Genachowski, FCC, Written Statement before the Energy and Commerce Subcommittee on Communications, Technology and the Internet, U.S. House of Representatives, at 2 (Sept. 17, 2009), available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-293508A1.pdf.

²⁷¹ See, e.g., Comments of CTIA – The Wireless Association, NBP Public Notice #3, GN Docket No. 09-51, at 16 (Sept. 22, 2009) (“The underlying infrastructure of wireless networks, including spectrum, as well as the tight and coordinated integration of customer equipment with the network, make wireless significantly different from wired broadband networks.”).

²⁷² The FCC defines “exclusive use” as “a licensing model in which a licensee has exclusive and transferable flexible use rights for specified spectrum within a defined geographic area, with flexible use rights that are governed primarily by technical rules to protect spectrum users against interference.” *Spectrum Policy Task Force Report*, Report, ET Docket No. 02-135, at 5 (Nov. 2002).

spectrum must be made available for the industry to support the future demand for wireless broadband applications and continue the extraordinary investment and innovation of the past two decades.

The wireless industry, and Verizon Wireless in particular, efficiently use spectrum, as documented below. Verizon Wireless has driven its network to greater levels of efficiency in response to consumer demand and competitive market pressures. None of these technology improvements have been mandated by government action, nor has there been any government oversight of the technology choices made by Verizon Wireless. Additionally, the wireless industry, through constant changes in the underlying network architecture, has increased voice and data capacity extensively and rapidly – and was able to do so because the FCC did not impose intrusive regulatory requirements on spectrum use. Further, investment in the wireless ecosystem has been enabled by the Commission’s exclusive use, flexible licensing model. The Commission should absolutely continue that model, and resist calls for new spectrum regulation. To ensure sufficient spectrum is available, the Commission should also initiate immediately a targeted process to identify and allocate additional spectrum for exclusive use.

Moreover, the Commission must avoid regulatory mandates that would limit carriers’ ability to use their current spectrum and obtain more spectrum. Thus, for example, additional roaming mandates will add more traffic to a carrier’s network, potentially creating a need for more spectrum. Likewise, policies that prevent carriers from taking action against disproportionately heavy bandwidth users cannot work unless carriers are permitted to obtain more spectrum. But policies such as spectrum caps and spectrum underlays and overlays will impede home roaming and network neutrality mandates by preventing carriers from obtaining the extra spectrum they will need to accommodate heavy increases in network traffic and

bandwidth consumption. Thus, the Commission must avoid adopting inconsistent and contradictory spectrum policies. The proper path is to stay the course, and continue the Commission's successful deregulatory spectrum management policies.

A. The Wireless Industry Generally, and Verizon Wireless Specifically, Efficiently Utilize Their Wireless Spectrum.

The Commission's flexible, exclusive use regulatory policies for wireless spectrum have provided the opportunity and appropriate incentives for wireless providers to maximize spectrum use and efficiency. Over the past two decades, the wireless industry has constantly updated the technologies used to provide wireless services, driving innovation and efficiency at incredible rates. Verizon Wireless has been a leader in driving these innovations, making huge investments in successive wireless technologies – CDMA, EVDO Rev. A, and now LTE – each of which has brought major improvements in network speeds and efficiency.

1. The Wireless Industry Has Consistently Implemented Technological Innovations to Maximize Spectrum Efficiency.

As the Commission has recognized, electromagnetic spectrum is a scarce and unique resource that requires wireless providers to drive as much efficiency as possible to serve the needs of consumers.²⁷³ This need for efficiency has increased due to the rapid growth in demand for wireless voice and data services by the public, which in turn has been fueled by constant innovation. Improvements in network coverage and quality, technological developments such as the reduction in size of handheld devices, the streamlining of the roaming process, and pricing

²⁷³ See *Principles for Reallocation of Spectrum to Encourage the Development of Telecommunications Technologies for the New Millennium*, Policy Statement, 14 FCC Rcd 19868, 19870 (¶ 7) (1999) (“The growing demand for spectrum by new services and the continuing development of radio communications technologies make spectrum management a unique challenge. Spectrum is a valuable and finite public resource that must be allocated and assigned in a manner that will provide the greatest possible benefit to the American public. At the same time, it is important to encourage the development and deployment of new, more efficient technologies that will increase the amount of information that can be transmitted in a given amount of bandwidth.”).

innovations such as “all you can talk” voice services for a single flat rate have driven growing demand for wireless services.²⁷⁴

This constant increase in demand has required wireless providers to continually innovate to better utilize existing spectrum holdings. Technology developments such as frequency reuse, antenna sectorization, cell splitting, and the migration from analog to digital technologies have enabled the wireless industry to drive efficiency in spectrum use and have been identified by the Commission as key contributors to promoting efficient spectrum use and enhancing service quality.²⁷⁵

- *Frequency Reuse.* Frequency reuse is one of the fundamental concepts on which commercial mobile radio systems are based, and it is what enables a wireless system to handle a huge number of calls with a limited number of channels. Frequency reuse involves the partitioning of an area into a group of “cells,” with specific frequencies assigned to each cell. Through careful frequency selection and the use of low power transmissions, operators can reuse frequencies in non-adjacent cells. In early cellular systems, a frequency reuse factor of 7 was typical, meaning that 1/7 of the total spectrum was available for use in any individual cell.²⁷⁶ Today, with the use of advanced technologies like CDMA, wireless systems are built with a frequency reuse

²⁷⁴ See, e.g., *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services*, Fourth Report, 14 FCC Rcd 10145, 10155-56 (1999) (“*Fourth Annual CMRS Competition Report*”) (crediting the widespread adoption of “digital one-rate” pricing plans with increasing demand); *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services*, Second Report, 12 FCC Rcd 11266, 11318 (1997) (“*Second Annual CMRS Competition Report*”) (“Increased demand for wireless telephony can also be attributed to general improvements in cellular phones, such as lighter handsets and longer battery life, and improved service quality.”).

²⁷⁵ See, e.g., *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services*, Twelfth Report, 23 FCC Rcd 2241, 2299 (¶ 128, n. 302) (2008) (noting that cellular, PCS, and digital SMR networks engage in frequency reuse to maximize efficiency, and that frequency reuse to prevent calls from being dropped); *Service Rules for the 698-746, 747-762 and 777-792 MHz Bands*, Second Report and Order, 22 FCC Rcd 15289, 15433-34, (¶ 405) (2007) (“*700 MHz Report & Order*”) (requiring that a public safety communications network “employ spectrum efficient techniques, such as frequency reuse and sectorized or adaptive antennas”); *Sunset of the Cellular Radiotelephone Service Analog Service Requirement and Related Matters*, Memorandum Opinion and Order, 22 FCC Rcd 11243, ¶ 23 (2007) (“We are concerned that any extension of the analog requirement would inhibit deployment of more spectrally efficient digital technologies.”).

²⁷⁶ Theodore S. Rappaport, *Wireless Communications: Principles and Practice* 26-27 (Prentice Hall PTR 1996); William C.Y. Lee, *Mobile Communications Engineering* 6-9 (McGraw-Hill 1982).

factor of 1, meaning that all of the spectrum licensed to an operator is available for use in every cell of the network.²⁷⁷

- *Antenna Sectorization.* Initial cellular systems utilized antennas that transmitted the same signal in all directions (omni-directional). Because of the need for more efficient spectrum usage, however, wireless operators today generally do not utilize omni-directional antennas. Instead, they typically use multiple directional antennae at the cell site, each radiating within a specific sector of the cell. As the Commission has recognized, sectorized antennas allow for more efficient spectrum utilization by “assigning spectrum usage on a dynamic basis according to user demand and re-using the same frequency to transmit different information to customers who are in different direction.”²⁷⁸
- *Cell Splitting.* Another innovation deployed by wireless providers is cell splitting. Cell splitting is the process of subdividing a congested service area served by a single base station into multiple smaller service areas. Each smaller service area would have its own base station and a corresponding reduction in antenna height and transmitter power. Cell splitting improves the efficiency of spectrum use because it increases the number of times that spectrum is reused. By defining new service areas that have a smaller radius than the original service area and by installing these low power/low height base stations (microcells or picocells), overall spectrum capacity increases due to the additional number of channels per unit area.
- *Analog to Digital Transition.* While the introduction of digital technologies enabled the delivery of more robust wireless data communications, the initial driver was the achievement of greater efficiency gains. With the transition from analog to digital systems (such as CDMA, TDMA and GSM), voice traffic capacity experienced extensive gains – 3 to 6 times as many voice channels were available in the same amount of spectrum. Today, advanced technologies like EVDO Rev. A utilize spectrum ten times as efficiently as early digital systems. The use of digital technology provided other benefits as well. For example, CDMA technology requires extremely precise power control throughout the network that allows for the wireless provider to nearly constantly reshape the technical operations of the network to best

²⁷⁷ Andrew J. Viterbi, *CDMA: Principles of Spread Spectrum Communication* 180 (Addison Wesley Longman 1995).

²⁷⁸ *Modification of Parts 2 and 15 of the Commission’s Rules for Unlicensed Devices and Equipment Approval*, Notice of Proposed Rulemaking, 18 FCC Rcd 18919, 18913 (¶¶ 8-9) (2003). *See also Modification of Parts 2 and 15 of the Commission’s Rules for Unlicensed Devices and Equipment Approval*, Report and Order, 19 FCC Rcd 13539, 13541 (¶ 7) (2004) (“[Sectorized and phased array antennas] enable[] an application like a broadband local area network to serve a number of spatially separated clients from a single antenna system. These antennas allow systems to use spectrum more efficiently by making it possible to re-use a given frequency to communicate unique information with different devices along non-overlapping paths.”).

meet customer requirements.²⁷⁹ Indeed, one expert notes that CDMA system designers “have continually refined CDMA systems in order to extract more capacity from the limited spectrum available . . . and to deliver better performance.”²⁸⁰

Licensees face “relentless” pressure to deploy these spectrum-efficient techniques, as they ensure that “additional users, and revenues” can be accommodated.²⁸¹ The availability of new technologies and the increasing demand for wireless services “force wireless carriers to continuously re-evaluate ways to increase the value of the radio spectrum allocated to their licenses,” ensuring that spectrum is efficiently used.²⁸² The end result is that U.S. companies maintain the most spectrally efficient networks in the world, serving an average of 660,073 subscribers per megahertz of spectrum allocated – a dramatic improvement in the number of subscribers per megahertz than earlier generation systems were capable of handling.²⁸³ To ensure that efficient spectrum use continues, the Commission should maintain its exclusive and flexible use policies, as these not only provide the flexibility to implement such innovations but also “create[] incentives to deploy efficient technology, because financial gains accrue to the investor.”²⁸⁴ When allowed to control the use of their radio frequencies effectively, licensees

²⁷⁹ Comments of Verizon Wireless, ET Docket No. 03-237, at Exhibit A, *Declaration of Dr. Charles L. Jackson Regarding Limits to the Interference Temperature Concept* at 16 (April 5, 2004) (“Jackson Interference Temperature Declaration”).

²⁸⁰ *Id.* at 15.

²⁸¹ Comments of Thomas Hazlett and Matthew Spitzer, ET Docket No. 03-237, at 33, 35 (April 5, 2004) (“Hazlett and Spitzer Interference Temperature Comments”).

²⁸² *Id.* at 33.

²⁸³ Letter from Christopher Guttman-McCabe, CTIA – The Wireless Association, to Marlene H. Dortch, Secretary, Federal Communications Commission, GN Docket No. 09-51, at Attachment 13 (filed Aug. 14, 2009) (“CTIA August 14 Letter”).

²⁸⁴ Hazlett and Spitzer Interference Temperature Comments at 34.

devote significant financial resources to squeezing additional services out of a given spectrum band.²⁸⁵

2. Verizon Wireless Is a Leader in Using Its Spectrum Holdings Intensely and Efficiently.

While the industry generally has developed technologies that enable highly efficient use of CMRS spectrum, Verizon Wireless in particular has established itself as an industry leader in this regard and effectively uses its spectrum holdings to deliver innovative services to its customers. Verizon Wireless, and each of its predecessor companies, has steadily and rapidly deployed new technologies over the past 20 years to better meet consumer demand. Beginning with first generation CDMA technology (IS-95 or cdmaOne), to 1xRTT, to EVDO, to EVDO Rev. A and now to LTE,²⁸⁶ Verizon Wireless has pushed the capabilities of its wireless network at a relentless pace to deliver greater voice capacity and increasingly sophisticated data products and services to its customers. Indeed, since the launch of Verizon Wireless in 2000, wireless subscriber growth in largely the same spectrum holdings have grown from approximately 25 million customers²⁸⁷ to nearly 88 million subscribers in July of 2009.²⁸⁸ This better than tripling of customers has been made possible by the extensive engineering innovations and technical efficiencies Verizon Wireless has used to manage not just the enormous increase in customers, but also the enormous increase in network usage per customer.

²⁸⁵ *Id.*

²⁸⁶ Verizon Wireless LTE Paper at 6-7.

²⁸⁷ See Stephen Labaton, F.C.C. Approves Bell Atlantic-GTE Merger, Creating No. 1 Phone Company, N.Y. Times (June 17, 2000), available at <http://www.nytimes.com/2000/06/17/business/fcc-approves-bell-atlantic-gte-merger-creating-no-1-phone-company.html> (last visited Sept. 30, 2009).

²⁸⁸ See Verizon Wireless: We Added Subscribers in Q2 Too, ChannelWeb (July 24, 2009), available at <http://www.crn.com/mobile/218600525;jsessionid=AMHEDP0SRMF23QE1GHRSKHWATMY32JVN> (last visited Sept. 30, 2009).

Over the past 15 years, Verizon Wireless has aggressively deployed new wireless technologies to make more efficient use of its licensed spectrum and increase the capabilities delivered to its customers. A summary of these advancements and their corresponding benefits appears in *Figure 8*. Beginning with the introduction of 2nd generation digital CDMA technology in the mid-1990's (cdmaOne)²⁸⁹ and extending through the nationwide deployment of EVDO Rev. A just a few years ago, Verizon Wireless has vastly improved the spectral efficiency of its wireless network and the data throughputs delivered to its customers. Voice capacity and quality have made significant advances, all within the same spectrum previously allotted. More importantly, data communications have been deployed and integrated into the Verizon Wireless mobile network and peak data rates have increased by a factor of better than 200 (from 14.4 kbps to more than 3 Mbps) in this short period of time. *Figure 8* makes clear that the pace of innovation has also increased during this timeframe:

	cdmaOne	1xRTT	EVDO Rel 0	EVDO Rev A
Year Deployed	Mid 1990's	2002	2004	2006
Spectrum	1.25 MHz x 2	1.25 MHz x 2	1.25 MHz x 2	1.25 MHz x 2
Spectral Efficiency	N/A	120 kbps/MHz	360 kbps/MHz	900 kbps/MHz
Peak Data Rate	14.4 kbps	153 kbps	2.4 Mbps (down) 153 kbps (up)	3.1 Mbps (down) 1.8 Mbps (up)
Average Data Rate	9-14.4 kbps	60-80 kbps	400-700 kbps (down) 60-80 kbps (up)	600-1400 kbps (down) 500-800 kbps (up)
Roundtrip Air Link Latency	N/A	~ 400 msec	~ 150 msec	60 msec

Figure 8: Verizon Wireless Deployment of Wireless Technologies

These extensive technological improvements – none mandated by regulation – in turn have led to substantial gains in spectrum efficiency by Verizon Wireless. Efficiency metrics

²⁸⁹ Verizon Wireless LTE Paper at 6.

describe not only how much spectrum a firm holds, but also how it is being used, and they also account for differences in spectrum needs based on the size of a provider's subscriber base. While numerous other wireless operators have similarly deployed more spectrally efficient technologies, Verizon Wireless is an extremely efficient user of spectrum when one considers the number of customers served and the amount of spectrum licensed to it. In the cellular, PCS, and SMR bands that currently accommodate most commercial wireless customers, Verizon Wireless serves 1.97 million customers per MHz of spectrum – almost triple the intensity of use that CTIA reports for U.S. licensees generally.²⁹⁰ In short, Verizon Wireless has made the most of technological innovations that maximize spectrum capacity.

As Verizon Wireless builds out its 4G network, it will continue to be a market leader in spectral efficiency. In 2007, following the completion of extensive standards efforts and network trials, Verizon Wireless announced its plan to deploy a nationwide 4G network using LTE technology.²⁹¹ In 2008, Verizon Wireless invested over \$9 billion for 700 MHz spectrum in Auction 73 – including licenses for 22 MHz of contiguous spectrum throughout the continental United States and Hawaii. Verizon Wireless plans to use this spectrum to deploy its 4G LTE network. For customers, LTE will offer a number of distinct advantages over previous wireless technologies. Higher peak data speeds will be made achievable, latency will be greatly reduced, and traffic channels will be more scalable (allowing wireless providers to use spectrum resources). Further, as *Figure 9* shows, LTE will represent an improvement of 1.5 to 2 times the

²⁹⁰ CTIA May 12 Letter, Attachment at 9.

²⁹¹ Press Release, Verizon Wireless, “Verizon Selects LTE As 4G Wireless Broadband Direction” (Nov. 29, 2007), available at <http://news.vzw.com/news/2007/11/pr2007-11-29.html> (last visited Sept. 30, 2009)..

spectral efficiency over the best 3G wireless networks due to the use of a flat all-IP architecture and enhanced support for end-to-end quality of service for the network.²⁹²

	EVDO Rev A	LTE
Year Deployed	2006	2010
Spectrum	1.25 MHz x 2	10 MHz x 2
Spectral Efficiency	900 kbps/MHz	1500 kbps/MHz
Peak Data Rate	3.1 Mbps (down) 1.8 Mbps (up)	86 Mbps (down) 28 Mbps (up)
Average Data Rate	600-1400 kbps (down) 500-800 kbps (up)	5-12 Mbps (down) 2-5 Mbps (up)
Roundtrip Air Link Latency	60 msec	30 msec

Figure 9: Capabilities of Verizon Wireless' LTE Network

B. Current Spectrum Management Policies Have Facilitated This Innovative and Efficient Use of Spectrum and Should Be Maintained.

The Commission’s existing spectrum management policies have facilitated the wireless sector’s innovative and efficient use of spectrum described above. Indeed, the Commission’s approach over the past two decades has been to provide licensees with maximum flexibility to meet their business plans and the needs of their customers, with as little government intervention as possible.

For example, the Commission has enabled substantial innovation by consistently rejecting any regulation that would mandate the use of a specific technology by a wireless provider. Economists Thomas Hazlett and Matthew Spitzer have credited the “relaxation of the government technology mandate” with spurring “vigorous, socially valuable competition among

²⁹² Verizon Wireless LTE Paper at 10.

advanced wireless technologies,” noting that operators’ exclusive access to their spectrum gave them the incentive to invest aggressively.²⁹³ In turn, by consistently providing state-of-the-art networks, wireless carriers have fostered substantial innovation both in the development of spectrally efficient technologies and in products and services for consumers.

The Commission’s stated objective in this proceeding is to “build upon the Commission’s policies that have facilitated innovation.”²⁹⁴ It therefore should continue to encourage innovative activities by licensees by maintaining the same regulatory path and not micromanaging how spectrum is used.²⁹⁵ The regulatory flexibility historically provided to commercial wireless licensees has resulted in significant benefits to consumers, as wireless providers are constantly endeavoring to maximize their spectral efficiency to improve coverage and capacity. The industry’s strong and continuing record of spectral efficiency demonstrates that licensees are in the best position to manage their spectrum and develop further innovative means of bandwidth maximization. There is no basis for the Commission to depart from this successful model. It should instead maintain a regime that “makes the licensee a zealous protector of radio space, an aggressive investor in infrastructure, and a risk-taking entrepreneur in search of new ‘killer apps.’”²⁹⁶

²⁹³ See, e.g., Thomas W. Hazlett and Matthew L. Spitzer, *Advanced Wireless Technologies and Public Policy*, 79 S. CAL. L. REV. 595, 645 (2006).

²⁹⁴ *NOI*, ¶ 24.

²⁹⁵ Reply Comments of V-Comm, L.L.C., ET Docket No. 03-237, 16-17 (May 5, 2004) (“V-COMM Interference Temperature Replies”) (“Market forces are more suited than the Commission’s rule making process to weigh the costs and benefits of new technologies to improve the use of radio spectrum. These forces have worked to evolve radio communications and services over the past decades and will continue to do so without government intervention. To optimize spectrum use, the FCC should seek to minimize regulatory involvement and to allow incumbent licensees to maximize the use and benefits derived from spectrum through deployments of innovative technologies and methods that meet the needs of the markets.”).

²⁹⁶ *Advanced Wireless Technologies and Public Policy*, 79 S. CAL. L. REV. at 626.

1. Exclusive Use Licenses with Full Flexibility of Use Is the Best Model to Attract the Investment Needed for Continual Network Innovation.

The Commission has recognized the value of exclusive use licenses that give licensees the flexibility to make use of their spectrum in ways that respond to consumer needs and evolving technologies.²⁹⁷ This flexibility is crucial to facilitating the innovation and investment in wireless services that has characterized this sector's history and will be necessary for its future. Also essential is certainty that licensees will continue to enjoy exclusive and flexible use of their investments.

The Commission's policy of granting exclusive and transferable flexible use rights to CMRS licensees has fostered investment and the development of innovative products and services.²⁹⁸ This "exclusive use" licensing model has provided carriers with a powerful incentive to upgrade technology to increase the quality of their services and to expand the number of users and devices that communicate on their spectrum.²⁹⁹

²⁹⁷ *Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, Report and Order and Further Notice of Proposed Rulemaking, 18 FCC Rcd 20604, 20632 (¶ 57) (2003) ("For its part, the Commission has promoted innovative policies and licensing models that seek to increase communications capacity and efficiency of spectrum use, and make spectrum available to new uses and users. Of particular importance to this proceeding is the Commission's embrace of policies that provide exclusive use licensees in the Wireless Radio Services with increased flexibility to make use of their licensed spectrum in ways that respond quickly and effectively to evolving needs (e.g., consumer demands), technologies (e.g., access-enhancing or efficiency-improving innovations), and market developments. Typified by the Part 24 rules for broadband Personal Communications Services, the Part 27 rules for Wireless Communications Services, and the Part 101 rules for the 39 GHz Service, these licensing models have provided licensees increasing flexibility with regard to the applicable technical and service rules. In adopting these more flexible rules, the Commission has determined that it is in the public interest to afford Wireless Radio Services licensees significant flexibility in the design of their systems to respond readily to consumer demand for their services, thus allowing the marketplace to dictate the best uses of the licensed spectrum.").

²⁹⁸ *See, e.g.*, Thomas W. Hazlett, *A Law and Economics Approach to Spectrum Property Rights: A Response to Weiser and Hatfield*, 15 Geo. Mason L. Rev. 975, 1005 (2008) ("With broad, exclusive spectrum rights, de facto owners invest aggressively in wireless infrastructure complementary to their airwaves and then promote intense utilization of the opportunities thereby afforded. . . . Firms do not bid billions of dollars for licenses to obtain 'exclusive use,' but to exercise 'exclusive rights' so as to enable diverse non-exclusive spectrum access for subscribers, application providers, technology suppliers, and rival networks.").

²⁹⁹ Hazlett and Spitzer Interference Temperature Comments at 18-19.

The result has been efficient and intensive use of cellular, PCS, and SMR spectrum. The Commission has reiterated its commitment to flexibility and exclusivity in its service rules for other bands, and has embraced market forces, rather than the “shortages and waste” of administrative allocation, as the best means to ensure efficient use of spectrum.³⁰⁰ By granting licensees exclusive use of their assigned spectrum and the “flexibility to determine the types of services and the technologies and technical implementation designs used to provide those services,”³⁰¹ the Commission has fostered highly efficient and innovative use of spectrum. Economists have consistently endorsed Commission efforts to provide licensees with strong and flexible rights in the form of geographic licenses that can be purchased at auction and traded on the secondary market,³⁰² as it is through such policies that the Commission can ensure that spectrum is put to its highest and best use.³⁰³

³⁰⁰ Comments of Verizon and Verizon Wireless on a National Broadband Plan, GN Docket No. 09-51, at 70 (June 8, 2009) (“Verizon Broadband NOI Comments”). See Evan Kwerel and John Williams, FCC Office of Plans and Policy Working Paper Series, *A Proposal for a Rapid Transition to Market Allocation of Spectrum*, at iv (Nov. 2002).

³⁰¹ *Establishment of an Interference Temperature Metric to Quantify and Manage Interference and to Expand Available Unlicensed Operation in Certain Fixed, Mobile and Satellite Frequency Bands*, Notice of Inquiry and Notice of Proposed Rulemaking, 18 FCC Rcd 25309, 25311 (¶ 6) (2003).

³⁰² See, e.g., Ronald Coase, *The Federal Communications Commission*, 2 J.L. & Econ. 1 (1959); Arthur S. De Vany et al., *A Property System for Market Allocation of the Electromagnetic Spectrum*, 21 Stan. L. Rev. 1499 (1969); Douglas Webbink, *Radio Licenses and Frequency Spectrum Use Property Rights*, Comm. & The Law 4 (1987); Gregory Rosston and Jeffrey Steinberg, *Using Market-Based Spectrum Policy to Promote the Public Interest*, 50 Fed. Comm. L.J. 87 (1997); Thomas Hazlett, *The Wireless Craze, the Unlimited Bandwidth Myth, the Spectrum Auction Faux Pas, and the Punchline to Ronald Coase’s ‘Big Joke’: An Essay on Airwave Allocation Policy*, 14 Harv. J.L. & Tech. 335 (2001); Hazlett and Spitzer Interference Temperature Comments; William Baumol and Dorothy Robyn, *Toward an Evolutionary Regime for Spectrum Governance: Licensing or Unrestricted Entry?* (2006); Gerald Faulhaber, *The Future of Wireless Communications: Spectrum as a Critical Resource*, 18 Info. And Econ. Policy 256 (2006).

³⁰³ Reed Hundt, Chairman, Federal Communications Commission, Address at the CTIA Wireless 1997 Convention and Exposition (Mar. 4, 1997) (“We should get spectrum into the private market in a measured but steady way. We should let licensees use it flexibly, with easy transferability and no artificial build-out requirements, channel loading rules, or efficiency standards.”); Reed Hundt, Chairman, Federal Communications Commission, *The Hard Road Ahead – An Agenda for the FCC in 1997* (Dec. 26, 1996) (“Spectrum should be put to its most valued use. The Commission should trust markets to assure this result, although we should act as the “register of

The Commission's existing policies of exclusive licensee rights and regulatory flexibility have permitted widespread technology implementation and adoption, in large part due to investment that far outstrips investment in unlicensed spectrum.³⁰⁴ As Verizon Wireless has previously noted, CMRS licensees "have made multi-billion dollar investments in spectrum, R&D, and networks that have spurred innovation and created a robust market for wireless services."³⁰⁵ As a result, the wireless industry now provides robust digital voice and data services to 270 million customers in the U.S. on hundreds of devices.³⁰⁶ Moreover, wireless companies, including Verizon Wireless, plan further upgrades and implementation of new technologies, and significant investment will be required to achieve these ends. Verizon Wireless, AT&T, Cox Communications, and MetroPCS, for example, have all announced plans to deploy next-generation networks based on LTE that will promote continued growth of

deeds" for spectrum licenses – maintaining information as to which firms hold what licenses. Auctions allow markets to determine who will use the spectrum. We should also rely on markets to determine how the spectrum will be used. The Commission should move away from the old top-down, central planning approach of the past towards a decentralized approach that allows the spectrum licensee, rather than the government, to determine how spectrum will be used. . . . In my view our spectrum policy should, to the greatest extent possible, permit open entry, allow maximum technical and service flexibility, promote innovation and facilitate seamless networks so that spectrum is rapidly deployed to provide the greatest public benefits.”).

³⁰⁴ *Advanced Wireless Technologies and Public Policy*, 79 S. CAL. L. REV. at 646-647 (“In [exclusively-assigned, flexible-use spectrum] bands, licensees invest enormous sums to deploy advanced technologies. They do so due to two advantages offered by the property rights regime. First, the governance rules imposed on unlicensed users, including power limits and technology standards, are absent. With exclusive rights, decisions about governance are delegated to rights holders, providing the network operator wider latitude to optimize spectrum use than networks accessing unlicensed bandwidth enjoy. Second, unlicensed bandwidth potentially allows large numbers of users to access spectrum now and in the future without the permission of network investors. This constitutes a threat of appropriation for such investors, lowering expected returns for irreversible network infrastructure investments. Exclusive ownership of spectrum rights, alternatively, provides security for investors sinking capital complementary to the use of frequencies.”).

³⁰⁵ Verizon Broadband NOI Comments at 72.

³⁰⁶ *Id.*

broadband services.³⁰⁷ Because of the Commission's flexible, exclusive use regulatory approach for wireless, these developments can occur swiftly in response to marketplace forces rather than requiring governmental intervention. As the Commission considers making additional spectrum available for future use, it should make such spectrum available based on its exclusive use model and through its established open auction process.

2. The Commission's Existing Auction Policies Promote Innovation and Investment.

The *NOI* asks whether the Commission should consider changes in its auction mechanisms.³⁰⁸ Verizon Wireless believes that unfettered auctions are the most appropriate model for spectrum access, and it urges the Commission to continue its successful auction policies. The Commission has repeatedly found that open, competitive bidding serves the public interest and is the most efficient means for licensing spectrum.³⁰⁹ Open bidding gives all comers an equal opportunity to access spectrum. It also ensures that spectrum, which is a scarce, valuable resource, will be put to its highest and best use.³¹⁰ Professor Hazlett has cited the

³⁰⁷ See Press Release, Verizon Wireless, "Verizon Selects LTE As 4G Wireless Broadband Direction, Technology Platform to be Trialed in 2008" (Nov. 29, 2007), available at <http://news.vzw.com/news/2007/11/pr2007-11-29.html> (last visited Sept. 30, 2009); Marin Perez, *MetroPCS Chooses LTE For 4G Wireless Network*, InformationWeek, Aug. 13, 2008, available at <http://www.informationweek.com/story/showArticle.jhtml?articleID=210003630> (last visited Sept. 30, 2009); Press Release, AT&T, "AT&T Acquires Key Spectrum To Set Foundation For Future Of Wireless Broadband, More Choices For Customers" (Apr. 3, 2008), available at <http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=25428> (last visited Sept. 30, 2009); Press Release, Cox Communications, "Cox to Launch Next Generation Bundle with Wireless in 2009" (Oct. 27, 2008), available at http://media.corporate-ir.net/media_files/irol/76/76341/release102708.pdf (last visited Sept. 30, 2009).

³⁰⁸ *NOI*, ¶ 31.

³⁰⁹ See, e.g., *2004 Biennial Regulatory Review*, Wireless Telecommunications Bureau Staff Report, 20 FCC Rcd 124 (2005).

³¹⁰ See, e.g., *Public Notice, DA 00-49; Auction of C and F Block Broadband PCS Licenses; NextWave Personal Comm'ns, Inc. and NextWave Power Partners Inc.*, Order on Reconsideration, 15 FCC Rcd 17,500, 17,514-15 (¶ 27) (2000) ("Section 309(j) embodies a presumption that licenses should be allocated as a result of an auction to those who place the highest value on the use of the spectrum. Such entities are presumed to be those best able to put the licenses to their most efficient use.").

Commission's wireless auctions as "a paradigmatic example of efficient regulatory reform."³¹¹

The Commission should continue to conduct open auctions and maintain its policy of rejecting calls for closed bidding.³¹²

In its most recent report on the state of competition in the wireless market, the Commission credited its recent auctions with enhancing competition, noting that "[t]he results of the recent auctions indicate that the Commission's spectrum allocation and assignment policies have helped minimize spectrum-related entry barriers."³¹³ Indeed, the Commission's most recent major auction (Auction No. 73, the auction of 700 MHz band licenses), resulted in "a diverse mix of new entrants and small regional and rural providers," in addition to nationwide providers, "acquiring access to the spectrum needed to deploy the next generation of wireless networks."³¹⁴ Small and rural providers "won spectrum that almost covers the entire United States," indicating that the auction was successful in promoting access to spectrum nationwide.³¹⁵ Other prospective entrants had every opportunity to win licenses in these auctions, including Google, which had pushed aggressively for the adoption of open access requirements on the 700 MHz C

³¹¹ Thomas W. Hazlett, U.S. Wireless License Auctions: 1994-2009 at 2 (July 14, 2009) (working paper presented to the ACCC Regulatory Conference in Brisbane, Australia, July 30-31, 2009), on file with the George Mason University School of Law), *available at* <http://mason.gmu.edu/~thazlett/pubs/U.S.%20Wireless%20Licenses%20Auctions%201994-2009.doc> ("Hazlett Auctions Working Paper").

³¹² *See, e.g., Amendment of the Commission's Rules Regarding Installment Payment Financing for Personal Commc'ns Servs. (PCS) Licensees*, Sixth Report and Order and Order on Reconsideration, 15 FCC Rcd 16,266, 16,267-69 (¶ 2) (2000) (eliminating closed bidding for certain C and F block licenses).

³¹³ *Thirteenth Annual CMRS Competition Report*, ¶ 68.

³¹⁴ *Id.* The Commission also noted that "69 percent of the licenses won were by bidders other than the nationwide wireless incumbents, and a bidder other than a nationwide incumbent provider won a license in every market." *Id.*

³¹⁵ *Id.*

Block.³¹⁶

The Commission's AWS-1 auction was similarly successful. Professor Hazlett observed that while T-Mobile, a nationwide wireless operator, was the leading purchaser, it was known to be severely spectrum-constrained.³¹⁷ As a result of its acquisitions in the AWS-1 auction, T-Mobile has been able to commence construction of a next-generation wireless network.³¹⁸ While the AWS-1 auction did involve significant incumbent bidding, Professor Hazlett found that such bidding "was driven by spectrum demand rather than entry deterrence."³¹⁹ Indeed, the capacity demands of the data applications increasingly desired by consumers is well-known.³²⁰

Moreover, auctions have worked well to place spectrum in the hands of those who value it the most highly, including small wireless providers. While certain organizations, such as RCA, have complained of an inability to access spectrum, a review of RCA's membership

³¹⁶ Before Verizon Wireless placed its first C Block bid in round 27, nine of the twelve bidders that had placed a bid on a C Block Regional Area Grouping (REAG) had already ceased bidding or withdrawn their bids for C Block licenses, as Google had steadily driven up the price and eventually pierced through the reserve amount. By Round 30, Verizon Wireless became the high bidder in the C block, because the total of the company's bids on the individual REAG licenses exceeded Google's previously winning bid on the entire 50-state package. Although the auction continued for 230 more rounds, only one company chose to outbid Verizon Wireless and on just the Alaska REAG license. Significantly, in the round just before it dropped out of the auction, Google could have topped Verizon Wireless' entire C Block bid for an additional amount of only \$242 million, substantially less than the average value by which Google's market cap increased each Wall Street trading day throughout 2007. Miguel Helft, *An Auction That Google Was Content to Lose*, N.Y. Times, Apr. 4, 2008, available at <http://www.nytimes.com/2008/04/04/technology/04auction.html> (last visited Sept. 30, 2009).

³¹⁷ Comments of Verizon Wireless, WT Docket No. 06-150, Attachment A, Thomas W. Hazlett, Regulatory Policy at 700 MHz: Competition, Auction Receipts, and Economic Welfare at 12 (May 23, 2007) ("Hazlett 700 MHz Statement").

³¹⁸ Comments of T-Mobile USA, Inc., GN Docket No. 09-51, at 2-3 (June 8, 2009) ("T-Mobile Broadband Plan Comments") ("Including auction payments, T-Mobile has invested over \$7 billion thus far to build out its AWS-1 service offering, which provides 3G mobile broadband, generating and preserving thousands of jobs as it deploys its facilities and rolls out new 3G-capable handsets and other devices.").

³¹⁹ Hazlett 700 MHz Statement at 12.

³²⁰ See, e.g., Peter Burrows, *Can AT&T Meet iPhone Network Demands?*, BusinessWeek (Aug. 23, 2009), available at http://www.businessweek.com/technology/content/aug2009/tc20090823_412749.htm (last visited Sept. 30, 2009).

demonstrates otherwise. As an initial matter, according to a chart from RCA’s home page, RCA members have spectrum covering 73 percent of the U.S. land area.³²¹

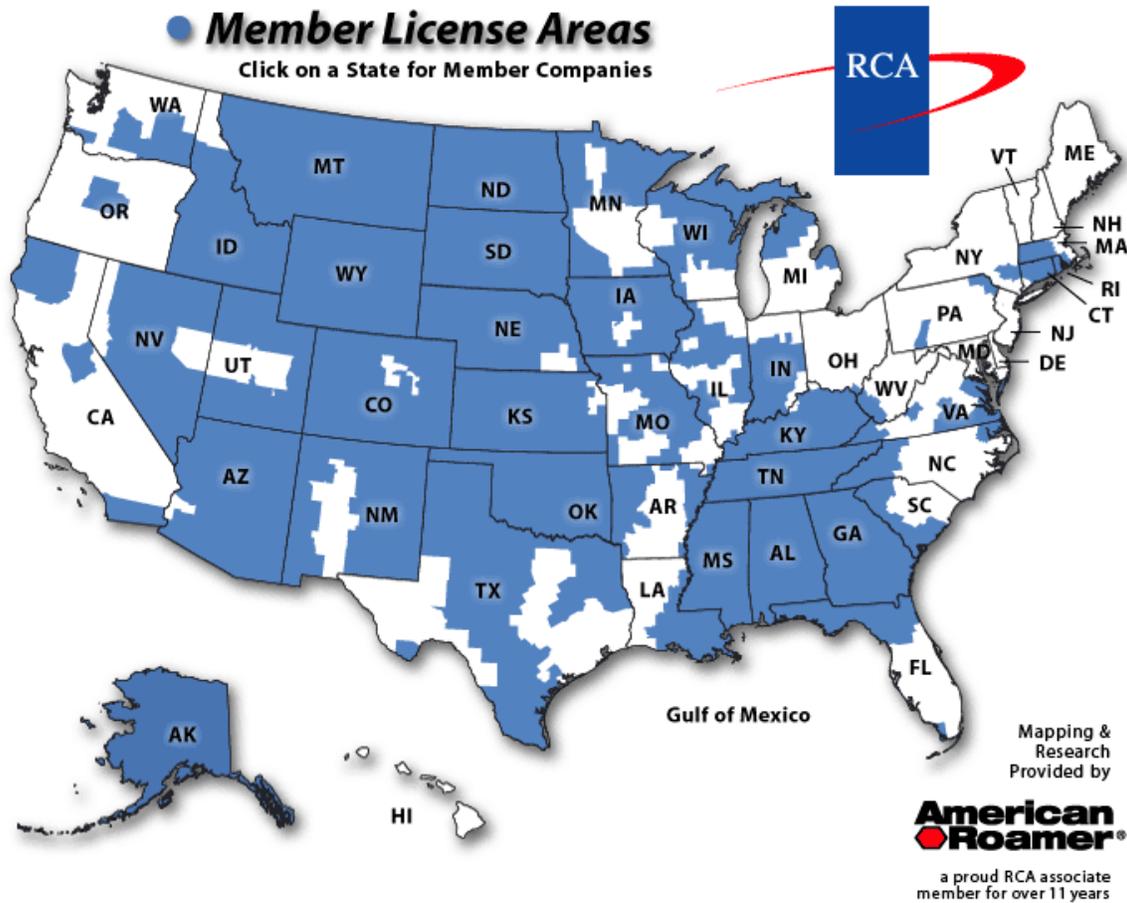


Figure 10: RCA Member License Areas

Based upon the data provided through this map, Verizon Wireless identified 82 licensed RCA members, and then analyzed the participation of those RCA members in recent FCC mobile auctions.³²² In Auction No. 66, Verizon Wireless found that over 70 percent of the participating RCA members won licenses:

³²¹ Rural Cellular Association, <http://www.rca-usa.org/> (last visited Sept. 30, 2009).

³²² Verizon Wireless used geographic data and names provided through the interactive map at http://americanroamer.com/rca/rca_members.php and cross-indexed that information against the FCC’s ULS ownership database. The ULS ownership database highlights information filed on FCC Form 175 “short form”

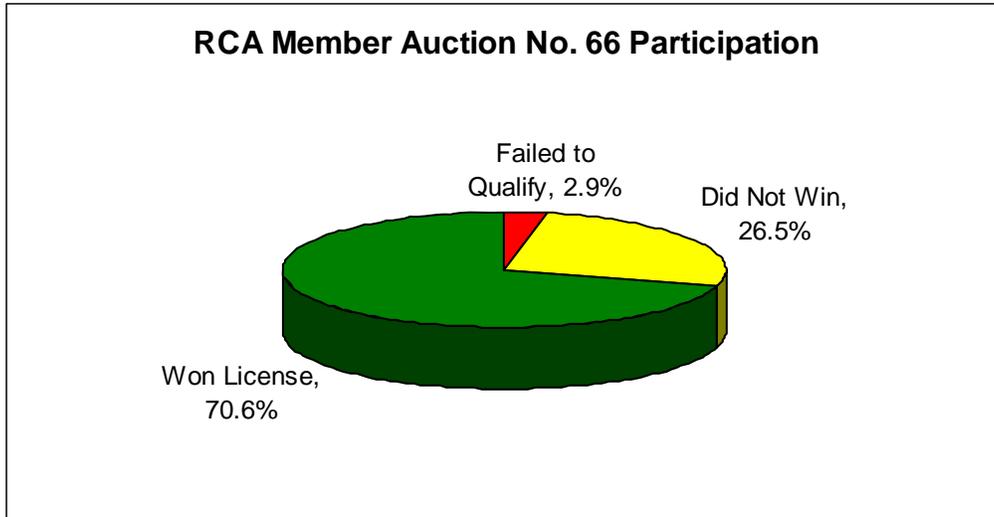


Figure 11: RCA Member Participation in Auction No. 66

Similarly, in Auction No. 73, 60 percent of participating RCA members won licenses:

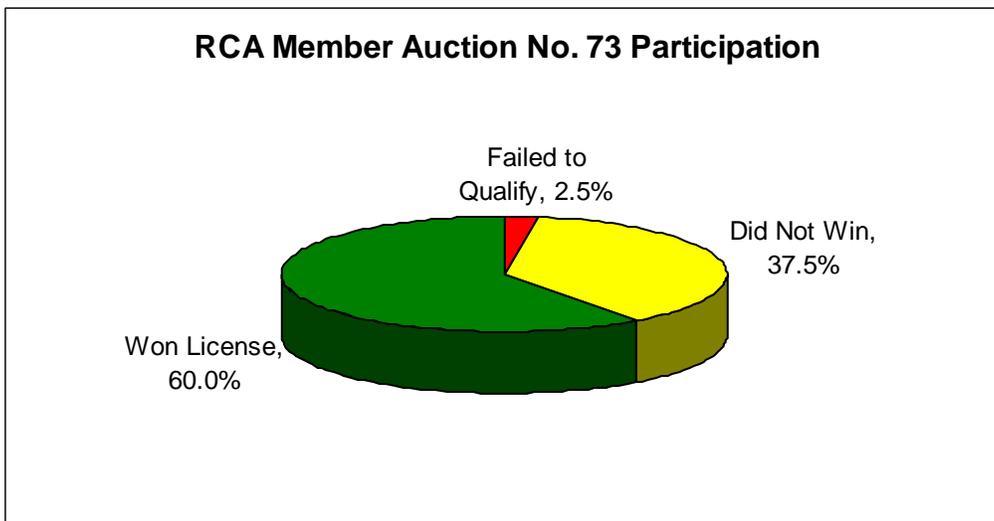


Figure 12: RCA Member Participation in Auction No. 73

auction applications, thereby enabling Verizon Wireless to determine whether an RCA member participated in particular auctions. For purposes of this analysis, Verizon Wireless concentrated on auctions that attracted broad participation – Auction No. 66 for AWS spectrum and Auction No. 73 for 700 MHz spectrum. Verizon Wireless then determined which RCA members obtained licenses by reference to the post-auction “winning bidders” Public Notices. See Auction of Advanced Wireless Services Licenses Closes; Winning Bidders Announced for Auction No. 66, DA 06-1882 (rel. Sept. 20, 2006), available at <http://wireless.fcc.gov/auctions/default.htm?job=release&id=72&y=2006> (last visited Sept. 30, 2009); Auction of 700 MHz Band Licenses Closes, DA 08-595 (rel. Mar. 20, 2008), available at <http://wireless.fcc.gov/auctions/default.htm?job=release&id=72&y=2008> (last visited Sept. 30, 2009).

These statistics demonstrate that, in fact, small and rural companies have been able to access needed spectrum through FCC auction mechanisms.

In addition to the benefits discussed above, auctions are also regarded as an efficient tool for assigning the exclusive rights that are the hallmark of effective spectrum regulation.³²³ As a result, licensees of these exclusive, auctioned spectrum licenses are not encumbered by the need to seek permission from the government to move forward with new and innovative technology or uses – instead they are able to nimbly act upon any capability that is desired by customers. Parties who most value the rights granted by exclusive licenses are able to quickly obtain and deploy service. The Commission should not alter this effective mechanism for providing access to spectrum.³²⁴

3. The Secondary Market Is a Valuable Source of Access to Spectrum.

A dynamic secondary market is an important spectrum management tool that allows spectrum to flow to its best and most efficient use as demand and supply conditions change.³²⁵ The Commission has taken several steps to facilitate wireless service providers' access to spectrum on the secondary market, and these policies have helped achieve the Commission's goal of "permit[ting] spectrum to flow more freely among users and uses in response to economic demand."³²⁶

³²³ Hazlett Auctions Working Paper at 28.

³²⁴ NOI, ¶ 31.

³²⁵ See John W. Mayo and Scott Wallsten, *Enabling Efficient Wireless Communications: The Role of Secondary Spectrum Markets*, The Georgetown Center for Business and Public Policy, June 2009 ("Mayo-Wallsten") at 2, available at <http://cbpp.georgetown.edu/75849.html> (last visited Sept. 30, 2009).

³²⁶ NOI ¶ 32. See also *Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, Second Report and Order, Order on Reconsideration, and Second Further Notice of Proposed Rulemaking, 19 FCC Rcd 17503, 17505 (¶ 1) (2004).

First, in 1996, the Commission expanded the ability of wireless licensees to engage in secondary market transactions through the partitioning of licensed service areas and/or the disaggregation of spectrum.³²⁷ It concluded at the time that these options can provide licensees with the flexibility to use spectrum more efficiently, increase opportunities for entry into the wireless market, speed service to unserved and underserved areas, and provide a funding source to enable licensees to innovate and build out their systems.³²⁸ The Commission later found that these policies also help bring wireless services into rural areas by allowing rural carriers to purchase licenses that best meet their service area and financial needs.³²⁹ The Commission's rules permitting partitioning and disaggregation have resulted in the creation of hundreds of new licenses and have proved an effective means of ensuring spectrum is used in the most efficient way by those best able to use it.³³⁰

In 2000, the Commission initiated a far-reaching secondary market policy review designed to promote more efficient use of spectrum, remove regulatory uncertainties, and

³²⁷ See *Geographic Partitioning and Spectrum Disaggregation by Commercial Mobile Radio Services Licensees and Implementation of Section 257 of the Communications Act – Elimination of Market Entry Barriers*, Report and Order and Further Notice of Proposed Rulemaking, 11 FCC Rcd 21831 (1996) (adopting rules permitting partitioning and disaggregation by all broadband PCS licensees, and proposing adopting similar partitioning and disaggregation rules for cellular and General Wireless Communications Services licensees) (“*Partitioning/Disaggregation Order*”), *aff’d* 15 FCC Rcd 8726 (2000); see also *Geographic Partitioning and Spectrum Disaggregation by Commercial Mobile Radio Services Licensees and Implementation of Section 257 of the Communications Act – Elimination of Market Entry Barriers*, Second Report and Order, 15 FCC Rcd 10432 (2000) (adopting rules for spectrum disaggregation by cellular licensees, maintaining existing partitioning rules for initial cellular licensees, and extending partitioning rules to unserved area licensees).

³²⁸ *Partitioning/Disaggregation Order*, ¶¶ 3-4.

³²⁹ *Facilitating the Provision of Spectrum-Based Services to Rural Areas and Promoting Opportunities for Rural Telephone Companies To Provide Spectrum-Based Services*, Notice of Inquiry, 17 FCC Rcd 25554, 25558-59 ¶ 8 (2002).

³³⁰ In fact, of the 102 original A Block and B Block MTA PCS licenses, only 17 have not been partitioned and/or disaggregated, resulting in 717 active A and B Block PCS licenses today.

establish clear policies and rules concerning spectrum leasing.³³¹ In 2003, it authorized the leasing of spectrum usage rights in the secondary market, finding that providing a diverse array of parties the opportunity to access spectrum through leasing arrangements would “significantly advance our goal of promoting facilities-based competition in broadband and other communications services as well as our objective to ensure more efficient, intensive, and innovative uses of spectrum.”³³² With respect to some leasing arrangements (*i.e.*, spectrum manager leases), the Commission subsequently eliminated altogether the requirement of prior regulatory approval and the number of wireless services whose licensees can avail themselves of the leasing option.³³³ At the same time, the Commission made changes to its application processing rules to streamline the approval process for leases and transfers/assignment, with many transactions qualifying for “immediate approval procedures.”³³⁴ These processing reforms have reduced the average time for the Commission to act on an application proposing transfer of a PCS license from 151 days in 1998 to approximately 30-40 days today.³³⁵

All of these Commission reforms have significantly expanded secondary market opportunities, granting licensees considerable flexibility – as well as a powerful financial

³³¹ See *Principles for Promoting the Efficient Use of Spectrum by Encouraging the Development of Secondary Markets*, Policy Statement, 15 FCC Rcd 24178 (2000); *Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, Notice of Proposed Rulemaking, 15 FCC Rcd 24203 (¶¶ 14-82) (2000).

³³² See *Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, Report and Order and Further Notice of Proposed Rulemaking, 18 FCC Rcd 20604, 20623 (¶ 39) (2003).

³³³ See *Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, Second Report and Order, Order on Reconsideration, and Second Further Notice of Proposed Rulemaking, 19 FCC Rcd 17503, 17528-17536, (¶¶ 51-66) (2004).

³³⁴ *Id.*, ¶¶ 10-50.

³³⁵ Mayo-Wallsten at 26.

incentive – to make unused spectrum available to other carriers. According to data compiled from the Commission’s Universal Licensing System (“ULS”), the number of approved transfer/assignment applications jumped from an average of roughly 620 per year for the years 1997-1999 to an average of over 2,500 for the years 2000-2008.³³⁶ A similar increase is seen in the leasing of spectrum. The number of spectrum lease applications/notifications filed has grown from 120 in 2004 to an average of 573 over the past three calendar years.³³⁷ Indeed, as of September 27, 2009, there were 2,632 spectrum leases. Of those leases, 1,763 were “long term,” with 1,515 involving arrangements where the lessee has *de facto* control over use of the spectrum. Leasing has been utilized by smaller rural carriers, including Commnet Wireless, GCI Communication, Long Lines Wireless, MTPCS, Pioneer Telephone, RSA 1 Limited Partnership d/b/a Cellular 29 Plus, and USA Communications. In addition, at least one provider has gained access to a nationwide license pursuant to a spectrum leasing arrangement.³³⁸

To analyze the efficacy of the leasing option, Verizon Wireless undertook an examination of ULS data related to active leases of broadband PCS spectrum.³³⁹ Verizon Wireless selected broadband PCS as being representative of a mature, market-area licensed service appropriate for leasing (unlike cellular, which is largely site-licensed, and the BRS/EBS band, where a large

³³⁶ Mayo-Wallsten at 21, Table 3. These figures are for approved applications, and thus do not reflect the total number of separate licenses or service areas in which spectrum was transferred. The primary radio services reflected in this calculation are Cellular, PCS, Paging, BRS, EBS, Microwave, Public Safety, Land Mobile, Industrial/Business, and Coast Guard.

³³⁷ Mayo-Wallsten at 22-23, Tables 4 and 5.

³³⁸ Long-Term *De Facto* Transfer Lease Application, File No. 0003108073 (filed July 17, 2008); *Crown Castle Announces Long-Term Modeo Spectrum Lease*, News Release, Crown Castle, July 23, 2007; ULS Lease ID L000002305 (covering the 1670-1675 MHz band).

³³⁹ While Mayo & Wallsten have performed some analysis of the FCC’s secondary markets, their analysis concentrated on the number of completed leases. Verizon Wireless’s evaluation of the number of MHz-POPs actually under lease at any given point in time provides another metric for assessing the impact of secondary markets.

number of leases pre-date the lease filing system and are therefore unavailable for analysis).³⁴⁰

The results in the chart below demonstrate that, in fact, leasing is being widely used and has a broad impact on mobile spectrum:

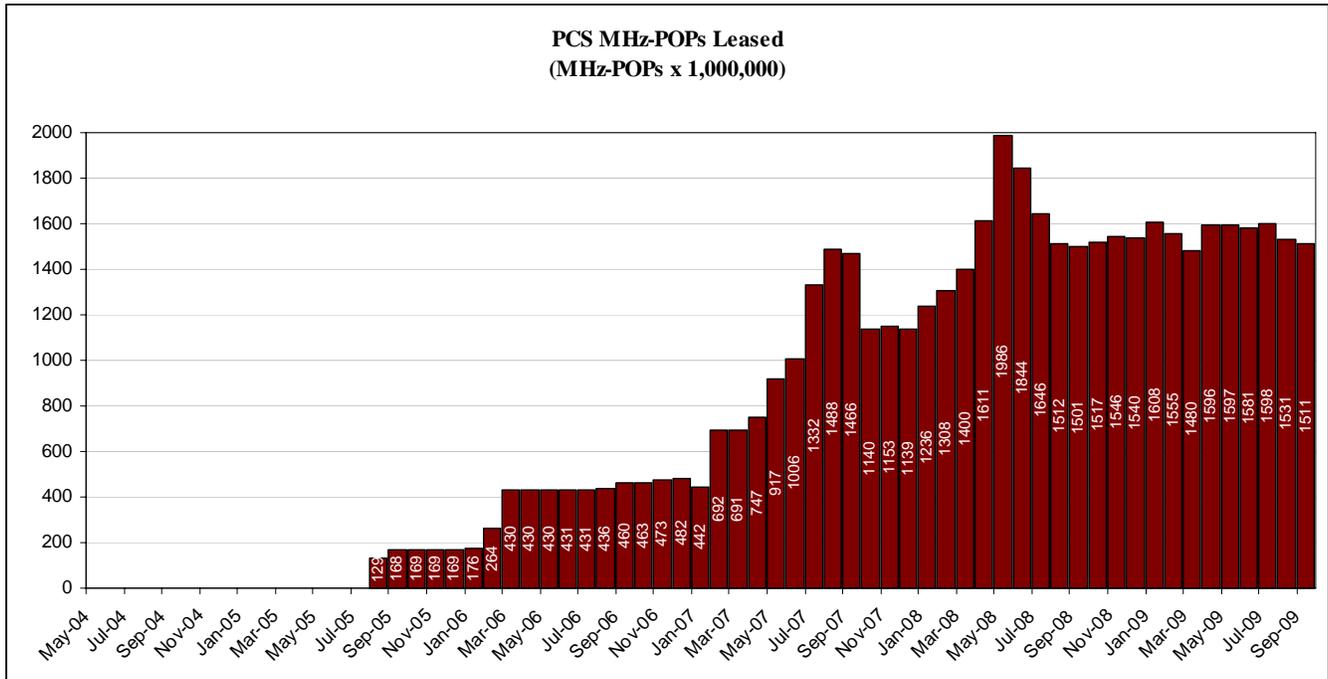


Figure 13: Total Broadband PCS MHz-POPs Subject to Lease

In fact, the net MHz-POPs under lease at present is roughly equivalent to a lease of 5 MHz nationwide.

There is no merit to the claim that small carriers cannot obtain spectrum through market-based mechanisms. To evaluate this assertion, Verizon Wireless analyzed assignments of

³⁴⁰ ULS lease data for PCS authorizations, database extract for Market Based Services as of 9/20/2009. Data limited to “CW” (PCS) leases in HD table, and net additions/subtractions to total amounts under lease derived by multiplying POPs, as defined in MP table, by frequency bands under lease as shown in MF table, and summing by lease. Leased MHz-POPs increased upon Grant Date for lease in HD table and subtracted upon Cancellation Date shown in HD table. Does not include a small number of leases for undefined areas where POPs in MP table was zero or null value. More information regarding the data contained in ULS records can be found in the ULS data dictionary, available at http://wireless.fcc.gov/uls/data/documentation/pa_ddef38.pdf (last visited Sept. 30, 2009).

market-area and cellular authorizations from 2008 through present.³⁴¹ Verizon Wireless identified, for each assignment transaction, whether the assignee or assignor was affiliated with Verizon Wireless, AT&T, Sprint, or T-Mobile (“Nationwide Carriers” or “N/W”). Based upon those classifications, the data shows that the overwhelming majority of such transactions take place between non-Nationwide Carriers. Moreover, the percentage of transactions where non-Nationwide Carriers assigned spectrum to Nationwide Carriers was almost exactly balanced by transactions involving the assignment of spectrum from Nationwide Carriers to non-Nationwide Carriers:

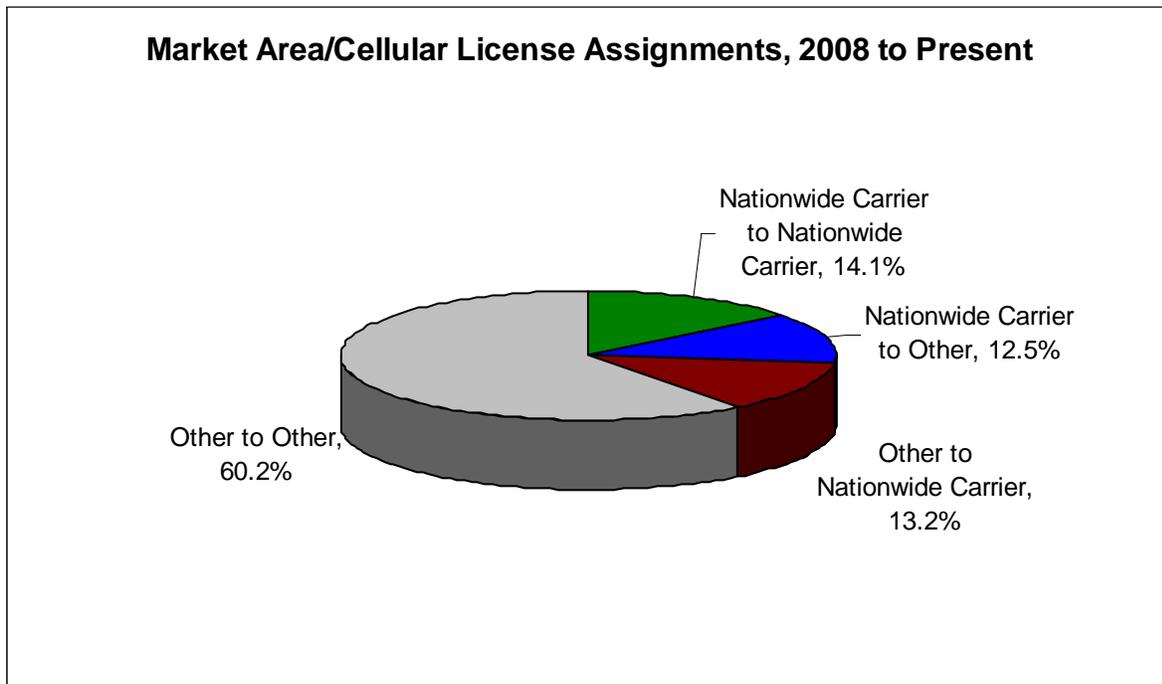


Figure 14: License Assignment Categories, 2008 to Present

The robust state of the secondary market for the purchase and lease of spectrum, and the ways in which that market serves small and large carriers alike, is illustrated by the emergence of

³⁴¹ Verizon Wireless obtained data from the FCC’s ULS databases. Verizon Wireless limited the dataset to those applications with a consummated status, where the consummation occurred after Jan. 1, 2008. Verizon Wireless also eliminated those applications that did not involve at least one market-based license or cellular license, defined as those authorizations that are currently “active” in either the L_Market or L_Cell database files.

marketplace actors such as Spectrum Bridge Inc., which serves as a clearinghouse for secondary market transactions. Spectrum Bridge provides “asset management tools and [a] comprehensive spectrum database” for entities ranging from “the smallest of local companies to the largest global spectrum holders and users.”³⁴² Using Spectrum Bridge’s SpecEx, a marketplace for spectrum, wireless companies can buy, sell and lease rights to their spectrum.³⁴³ Indeed, the president of the Rural Telecommunications Group (“RTG”) stated that “Spectrum Bridge simplified the process of finding the right spectrum to expand my clients’ and RTG members’ wireless networks. I was able to quickly search through hundreds of millions of dollars worth of available spectrum and find exactly what my clients needed.”³⁴⁴ As of September 2009, SpecEx listed licenses in spectrum bands including 700 MHz, AWS, EBS, and Broadband PCS as available for purchase or lease across an assortment of states.³⁴⁵

In a well-functioning secondary market, spectrum will migrate to more efficient uses as supply and demand shift.³⁴⁶ It is clear that the Commission’s existing secondary market policies are enabling access to spectrum. Indeed, as shown above, almost three-quarters of the cellular assignments over the last two years gave non-Nationwide Carriers access to additional spectrum.

³⁴² Spectrum Bridge, About Us, http://spectrumbridge.com/web/index.php?option=com_content&view=article&id=54&Itemid=7 (last visited Sept. 24, 2009).

³⁴³ *See id.*

³⁴⁴ Spectrum Bridge press release, *Wireless Carriers, Utilities, Railways And Others Have Made Specex.Com The Number One Source For Secondary Market Spectrum*, (Aug. 10, 2009), available at http://spectrumbridge.com/pdf/SpecExNumber1SourceSecondarySpectrum_7-30.pdf (last visited Sept. 30, 2009).

³⁴⁵ *See* SpecEx, Spectrum Listing Search Options, <http://www.specex.com/marketplace/search.aspx> (last visited Sept. 24, 2009). Advocates for some smaller wireless carriers claim that consolidation has made it impossible for them to compete as they are unable to acquire spectrum from larger carriers. *See* Rural Telecommunication Group, Inc. Petition for Rulemaking (filed Jul. 16, 2008). The statistics cited above, as well as the RTG’s statement, belie these claims.

³⁴⁶ Mayo-Wallsten at 2.

Moreover, approximately 10 billion MHz-pops of PCS spectrum have changed hands annually since 2003.³⁴⁷ Verizon Wireless urges the Commission to “fashion policies that better enable the growth and development of [secondary] markets.”³⁴⁸ Through continued Commission efforts to expand secondary market opportunities and facilitate secondary market transactions, the Commission will most effectively ensure continued access to spectrum, access which will promote considerable innovation and investment.

C. The FCC Should Not Alter its Successful Spectrum Policies, Particularly By Modifying its Exclusive, Flexible Use Licensing Model.

Some parties will likely use this proceeding to argue for new regulations restricting carriers’ acquisition, deployment and management of spectrum. Any consideration of such proposals would be a mistake and inconsistent with the historical record established by existing policies. First, there is no factual basis to entertain such proposals. Second, doing so would only inject uncertainty into the market – and Commission decisions and the economic literature demonstrate that uncertainty is the enemy of innovation and investment. Third, additional rules would risk harm to carriers and their customers, by impeding carriers’ ability to acquire and deploy the spectrum they need, where and when they need it, to meet customers’ growing demands. Fourth, as a legal matter, given the Commission’s consistent findings as to the wisdom of a limited role in managing spectrum, reversing ground by intruding into carriers’ use of spectrum would be problematic.

As the Commission considers new policies to promote spectrum access, it must not undermine the rights of exclusive use licensees. Furthermore, “a functioning market depends

³⁴⁷ *Id.* at 24.

³⁴⁸ *Id.* at 27.

fundamentally on a clear definition of underlying spectrum rights.”³⁴⁹ The FCC should continue to maintain its current exclusive use licensing model, with clearly defined spectrum rights for licensees, to perpetuate the innovative trends associated with the wireless industry. Adoption of mechanisms such as “overlays” and “underlays” operating on spectrum already exclusively licensed will only serve to undercut the efficient use of mobile spectrum and licensees’ flexibility to utilize the technologies and spectrum management techniques that best serve customers.

1. The Commission Must Provide Regulatory Stability for the Industry to Continue to Attract Necessary Investment in Wireless Products and Services.

As the Commission observed in the NOI, to enable continued innovation in the wireless industry, the Commission will need to ensure that “obstacles and deterrents to wireless innovation and investment” are reduced and eliminated.³⁵⁰ One of the most important steps the Commission can take therefore is not to alter or generate uncertainty about the regulatory approach for wireless that has proven so successful, particularly with regard to the spectrum rights of existing licensees.

The Commission has long observed the important role that regulatory stability plays in driving investment, going so far as to cite regulatory predictability as an “important prerequisite” for investment.³⁵¹ Such certainty is particularly important where significant build-out is required

³⁴⁹ Reply Comments of Verizon Wireless, WT Docket No. 02-135, at 2 (filed Feb. 28, 2003).

³⁵⁰ NOI, ¶ 11.

³⁵¹ *Implementation of Sections 3(n) and 332 of the Communications Act, Regulatory Treatment of Mobile Services*, Second Report and Order, 9 FCC Rcd 1411, 1421 (¶ 25) (1994) (“This approach should result in the durability of our regulatory classifications, thus promoting the regulatory predictability that is an important prerequisite for investment.”) (“*Second CMRS Report and Order*”).

to drive the deployment of new technologies to American consumers.³⁵² As the Commission proceeds with this inquiry and takes steps to implement its recently-reaffirmed policy goals of deploying advanced services to unserved and underserved areas, fostering continued investment through a clear, reliable regulatory framework remains especially important.³⁵³ By preserving regulatory certainty, the Commission will take important steps toward promoting infrastructure investment, robust competition, and access to advanced technologies and services.³⁵⁴ As the Commission has recognized, the alternative is to undermine investment and innovation, an outcome that is clearly inconsistent with the goals set forth in the NOI.³⁵⁵

The Commission's emphasis on regulatory predictability as a prerequisite to investment

³⁵² See *Appropriate Framework for Broadband Access to the Internet over Wireline Facilities, Universal Service Obligations of Broadband Providers, Computer III Further Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer III and ONA Safeguards and Requirements*, Notice of Proposed Rulemaking, 17 FCC Rcd 3019, 3022-33 (¶ 5) (2002) (stating that “broadband services should exist in a minimal regulatory environment that promotes investment and innovation in a competitive market. We recognize that substantial investment is required to build out the networks that will support future broadband capabilities and applications. Therefore, our policy and regulatory framework will work to foster investment and innovation in these networks by limiting regulatory uncertainty and unnecessary or unduly burdensome regulatory costs”).

³⁵³ *A National Broadband Plan for Our Future*, Notice of Inquiry, FCC 09-31 (2009); *Appropriate Regulatory Treatment for Broadband Access to the Internet over Wireless Networks*, Declaratory Ruling, 22 FCC Rcd 5901, 5911 (¶ 27) (2007) (“Through this classification, we provide the regulatory certainty needed to help spur growth and deployment of [wireless broadband] services. Particularly, the regulatory certainty we provide through this classification will encourage broadband deployment in rural and underserved areas, where wireless broadband may be the most efficient broadband option.”) (“*Wireless Internet Access Order*”).

³⁵⁴ *Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable And Timely Fashion, and Possible Steps To Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996*, Third Report, 17 FCC Rcd 2844, 2897 (¶¶ 133, 135) (2002) (finding that “our recent and recommended actions are designed to promote competition and investment through limiting regulatory cost and regulatory uncertainty” and stating the Commission’s “belief that robust competition, minimal regulation, and regulatory certainty create the best environment for increased availability for advanced telecommunications capability”).

³⁵⁵ See *Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities, Internet Over Cable Declaratory Ruling, Appropriate Regulatory Treatment for Broadband Access to the Internet Over Cable Facilities*, Declaratory Ruling and Notice of Proposed Rulemaking, 17 FCC Rcd 4798, 4802 (¶ 5) (2002) (“In this regard, we seek to remove regulatory uncertainty that in itself may discourage investment and innovation.”) (“*Cable Modem Declaratory Ruling*”).

has been affirmed by economists, who have observed that “[i]nvesting under the shadow of uncertain regulatory rules in an *innovative* service exacerbates the already substantial risks associated with that investment.”³⁵⁶ Conversely, a stable regulatory environment minimizes the policy barriers to new investment, as investors can understand how regulation will impact their decisions.³⁵⁷ The high valuation placed on certainty has led to significantly more investment in exclusive spectrum licenses than in unlicensed spectrum where operator rights are less clearly defined.³⁵⁸

Evidence of the impact of regulatory stability on investment choices is most clearly illustrated by the Commission’s spectrum auctions, the success of which have frequently been contingent on the service rules established in advance of the bidding process. As Verizon Wireless has previously observed, “[t]oo much uncertainty regarding the allocation can change the auction process from the Congressionally-mandated purpose of the rapid introduction of new technologies, products and services ‘without administrative delays,’ to nothing more than a high-risk speculation that in fact undermines the certainty that any spectrum market needs to function

³⁵⁶ AT&T’s and TCI’s Joint Reply to Comments and Joint Opposition to Petitions to Deny or to Impose Conditions, CS Docket No. 98-178, App. B, Declaration of Professors Janusz A. Ordover and Robert D. Willig, at 20-21 (Nov. 13, 1998) (emphasis in original). Professors Ordover and Willig further noted that “[w]hen an investor can be subjected to unanticipated regulatory constraints on its pricing or be required to sell its services at rates that do not reflect proper economic costs, the incentives to invest are potentially undermined.” *Id.*

³⁵⁷ Martin Taschdjian, *From Open Networks to Open Markets: How Public Policy Affects Infrastructure Investment Decisions*, Program on Information Resources Policy, Harv. Univ. (Nov. 2000) 33, *available at* http://pirp.harvard.edu/pubs_pdf/taschdj/taschdj-p00-5.pdf (“In order to minimize the policy barriers to new investment, policymakers need to create a stable regulatory environment, removing policy as much as possible as a source of uncertainty. In this context, stability does not mean that policy never changes. Rather, it implies that the conditions that will cause intervention are announced in advance, so that investors understand and can consider the policy impacts on their decisions.”).

³⁵⁸ Thomas W. Hazlett, *Optimal Abolition of FCC Spectrum Allocation*, 22 *Journal of Economic Perspectives* 103, 123 (Winter 2008) (“Over the past decade, U.S. regulators have allocated hundreds of MHz for additional unlicensed use, yet it has generated relatively little economic activity. Very substantial investments, in contrast, continue to be made by wireless operators gaining new exclusive rights, often bidding billions of dollars for the privilege. . . . [n]o investment approaching this scale has been observed using unlicensed airwaves.”).

properly.”³⁵⁹ Where potential bidders cannot be assured of the commercial viability of their spectrum because of unsettled or improperly settled regulatory issues, an environment is created that discourages participation and drives down revenues.³⁶⁰

The damaging impact of uncertainty on auction results was most recently demonstrated by the failure to attract bids for the 700 MHz D Block. The Commission’s approach to the D Block was based on the premise that a commercial entity would build a broadband network for public safety in exchange for public safety’s spectrum.³⁶¹ However, the significant uncertainty associated with this approach made prospective bidders unable to determine what obligations they might be incurring, which ultimately led to the D Block’s failure to attract a successful bidder.³⁶²

2. There Is No Basis for Spectrum Aggregation Limits or A Lowered Spectrum Screen.

The Commission has asked how it can foster new deployments and services by promoting access to spectrum.³⁶³ Consistent with this goal, Verizon Wireless urges the Commission to continue allowing the marketplace to foster innovation and not to impose a spectrum cap or lower spectrum screen that would make it more difficult and costly for a service

³⁵⁹ Reply Comments of Verizon Wireless, ET Docket No. 02-135, at 5 (July 23, 2002).

³⁶⁰ See, e.g., *Service Rules for the 698-746, 747-762 and 777-792 MHz Bands, Implementing a Nationwide, Broadband, Interoperable Public Safety Network in the 700 MHz Band*, Third Further Notice of Proposed Rulemaking, 23 FCC Rcd 14301 (2008) (Concurring Statement of Commissioner Michael J. Copps) (“Ambiguities like these are essential to address up-front. If we leave them to later, uncertainties can only discourage potential bidders from participating.”).

³⁶¹ Comments of Verizon Wireless, WT Docket No. 06-150, at 3 (June 20, 2008).

³⁶² *Id.* at 2-3.

³⁶³ *NOI*, ¶ 33.

provider to meet consumer demands for innovative devices and services.³⁶⁴ In a separate proceeding, the Rural Telecommunications Group (“RTG”) proposed that the Commission impose a spectrum cap of 110 MHz for all spectrum below 2.3 GHz.³⁶⁵ A cap would, however, contravene the Commission’s goals in this proceeding, because it would promote neither efficient use of spectrum nor innovation, nor is it necessary to maintain competition. Moreover, following the Commission’s repeal of spectrum caps as not in the public interest, and its finding, year after year, that CMRS competition is robust, there is no plausible legal basis for reversing course.

The record on RTG’s petition contains ample information as to why reinstating any spectrum cap would be ill-advised. Former Chief Economist Michael Katz concluded that not only would a cap not *promote* competition, but that a cap would actually *limit* competition by restricting output and preventing a wireless operator from growing both as the industry grows and as a result of innovation.³⁶⁶ Professor Katz further observed that a spectrum cap would harm innovation:

[C]onsider a carrier that was deciding whether to develop and introduce a new service or device that was projected to be very popular with

³⁶⁴ See Opposition of Verizon Wireless, RM No. 11498, Attachment A at 3 (Dec. 2, 2008) (“Verizon Wireless Opposition to RTG Petition”) (“A spectrum cap would restrict output because it would make it more difficult and costly (and in some cases, impossible) for a service provider to expand when it had developed, or – in the case of innovation – was contemplating the development of, a service or device that required additional spectrum to meet consumer demand. A spectrum cap would thus harm consumers through the resulting combination of higher prices, lower service quality, and diminished innovation in service and handset offerings.”).

³⁶⁵ *Rural Telecommunications Group, Inc. Petition for Rulemaking To Impose a Spectrum Aggregation Limit on all Commercial Terrestrial Wireless Spectrum Below 2.3 GHz*, RM No. 11498 (July 16, 2008) (“RTG Petition”). Verizon Wireless filed an opposition to the Petition for Rulemaking on December 2, 2008 and reply comments on December 22, 2008. See Verizon Wireless Opposition to RTG Petition; Reply Comments of Verizon Wireless, RM No. 11498 (Dec. 22, 2008).

³⁶⁶ See Michael Katz, “An Economic Analysis of the Rural Telecommunications Group’s Proposed Spectrum Cap,” ¶ 6, attached to Verizon Wireless Opposition to RTG Petition (Dec. 2, 2008) (“Katz Spectrum Cap Declaration”).

consumers and would increase the carrier's need for spectrum. If the spectrum cap were a binding constraint on the carrier, it would find it more difficult and/or costly to introduce the new service or device. For example, introducing the new service while being unable to expand the carrier's network capacity might lead to network congestion and service degradation. The result would be to weaken innovation incentives and discourage dynamic competition.³⁶⁷

The Commission's competition policy is designed to bring the benefits of competition to consumers, and it is thus concerned with harm to competition, not harm to competitors.³⁶⁸ A spectrum cap's negative impact on innovation helps illustrate how RTG's petition confuses these two harms. To the extent a CMRS provider is able to develop innovative new products and services, the introduction of these products or services would harm the entity's less innovative competitors. The innovation, however, brings great benefits to consumers, and it is these benefits that the Commission's competition policy is designed to protect.³⁶⁹

In repealing the spectrum cap, the Commission determined that it could best evaluate the impact of spectrum aggregation on a case-by-case basis. Time and again in the years after repealing the cap, the Commission validated that judgment. In granting wireless mergers, the Commission has repeatedly recognized that “[e]fficiencies generated through a merger can mitigate competitive harms if such efficiencies enhance the merged firm’s ability and incentive to compete and therefore result in lower prices, improved quality of service, enhanced service or new products,”³⁷⁰ an end result that is clearly consistent with the Commission’s innovation goals.

³⁶⁷ *See id.*

³⁶⁸ *Id.*, ¶ 9.

³⁶⁹ *Id.*

³⁷⁰ *See, e.g., Applications of Cellco Partnership d/b/a Verizon Wireless and Rural Cellular Corporation For Consent To Transfer Control of Licenses, Authorizations, and Spectrum Manager Leases, Memorandum Opinion and Order and Declaratory Ruling, FCC 08-181, ¶ 93 (Aug. 1, 2008) (“Verizon Wireless/RCC Order”); Applications of AT&T Inc. and Dobson Communications Corp. For Consent to Transfer Control of Licenses and Authorizations,*

The Commission's repeated grants of wireless transactions were the result of strict and intensive case-by-case review that has enabled the Commission to review transactions not only for loss of competition, but also for public interest benefits, such as the promotion of innovation and efficient spectrum use that is central to this proceeding.³⁷¹

The recent combination of spectrum held by Sprint Corporation and Clearwire Corporation demonstrates how the Commission's case-by-case review, rather than a hard spectrum cap, best facilitates innovation. This joint venture, which promises to provide a new broadband wireless service in the 2.5 GHz band, was praised by Commissioners Copps³⁷² and Adelstein³⁷³ as a venture that provides significant public interest benefit in the form of increased competition and consumer choice. Yet this venture could have been precluded had a rigid spectrum cap been applied to that transaction, as there were 43 markets impacted by the

Memorandum Opinion and Order, 22 FCC Rcd 20295, 20330 (¶ 75) (2007) (“*AT&T/Dobson Order*”); *AT&T Inc. and BellSouth Corp. Application for Transfer of Control*, Memorandum Opinion and Order, 22 FCC Rcd 5662, 5760 (¶ 201) (2007); *Applications of Midwest Wireless Holdings and Alltel Communications, Inc. For Consent to Transfer Control of Licenses and Authorizations*, Memorandum Opinion and Order, 21 FCC Rcd 11526, 11564 (¶ 107) (2006) (“*ALLTEL/Midwest Order*”); *Applications of Nextel Communications, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations*, Memorandum Opinion and Order, 20 FCC Rcd 13967, 14013 (¶ 129) (2005); *Applications of Western Wireless Corporation and Alltel Corporation For Consent to Transfer Control of Licenses and Authorizations*, Memorandum Opinion and Order, 20 FCC Rcd 13053, 13101 ¶ 135 (2005) (“*ALLTEL/Western Wireless Order*”); *In re Applications of AT&T Wireless Services, Inc. and Cingular Wireless Corporation for Consent to Transfer Control of Licenses and Authorizations*, Memorandum Opinion and Order, 19 FCC Rcd 21522, 21599 (¶ 204) (2004) (“*Cingular/AT&T Wireless Order*”); see also Horizontal Merger Guidelines, issued by the U.S. Department of Justice and the Federal Trade Commission, at § 0.1, n.6. (Apr. 2, 1992, revised Apr. 8, 1997) (“*DOJ/FTC Merger Guidelines*”) § 4.

³⁷¹ *Cingular/AT&T Wireless Order*, ¶ 4 (“Thus, for the first time in this sector, we articulate and apply our public interest standard by undertaking a case-by-case analysis of a large transaction without the presence of a bright-line rule related to spectrum aggregation.”).

³⁷² *Sprint Nextel Corporation and Clearwire Corporation Applications For Consent to Transfer Control of Licenses, Leases, and Authorizations*, Memorandum Opinion and Order, 23 FCC Rcd 17570, Statement of Commissioner Michael J. Copps at 1 (2008) (“*Sprint/Clearwire Order*”).

³⁷³ See *Sprint/Clearwire Order*, Statement of Commissioner Jonathan Adelstein at 1.

transaction that exceeded the Commission’s initial screen.³⁷⁴ The Sprint/Clearwire combination is proof positive that a rigid spectrum aggregation limit is an inappropriate, arbitrary tool that will only impede the Commission’s innovation goals.

The Commission should note that some of the same parties arguing for spectrum caps are also arguing for home market roaming, which would exacerbate the harms created by a cap.³⁷⁵ Home market roaming rules would encourage smaller carriers to rely on the serving carrier’s network to carry their traffic, while a spectrum cap would constrain the ability of the serving carrier to expand the capacity available. The net result would risk a poor quality of service to customers of both carriers.

The Commission can most effectively ensure opportunities for market entry through its auctions process. Indeed, in Auction No. 66, the Commission’s 2006 auction of AWS-1 spectrum, “designated entities” were able to purchase more than a half billion dollars’ worth of spectrum, and the second largest bidder in terms of licenses won was a consortium that held no CMRS spectrum prior to Auction No. 66. Both Auction No. 66 and Auction No. 73, the more recent 700 MHz auction, featured a large, diverse group of winning bidders, demonstrating that the Commission’s existing auction policies fully promote access to spectrum and that further regulation is not needed.³⁷⁶

Finally, the Commission would face very high legal hurdles were it to take up consideration of a new spectrum cap. When the Commission repealed the spectrum cap in 2001,

³⁷⁴ *Sprint/Clearwire Order*, ¶ 77.

³⁷⁵ *See, e.g.*, Reply Comments of the Rural Telecommunications Group, Inc., WT Docket No. 09-66 (July 13, 2009) (arguing in favor of a spectrum cap and removal of the home market roaming exception).

³⁷⁶ Verizon Wireless Opposition to RTG Petition at 18.

it did so on three grounds: (1) that the Commission’s policy objective of promoting competition could be achieved through less burdensome means, such as its case-by-case review of transactions, (2) that it would monitor and oversee the continued effectiveness of its case-by-case review through an annual report, and (3) that statutory enforcement tools were available to police anticompetitive conduct.³⁷⁷ Each of these grounds remains valid. The Commission has conducted a rigorous and fact-intensive case-by-case review in numerous transactions, a review that has led to the Commission in some cases imposing divestiture requirements on applicants when doing so was deemed necessary to prevent the risk of competitive harm. Further, the Commission has adhered to its statutory duty to produce an annual CMRS Competition Report, in which it has consistently concluded that the CMRS market is effectively competitive.³⁷⁸ Finally, the statutory tools the Commission cited as effective to police against anticompetitive conduct – Sections 332(c), 201, 202 and 208 – remain fully in place.³⁷⁹

There is no plausible ground for the Commission, having validated its own rationales for repealing the cap, to consider reversing course now. Such an abject departure from precedent will require compelling evidence as to change in facts.³⁸⁰ In fact, the Commission was obligated to eliminate the cap under Section 11 of the Communications Act, which *requires* the repeal of unnecessary regulations. The Commission has already found that a spectrum cap cannot pass

³⁷⁷ 2000 Biennial Regulatory Review: *Spectrum Aggregation Limits for Commercial Mobile Radio Services*, Report and Order, 16 FCC Rcd 22668 (¶ 29) (2001) (“*Spectrum Cap Sunset Order*”).

³⁷⁸ See, e.g., *Thirteenth Annual CMRS Competition Report*.

³⁷⁹ *Spectrum Cap Sunset Order* at ¶ 29 n. 84.

³⁸⁰ *Brusco Tug & Barge Co. v. NLRB*, 247 F.3d 273, 278 (D.C. Cir. 2001) (“[I]t is ‘axiomatic that an agency adjudication must either be consistent with prior adjudications or offer a reasoned basis for its departure from precedent.’”); *Robbins v. Reagan*, 780 F.2d 37, 48 (D.C. Cir. 1985) (“This court has long held that an agency’s change in direction from a previously announced intention is a danger signal that triggers scrutiny to ensure that the agency’s change of course is not based on impermissible or irrelevant factors.”).

muster under its Section 11 obligations, and, as the record in response to RTG's petition shows, no facts have changed to disrupt that finding.³⁸¹

Just as the Commission should not apply a spectrum cap, it should also not take steps to reduce the existing spectrum screen. The Commission currently considers cellular, broadband PCS, SMR, AWS-1, 700 MHz, and BRS spectrum in its initial screen. The record is replete with evidence that all of these bands are used to provide competitive wireless service,³⁸² and there is no basis for the Commission to remove any of them from consideration. Indeed, Verizon Wireless believes that additional bands should be factored into the screen, such as Educational Broadband Service ("EBS") and MSS/ATC spectrum.³⁸³ The Commission's spectrum screen and case-by-case review of wireless transactions are valuable tools in assessing the public interest benefits of secondary market transactions, and reducing the screen will not promote access to spectrum or spur innovation and investment in wireless technology.

³⁸¹ More extensive discussion regarding the Commission's Section 11 obligations is contained in Verizon Wireless' Opposition to the Petition for Rulemaking filed by the Rural Telecommunications Group on the subject of a spectrum cap. Verizon Wireless Opposition to RTG Petition at 2-7.

³⁸² See, e.g., *Sprint/Clearwire Order*, ¶ 53 ("In previous Commission orders, the Commission made a determination to include, in its evaluation of potential competitive harm, spectrum in particular bands that is suitable for the provision of mobile telephony services. In connection with these transactions, consistent with our determination to evaluate a broader combined product market for mobile telephony/broadband services, we will include spectrum suitable for the provision of wireless broadband over broadband networks, in addition to spectrum suitable for mobile voice and data services. As previously explained by the Commission, suitability is determined by whether the spectrum is capable of supporting mobile service given its physical properties and the state of equipment technology, whether the spectrum is licensed with a mobile allocation and corresponding service rules, and whether the spectrum is committed to another use that effectively precludes its uses for mobile telephony/broadband services. For the purposes of evaluating spectrum aggregation issues associated with this transaction we include in both our updated market-specific spectrum screen as well as our market-by-market analysis those spectrum bands designated for cellular, PCS, SMR, and 700 MHz services, as well as AWS-1 and BRS spectrum where available.").

³⁸³ Joint Opposition to Petitions to Deny and Comments of Cellco Partnership d/b/a Verizon Wireless and Atlantis Holdings LLC, WT Docket No. 08-95, at 24-29 (Aug. 19, 2008).

3. There Is No Basis for Imposing “Use-or-Lose” Construction Requirements.

In its NOI, the Commission asks whether the imposition of “use-or-lose” construction requirements should be expanded to additional licensees and bands.³⁸⁴ The Commission further asks whether licensees that will not be able to meet applicable construction deadlines should be required to make unused spectrum available on the secondary market.³⁸⁵ Verizon Wireless opposes such proposals, as they would undermine licensee rights in their spectrum, greatly hinder investment in wireless technologies, and do nothing to foster innovation or investment in wireless services.

The Commission has found that permitting licensees the flexibility to build out their licenses in the most economic fashion promotes innovation and serves the public interest.³⁸⁶ A “use-or-lose” mandate, on the other hand, would require licensees to make unsound investments in their spectrum by deploying facilities in specific markets before it is economically prudent to do so, simply to maintain their entire license area. Such a result is plainly inconsistent with the

³⁸⁴ NOI, ¶ 33. Under these requirements, “the licensee will lose its authorization for unserved portions of its license area, which will be returned to the Commission for reassignment” in the event that the licensee fails to meet its end-of-term construction benchmarks. *700 MHz Report & Order*, ¶ 153.

³⁸⁵ NOI, ¶ 33.

³⁸⁶ *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 and Further Notice of Proposed Rulemaking, 19 FCC Rcd 19078, 19122 (¶ 77) (2004) (“Our intent in providing licensees with a substantial service option is not to mandate, but to encourage and facilitate construction in less populated areas by providing licensees with sufficient flexibility to develop unique business plans that do not require ubiquitous coverage or coverage of densely populated areas. In keeping with our market-oriented policies, we do not propose to require licensees to deploy services where their market studies or other analyses indicate that service would be economically unsustainable.”) (“*Rural Report and Order and FNPRM*”); *Facilitating the Provision of Spectrum-Based Services to Rural Areas and Promoting Opportunities for Rural Telephone Companies to Provide Spectrum-Based Services*, Notice of Proposed Rulemaking, 18 FCC Rcd 20802, 20819 (¶ 34) (2003) (“[T]he Commission has taken a market-oriented approach to spectrum policy that, where possible, has allowed economic forces to determine build-out of wireless facilities and the provision of wireless services. The Commission has shifted towards providing licensees increased flexibility to tailor use of their spectrum to unique business plans and needs.”).

Commission’s stated policy of “stimulat[ing] investment and innovation that can improve our lives” and removing “unnecessary impediments to such investment and innovation.”³⁸⁷ Further, as CTIA has observed, “keep what you use” regimes have the potential to stifle deployment of innovative technologies, as licensees will be pressured to construct licenses prematurely based on inefficient technologies.³⁸⁸ CTIA has also observed that such a requirement would make it more difficult for licensees to access investment capital, an outcome that clearly contravenes the goals outlined by the Commission in its NOI.³⁸⁹

Use or lose proposals are premised on the idea that recapturing “fallow” spectrum will cause it to be used. This is incorrect for at least two reasons. First, the fact that a licensee may not be fully utilizing all of its spectrum at a point in time does not mean that the spectrum does not hold economic value or that it will not be utilized in the future. The Commission does not license spectrum in small amounts that track carriers’ gradual need for more. Instead it allocates and auctions spectrum infrequently, and in substantial amounts. Licensees who project that they may only need a small amount initially, but more longer term, are required to buy more than what they need if they are to acquire any at all. But the spectrum still has economic value as an asset that can be deployed when needed.³⁹⁰

³⁸⁷ NOI, ¶ 24.

³⁸⁸ Comments of CTIA – The Wireless Association, WT Docket No. 02-381, at 14 (Jan. 14, 2005) (“A ‘keep what you use’ regime may, for example, require a licensee to deploy infrastructure based on existing less efficient narrowband technologies when new more efficient wideband technologies are on the horizon.”).

³⁸⁹ *Id.* at 15 (“Investors in wireless carriers may withdraw their support if they are uncertain whether licensees will be able to retain the full value of the spectrum they acquired at auction or in private transactions. Moreover, Wall Street in general may become skittish about investing in the wireless industry if it believes that the Commission will change build-out and license renewal requirements in such radical or unpredictable ways.”).

³⁹⁰ Hazlett 700 MHz Statement at 7 (“[T]he removal of licenses (or parts of licenses) from active participants in the marketplace is a costly procedure. This is particularly so when the licenses grant users wide flexibility over services and technologies, as proposed for 700 MHz licenses. When such liberal rights are held by firms, the

Second, the reality is that to the extent that carriers take longer to build out their licenses, this typically occurs in less densely populated areas, and it is these areas that would be impacted by “use or lose” policies. However, these less densely populated regions are not areas where there is a shortage of available spectrum. Indeed, the Commission’s experience with the cellular spectrum undercuts any rationale for forcing “fallow” spectrum to be given up on the theory that it will then be put to use by another licensee. Under the Commission’s cellular licensing rules, an entity may file an application requesting a license to serve an “unserved area,” defined by the Commission as any area in a market outside of a licensee’s Cellular Geographic Service Area (“CGSA”) following the expiration of the license’s five-year exclusivity period.³⁹¹ As CTIA has noted, demand for unserved area licenses has been negligible in the past several years.³⁹² Cellular licensees have covered nearly all of the U.S. population, leaving any area unserved either unpopulated or otherwise incapable of being economically served. Indeed, the cellular unserved area process demonstrates that such requirements will predominantly require licensees to inefficiently follow administrative licensing steps simply to extend coverage to consumers – not to promote deployment of wireless services. Considering “use or lose” mandates would be particularly problematic were they to apply to previously granted licenses. Licensees who obtain

spectrum is available for use by others without regulatory barriers. Where one technology or business model does not admit to profitable opportunities, a licensee would (without regulatory constraints) elect not to extend services there, but would remain open to new possibilities that develop with changing demands, entrepreneurial innovation, or technological advance.”).

³⁹¹ *Amendment of Part 22 of the Commission’s Rules to Provide for Filing and Processing of Applications for Unserved Areas in the Cellular Service and To Modify Other Cellular Rules*, First Report and Order and Memorandum Opinion and Order on Reconsideration, 6 FCC Rcd 6185, 6200 (¶ 33) (1991).

³⁹² Petition for Rulemaking of CTIA – The Wireless Association, RM No. 11510, at 10 (filed Oct. 8, 2008) (“The general absence of Phase II filings bolsters CTIA’s understanding that there is little demand for spectrum potentially available under the unserved markets policy. Indeed, in the three years prior to the analog sunset, the Commission granted only *three new Phase II applications* where the applicant was not a pre-existing adjacent carrier expanding an existing CGSA.”) (emphasis in original).

spectrum via Commission auctions do so with legitimate expectations that their licenses will not be taken away if initial build-out and service requirements have been satisfied.³⁹³

4. Rules Addressing Technology Choices Should Not Be Considered.

The Commission should maintain its long-held policy³⁹⁴ – a policy it has found to be highly beneficial – of not imposing specific technologies or uses on exclusively licensed spectrum.³⁹⁵ In particular, the Commission should continue to allow exclusive licensees to deploy private or commercial services and use their spectrum for fixed or mobile uses. Further, the Commission should maintain its policy of affording exclusive licensees the ability to make use of whatever technology is deemed most acceptable for their allotted spectrum.³⁹⁶ This

³⁹³ In contrast, the Commission adopted its “keep-what-you-use” requirements for the 700 MHz band *prior* to auctioning the spectrum, allowing all affected parties to determine the devaluation that build-out mandates may cause to the licenses. *700 MHz Report & Order*, ¶¶ 153-177.

³⁹⁴ *See, e.g., Amendment of the Commission’s Rules to Establish New Personal Communications Services*, Third Memorandum Opinion and Order, 9 FCC Rcd 6908, 6919 (¶ 66) (1994) (“[T]he Commission attempted to adopt technical standards that did not intentionally favor one technology over another. We continue to believe that this flexible approach encourages and facilitates the broadest range of PCS services and devices by permitting licensees to determine the most economic and effective methods of using the spectrum.”).

³⁹⁵ *Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands*, Report and Order, 18 FCC Rcd 25162, 25170 (¶¶ 19-20) (2003) (“*AWS-1 Service Rules Order*”) (“[O]ur Part 27 rules provide a broader and more flexible regulatory framework that has been applied to different services in multiple spectrum bands. . . . The Part 27 rules are designed to promote flexibility and permit market forces rather than the Commission to determine what services are offered in the spectrum licensed under this rule part. Hence, the Part 27 rules permit a licensee to provide any services for which its frequency bands are allocated. This light-handed regulatory approach means that licensees in the 1710-1755 and 2110-2155 MHz bands will not be restricted to providing Commission-defined services. Spectrum licensed under Part 27 can be used in a multiple of ways by the same or different licensees, and the spectrum can be put to different uses across the country. As a result, the marketplace rather than the Commission will determine how this spectrum is to be used, and this should not only encourage research and investment but also spur the development and deployment of innovative services to consumers.”).

³⁹⁶ *Reallocation and Service Rules for the 698-746 MHz Spectrum Band (Television Channels 52-59)*, Report and Order, 17 FCC Rcd 1022, 1023 (¶ 1) (2002) (“The flexible allocation we adopt for the Lower 700 MHz Band will allow service providers to select the technology they wish to use to provide new services that the market may demand.”); *AWS-1 Service Rules Order* at ¶ 1 (“Licensees in these bands will have the flexibility to provide any fixed or mobile service that is consistent with the allocations for this spectrum. . . . [o]ur licensing plan will allow the marketplace rather than the Commission to ultimately determine what services are offered in this spectrum and what technologies are utilized to provide these services. The licensing framework that we adopt today for these bands will ensure that this spectrum is efficiently utilized and will foster the development of new and innovative technologies and services, as well as encourage the growth and development of broadband services.”).

current model allows for the market to adjust and move in whatever direction makes sense to meet user demand.³⁹⁷ Any new regulatory programs or oversight would unnecessarily introduce delays and obstacles to innovation.

Verizon Wireless urges the Commission to maintain its policy of placing minimal restrictions on licensees' use of their spectrum. The Commission's successful history resulting from minimal regulation demonstrates that "[w]hen regulated liberally, such that licensees have the right to broadly determine spectrum use within the allocated frequency space . . . [the exclusively-licensed, flexible use] model has proven adept at creating sharing opportunities, inventing and deploying compatible technologies, and maintaining and upgrading wireless infrastructure to accommodate a broad range of diverse, valuable uses."³⁹⁸

5. Spectrum "Overlays" or "Underlays" Are Not Appropriate for Spectrum Used as Intensively as CMRS Spectrum and Will Contravene the Commission's Objectives in This Proceeding.

The Commission asks whether it can promote innovation through the adoption of "underlays," "overlays,"³⁹⁹ and other mechanisms involving "the use of devices that operate below an acceptable interference level."⁴⁰⁰ The FCC already assembled an extensive record on this question, and determined not to pursue these mechanisms.⁴⁰¹ That record – and its decision

³⁹⁷ *AWS-1 Service Rules Order* at ¶ 20 (finding that allowing the marketplace rather than the Commission to determine how spectrum is used "means that licensees in these bands will be free to change the services they provide and the technologies that they utilize as market conditions change.").

³⁹⁸ *Advanced Wireless Technologies and Public Policy*, 79 S. CAL. L. REV. at 628-629.

³⁹⁹ The Commission defines "underlays" as permitting certain low-power, low-impact applications to co-exist with existing licensed operations, and "overlays" as expanded use rights by new users that are subject to the requirement that such use be on a non-interference basis to the operations of existing users. *NOI*, ¶ 26.

⁴⁰⁰ *Id.*

⁴⁰¹ *See Establishment of an Interference Temperature Metric to Quantify and Manage Interference and to Expand Available Unlicensed Operation in Certain Fixed, Mobile and Satellite Frequency Bands*, Order, 22 FCC Rcd 8938 (2007) (terminating the Commission's interference temperature inquiry).

– should inform its inquiry here. These mechanisms may be suitable alternatives in unlicensed or other bands subject to a narrow set of rules, where spectrum sharing is possible. However, they are inappropriate for spectrum used as intensively as CMRS spectrum,⁴⁰² and should not be considered as acceptable for any bands subject to exclusive use licensing. Implementing such mechanisms in exclusive use bands would cause significant damage to existing networks and the consumers who rely on them, would undermine incumbent licensees’ exclusive rights and deter innovation and investment, including further investment in technologies designed to maximize spectral efficiency.

(i) CMRS Licensees’ Intensive Use of Spectrum Makes Underlays and Overlays Technologically Infeasible.

The idea that underlays and overlays could promote increased use of and access to wireless spectrum incorrectly assumes that existing licensees operating in the band do not effectively use the spectrum for which they are licensed. That is certainly not the case for CMRS bands.⁴⁰³ As Verizon Wireless has observed in earlier proceedings, the Commission’s policies of increasing licensee flexibility, together with market forces, have enabled licensees to deploy new methods and technologies to manage and control access and interference to efficiently serve a large number of customers on their limited spectrum bands.⁴⁰⁴ Indeed, carriers have continually invested in technologies that have increased capacity and improved spectral

⁴⁰² Comments of V-COMM, L.L.C., ET Docket No. 03-237, at 24 (April 5, 2004) (“V-COMM Interference Temperature Comments”) (“Any introduction of new uncontrolled, unlicensed entrants will result in an increase in the system noise floor and negatively impact cellular and PCS networks. The difficulties in applying this concept to the CMRS bands arise from the fact that these bands are currently one of the most intensively used frequency bands in the electromagnetic spectrum.”).

⁴⁰³ *See supra* Section III.A.

⁴⁰⁴ Comments of Verizon Wireless, ET Docket No. 03-108, at 3 (May 3, 2004) (“Verizon Wireless Cognitive Radio Comments”).

efficiency in their licensed bands.⁴⁰⁵ Cellular and PCS spectrum in particular are heavily used.⁴⁰⁶ The digital air interface technologies used by commercial wireless providers, on a near real-time basis, adjust power levels so that they operate with the minimal power necessary for reliable operations. Any underlay operations, even at very low power levels, would undermine the performance and capacity of the wireless network. Put simply, the advanced technologies that enable unlicensed devices to operate “in the noise floor” are the same ones already being used by CMRS operators today to make the most efficient use of their licensed spectrum and provide the most robust level of service possible for their customers.

(ii) Overlays and Underlays Would Harm Existing Networks.

Any addition of overlays and/or underlays would serve only to decrease spectral efficiency. Indeed, where spectrum rights are non-exclusive, “licensees can not capture the benefits from deploying spectrum-conserving technology,”⁴⁰⁷ nor will they have the incentive to invest in it,⁴⁰⁸ and operators will be forced to respond with costly measures to regain the lost capacity.

⁴⁰⁵ See *supra* Section III.A. See also V-COMM Interference Temperature Comments at 16-18 (describing advances in technology and system design improvements that optimize the use of spectrum and reduce noise levels in a spectrum band).

⁴⁰⁶ V-COMM Interference Temperature Comments at 42 (April 5, 2004) (“Despite the heavy demands on system capacity, cellular and PCS providers have continued to support significant growth in usage. To meet this demand for service, cellular and PCS providers have deployed advanced digital technologies, improved system performance and engineering, and expanded their networks, which have allowed them to increase capacity and improve spectrum efficiencies in their bands.”).

⁴⁰⁷ Hazlett and Spitzer Interference Temperature Comments at 20, quoting Evan Kwerel and John Williams, FCC Office of Plans and Policy Working Paper Series, *A Proposal for a Rapid Transition to Market Allocation of Spectrum*, at 5 (Nov. 2002).

⁴⁰⁸ V-COMM Interference Temperature Comments at 32 (“Another problem inherent with establishing an ‘interference temperature’ limit, is that there would no longer be an incentive for licensed service operators to develop and deploy advanced technologies that reduce system interference and more efficiently utilize spectrum.”).

Allowing outside users access to exclusively licensed spectrum would expose the licensee to increasingly harmful interference, interference that could cause numerous harms to the licensee's network. As an initial matter, incumbents would suffer capacity losses in their licensed spectrum.⁴⁰⁹ Dr. Jackson found that use of an underlay, such as contemplated by the interference temperature proposal, would take resources away from a PCS operator just as reducing the allotted bandwidth would take away resources.⁴¹⁰ He concluded that "doubling the interference temperature would take away just as much capacity as would cutting the PCS license almost in half."⁴¹¹ Professors Hazlett and Spitzer similarly found that increased noise in licensed spectrum bands would lead to significant capacity losses and coverage reduction.⁴¹² Moreover, the concept of overlays and/or underlays is based on the faulty assumption that CMRS systems are designed to overcome maximum (peak) noise conditions all the time. In fact, they tolerate it at reduced quality levels for only brief moments of the day.⁴¹³ Because of these noise condition increases, the introduction of such overlays or underlays would significantly degrade the quality of service received by customers. These service degradations could include dropped calls, blocked calls, reduced voice quality, decreased data throughput, and an inability to locate an E-911 caller.⁴¹⁴

⁴⁰⁹ Hazlett and Spitzer Interference Temperature Comments at 36.

⁴¹⁰ Jackson Interference Temperature Declaration at 30.

⁴¹¹ *Id.*

⁴¹² Hazlett and Spitzer Interference Temperature Comments at 37-38.

⁴¹³ V-COMM Interference Temperature Comments at 20.

⁴¹⁴ In its comments opposing the Commission's "interference temperature" proposal, V-COMM expressed particular concern that the presence of other devices in the band would degrade E911 performance, stating that "an uncontrolled transmission from an opportunistic device that senses no signal above the interference temperature threshold could literally obliterate the signal needed to triangulate an emergency caller's location. Under such

Moreover, an increase in noise conditions would impair the network and reduce coverage, especially in a CDMA-based network. By requiring a CDMA system to inefficiently raise the power used to communicate to a single device in order to overcome an “underlay” use, there will be a ripple effect through the network that will require the power to be increased for other mobile devices both in this cell site and at adjacent cell sites (due to the increased interference being created).⁴¹⁵ However, because there is a limit to the amount of spectrum capacity available to the system, an increase in average power results in a fewer number of devices served. As such, any disturbances to an exclusive use licensee’s spectrum rights would detrimentally harm the capacity available for the licensee.⁴¹⁶ This increased average power would reduce the number of devices that could be served from a given cell site. Additionally, increased noise conditions from an “underlay” use would reduce coverage in buildings, urban canyons and rural areas. This would occur because, to overcome the increase in the noise floor, base stations will need to throttle up the power of all mobile devices leading mobile devices on the perimeter of the base station coverage area to be forced either to another base station (if available) or to drop from the network altogether since they were already at maximum power. Mobile devices have limited power capacity due to battery size and life, emission limits, and other technical constraints. The practical impact is that the coverage area from a particular base station will contract and the capacity of each base station will be reduced in response to the introduction of interfering underlay operations – a result clearly not in the public interest.

circumstances, licensed network operators would not be able to maintain the FCC-required location accuracy levels.” V-COMM Interference Temperature Comments at 30.

⁴¹⁵ Jackson Interference Temperature Declaration at 8.

⁴¹⁶ *Id.* at 23-26.

(iii) Overlays and Underlays Would Undermine Licensee Rights and the Commission’s Goal of Promoting Investment in Innovation.

The Commission’s stated goal in this proceeding is to promote investment in wireless technologies. As Verizon Wireless has demonstrated, clearly established spectrum rights are essential to continued innovation in wireless services. Allowing non-licensees to gain access to licensed spectrum would lead to very undesirable results by interfering with licensees’ investment-backed expectations. Essentially, allowing such access would forcibly reallocate existing licensees’ spectrum rights (along with the associated rights of their equipment manufacturers and customers) to another set of users. As Verizon Wireless has noted, such action replaces “a competitive market process with an administrative determination of how spectrum sharing should work.”⁴¹⁷ Not only would the adoption of such proposals improperly interfere with licensees’ investments, they would jeopardize the utility of future auctions.

The consequences of forced band-sharing will require licensees to make significant investments in recouping the lost capacity, diverting funds away from innovation.⁴¹⁸ Indeed, Professors Hazlett and Spitzer found that, should unlicensed underlays be inserted in bandwidth used by a licensed CMRS operators, the resultant interference will have “serious economic consequences.”⁴¹⁹ This outcome clearly is inconsistent with the Commission’s stated goals in this proceeding. A 2004 study by V-COMM found that a “seemingly insignificant 0.33 dB

⁴¹⁷ Verizon Wireless Cognitive Radio Comments at 2.

⁴¹⁸ Hazlett and Spitzer Interference Temperature Comments at 36. *See also* V-COMM Interference Temperature Comments at 32 (“Should licensed operators overbuild their networks to accommodate the increase in noise floors due to the external interference from unlicensed devices, the impact can be severe in terms of build-out efforts and dollars . . . [T]his leads to a decrease in spectrum efficiency, higher prices for consumers, and removes the incentives for operators to deploy innovative technology in the future.”).

⁴¹⁹ Hazlett and Spitzer Interference Temperature Comments at 36.

increase in the cumulative noise floor throughout the system translates into an 18% increase in total costs,” while a 3 dB increase brings total costs to nearly 400% of current levels.⁴²⁰

Should there be any additional use that may be achievable for existing, auctioned spectrum, the current licensee of the spectrum should continue to have the right to expand its use to encompass these new technologies. For example, cellular licensees were originally required to use their spectrum in accordance with the analog standard adopted by the Commission. However, as discussed herein, over time and through the development of more efficient digital technologies, cellular licensees have been able to greatly increase capacity and coverage in their exclusively licensed spectrum in an expeditious fashion.⁴²¹ Had the FCC instead allowed other parties to use underlay or overlay instead of allowing the existing cellular licensees to develop and deploy new and better technologies, today’s robust and innovative wireless systems would not exist. Moreover, the exclusive use approach is consistent with the Commission’s pro-exclusivity, pro-flexibility policies and will promote innovation and the efficient use of spectrum.

D. The Commission Should Focus on Identification and Reallocation of More Exclusive Use Spectrum for Wireless Services.

The Commission’s stated goals of innovation and investment through spectrum access would best be met through the allocation of more exclusive use spectrum, rather than encumbering existing allocations with potentially harmful regulation. At this time, however, the Commission has identified only 50 megahertz of additional spectrum for next generation wireless growth. This total lags behind both the United States’ competitor nations as well as the

⁴²⁰ V-COMM Interference Temperature Comments at 58.

⁴²¹ *See supra* Section III.A.1.

ever-increasing demand for mobile broadband services.⁴²² Verizon Wireless therefore urges the Commission to undertake a targeted examination of spectrum to identify additional bands suitable for exclusive use licensing.

1. Allocations of Additional Spectrum Bands for Wireless Services Have Had a Major Impact on Innovation and Investment.

Each time new spectrum has been allocated and licensed for commercial mobile services, it has stimulated significant innovation. Broadband PCS spectrum, which was assigned through auction beginning in 1994, is a case-in-point. Unlike cellular and SMR spectrum, PCS was designed from the beginning to use a digital format.⁴²³ The Commission has credited its allocation of Broadband PCS spectrum with “contribut[ing] to a significant increase in competition in the mobile telephony market” and helping lead to “significant developments on the road to deploying 3G data networks.”⁴²⁴ In licensing the PCS bands, the Commission adopted flexible service rules that it noted “encouraged industry investment, promoted competition, and fostered technology innovations.”⁴²⁵ PCS licensees, including new entrants, were able to deploy digital networks that had more innovative technology capabilities, such as Internet browsing and data traffic (e-mail, text-messaging), from the very beginning of

⁴²² Rysavy Research, LLC., *Mobile Broadband Spectrum Demand*, available at http://www.rysavy.com/Articles/2008_12_Rysavy_Spectrum_Demand_.pdf at 24 (Dec. 2008) (last visited Sept. 30, 2009) (“Rysavy Report”) (“There are a number of market factors that are acting together to increase spectrum demand at an accelerating pace including ever-more mobile life- and work-styles, greater device sophistication, new bandwidth-consuming applications, an increasing percentage of mobile users taking advantage of data applications, and ongoing industry innovation. Furthermore, for mobile broadband networks to provide a credible alternative and complement to wireline networks, they must be able to maintain pace with respect to performance and capacity.”).

⁴²³ *Thirteenth Annual CMRS Competition Report*, ¶ 71. *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*, Seventh Report, 17 FCC Rcd 12985, 13009 (2002).

⁴²⁴ *Federal Communications Commission 2002 Biennial Regulatory Review*, Staff Report of the Wireless Telecommunications Bureau, 18 FCC Rcd 4243 (2002).

⁴²⁵ *AWS-1 Service Rules Order*, ¶ 14.

commercial service. The success with broadband PCS spectrum prompted the Commission to license AWS spectrum under the same flexible use framework with the expectation that this allocation would “encourage the deployment of a wide variety of fixed and mobile services in these bands.”⁴²⁶

AWS spectrum has enhanced both competition and innovation in the wireless marketplace since it was auctioned in 2006. For example, T-Mobile, the largest winner of AWS spectrum in Auction No. 66, is building out this spectrum to provide 3G mobile broadband utilizing High-Speed Downlink Packet Access (“HSDPA”) technology.⁴²⁷ T-Mobile’s HSDPA network was its first rollout of advanced 3G services, allowing T-Mobile to provide innovative services such as access to the Android software application store.⁴²⁸ In 2008, the Commission found that the band was sufficiently cleared of incumbents to include it in the input market for mobile telephony/broadband spectrum in its competitive review of secondary market transactions.⁴²⁹

Similarly, the Commission’s licensing of 700 MHz spectrum is enhancing competition and innovation. In 2003, the Commission auctioned 18 MHz of 700 MHz spectrum, on which

⁴²⁶ *Id.* ¶ 17.

⁴²⁷ T-Mobile Broadband Plan Comments at 2-3.

⁴²⁸ *See, e.g.*, Press Release, T-Mobile, “T-Mobile myTouch 3G Available in Stores Nationwide Beginning Today” (Aug. 5, 2009), available at http://www.t-mobile.com/company/PressReleases_Article.aspx?assetName=Prs_Prs_20090805&title=T-Mobile%20myTouch%203G%20Available%20in%20Stores%20Nationwide%20Beginning%20Today (last visited Sept. 30, 2009) (“Android Market™ hosts thousands of applications that can deliver further customization to customers based on their personal passions and preferences, supported by T-Mobile’s expanding 3G network, which is currently available in 176 cities nationwide.”).

⁴²⁹ *Verizon Wireless/ALLTEL Order*, ¶ 66.

licensees are permitted to operate fixed or mobile services.⁴³⁰ Qualcomm is using 6 MHz of this spectrum to provide the first mobile video service.⁴³¹ The Commission auctioned licenses covering an additional 52 MHz of 700 MHz spectrum in 2008, with 101 bidders winning 1090 licenses.⁴³² Winners of licenses in Auction No. 73 plan to use the spectrum to deploy innovative 4G services – such as the LTE services described herein.

The continued growth of innovative wireless products and services requires the identification of additional spectrum for the future. Verizon Wireless notes that while the AWS-1 and 700 MHz bands will play a crucial role in wireless innovation going forward, the Commission took more than a decade to allocate and auction these bands. Previous efforts to repurpose spectrum managed by the National Telecommunications and Information Administration (“NTIA”) from federal to commercial use have taken several years. This lengthy process underscores the importance of identifying potential spectrum bands early so that wireless carriers will continue to have access to sufficient spectrum resources to provide innovative services.⁴³³ Congress, NTIA, and the Commission must act quickly to commence this important process.

⁴³⁰ *AT&T/Dobson Order*, ¶ 31.

⁴³¹ *Id.*

⁴³² Federal Communications Commission, Auction 73, http://wireless.fcc.gov/auctions/default.htm?job=auCTION_summary&id=73 (last visited Sept. 17, 2009).

⁴³³ Rysavy Report at 24 (“Given the long timeframes involved in going from planning to auction to deployment, as experienced with the AWS and 700 MHz bands, planning for new spectrum should begin as soon as possible.”).

2. Multiple Studies Have Demonstrated the Need for Additional Spectrum to Support Mobile Services Going Forward.

Recognizing that “the world is at the precipice of the full scale convergence of two powerful and sweeping forces: wireless mobility and broadband internet access,”⁴³⁴ numerous studies have analyzed the growing market for mobile broadband and concluded that significant additional spectrum must be allocated in order to keep up with demand and changing technologies.⁴³⁵ These studies make clear the urgency with which the Commission must act to identify and allocate additional spectrum for wireless services in order to maintain and promote innovation.

In 2006, the International Telecommunications Union (“ITU”) investigated the amount of spectrum that would be needed to meet its broadband objectives.⁴³⁶ The ITU “undertook to determine how much spectrum would be needed for the case of a single network per country” in the years 2010, 2015, and 2020,⁴³⁷ finding that where there was a higher level of market development, the total spectrum requirements would be 840 MHz in 2010, 1,300 MHz in 2015,

⁴³⁴ 3G Americas, 3GPP Technology Approaches for Maximizing Fragmented Spectrum Allocations at 4 (July 2009), *available at* http://www.3gamericas.org/documents/3GA%20Underutilized%20Spectrum_Final_7_23_092.pdf (“3G Americas Report”) (last visited Sept. 30, 2009).

⁴³⁵ Rysavy Report at 3 (“The capacity of a wireless network (and therefore the network’s ability to support wireless broadband services and applications) in any given location depends on spectral efficiency, as well as the amount of spectrum the operator has available. Mobile network operators are currently implementing or considering various mechanisms to maximize capacity by managing bandwidth consumption in the absence of access to more licensed spectrum. While engineering greater spectral efficiency and building more cell sites will increase capacity, alone they are unlikely to address the expected magnitude of the demand. Long term, more spectrum is needed to enable the U.S. mobile network operators to keep pace with consumer demand for more and faster mobile broadband.”).

⁴³⁶ Estimated Spectrum Bandwidth Requirements for the Future Development of IMT-2000 and IMT-Advanced, Report ITU-R M.2078 (2006) (“ITU Bandwidth Requirements Report”).

⁴³⁷ 3G Americas Report at 20.

and 1,720 MHz in 2020.⁴³⁸ A subsequent study of the ITU identified spectrum below 5 GHz as being most suitable for mobile communications.⁴³⁹ The spectrum requirements identified by the ITU clearly outpace the Commission's current allocation of approximately 410 MHz for commercial wireless use.⁴⁴⁰

The ITU's estimate of future spectrum requirements may be understated given a report recently released by Cisco. That report, which forecasts the growth of global IP traffic, concludes that worldwide, mobile data will more than double every year between now and 2013.⁴⁴¹ While Cisco concludes that the Internet will grow by a factor of 4 between 2009 and 2013, it concludes that mobile data and Internet traffic will increase by a factor of 66 in the same timeframe. This significant difference in Internet growth versus mobile data growth is due to the relatively small percentage of Internet traffic that is currently mobile (less than 0.3 percent). Cisco concludes that will change considerably in the next five years with the growth of mobile broadband services. Therefore, for the U.S. to remain a leader in wireless innovation, it must promptly begin to evaluate future spectrum needs and allocate new bands accordingly.

⁴³⁸ ITU Bandwidth Requirements Report at 25.

⁴³⁹ Technical and Operational Information for Identifying Spectrum for the Terrestrial Component of Future Development of IMT-2000 and IMT-Advanced, Report ITU-R M.2079, at 6 (2006) ("ITU Technical Report") ("In particular, bands below 5 GHz allow sufficient mobility and there is an acceptable trade-off between cost and full area coverage.").

⁴⁴⁰ CTIA August 14 Letter at Attachment 13.

⁴⁴¹ Cisco, Cisco Visual Networking Index: Forecast and Methodology, 2008-2013 (June 9, 2009), *available at* http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-481360.pdf (last visited Sept. 30, 2009).

3. The United States Lags Behind Other Nations in Allocating More Spectrum for Wireless Services.

As CTIA has observed, U.S. wireless providers use approximately the same amount of spectrum to provide services as competitor nations such as Japan, the U.K., France, and Spain, yet they provide service to three times more consumers who use three to four times as many minutes.⁴⁴² In contrast, other nations are currently in the process of allocating large bands of spectrum for mobile wireless services. CTIA has observed that other countries around the world have identified between 72 and 355 MHz of spectrum for licensed mobile broadband.⁴⁴³ Specifically, Germany has identified 340 MHz of spectrum for commercial wireless use, the U.K. has identified 355 MHz, and France will add 72 MHz of spectrum as a result of its DTV transition.⁴⁴⁴ This newly-identified spectrum, when added to that already assigned for commercial wireless use, would put these countries' spectrum allocations well ahead of that in the U.S. The United States must take similar efforts if the wireless industry is to continue to invest in innovative new products and services. The Commission, NTIA, and Congress must identify additional spectrum to prevent the United States from losing ground to its peers with regard to wireless innovation.

4. Given Ample Spectrum Already Allocated for Unlicensed Operations, the Commission Should Focus on Allocating Spectrum for Licensed Use.

In contrast to the current state of licensed spectrum allocations, the Commission has adopted allocations for significant amounts of unlicensed spectrum over the past several years.

⁴⁴² Comments of CTIA – The Wireless Association, RM No. 11498, at 4 (filed Dec. 2, 2008) (“CTIA Spectrum Cap Comments”).

⁴⁴³ CTIA August 14 Letter at Attachment 13.

⁴⁴⁴ CTIA Spectrum Cap Comments at 5.

In 2003, the FCC provided for the use of an additional 255 MHz of spectrum in the 5 GHz band for unlicensed services, including fixed wireless and Wi-Fi systems.⁴⁴⁵ This amendment to Part 15 of the Commission’s rules was in addition to 300 MHz of spectrum that was already available for unlicensed systems in the 5 GHz band.⁴⁴⁶ In total, unlicensed providers now have access to 555 megahertz of spectrum in the 5 GHz band. Taking into account these additional allocations, there is currently on the order of 674-956 MHz of spectrum available for unlicensed use. *Figure 15* summarizes this spectrum:

Service	Spectrum Band	Total Spectrum
TV Band Devices	54-60 MHz 76-88 MHz 174-216 MHz 470-608 MHz 614-698 MHz	0 to 282 MHz ⁴⁴⁷
900 MHz Spread Spectrum	902-928 MHz	26 MHz ⁴⁴⁸
Unlicensed PCS	1920-1930 MHz	10 MHz ⁴⁴⁹
2.4 GHz Spread Spectrum	2400-2483.5 MHz	83.5 MHz ⁴⁵⁰
Unlicensed National Information Infrastructure	5150-5350 MHz 5470-5725 MHz 5725-5825 MHz	555 MHz ⁴⁵¹
	Total Spectrum For Unlicensed Services	674.5 to 956.5 MHz

Figure 15: Spectrum for Unlicensed Use

⁴⁴⁵ *Revision of Parts 2 and 15 of the Commission’s Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, Report and Order, 18 FCC Rcd 24484 (2003).

⁴⁴⁶ 47 C.F.R. § 15.401.

⁴⁴⁷ *See* 47 C.F.R. §15.707.

⁴⁴⁸ *See* 47 C.F.R. §15.247.

⁴⁴⁹ *See* 47 C.F.R. §15.301.

⁴⁵⁰ *See* 47 C.F.R. §15.247.

⁴⁵¹ *See* 47 C.F.R. §15.401.

In comparison, licensed, exclusive use CMRS spectrum is limited to 409.5 MHz currently, with approximately 50 MHz more in the pipeline for near term licensing.⁴⁵² Given the benefits of exclusive use licensing and the limited amount of spectrum available for that purpose, the Commission should focus its resources on the identification of more spectrum for licensed, exclusive use to alleviate the imbalance in current allocations.⁴⁵³

5. The Commission Should Undertake a Targeted Spectrum Inventory and Allocate New Spectrum Bands Pursuant to its Exclusive Use Policy.

In the Commission’s National Broadband Plan proceeding, the Commission asked whether it should conduct a “spectrum census” or “spectrum inventory” to identify spectrum bands that may be suitable for broadband services.⁴⁵⁴ Verizon Wireless believes that an inventory could play an important role in “making sufficient spectrum available . . . to support new services and new applications.”⁴⁵⁵ However, a targeted inventory effort, rather than a larger, unfocused effort, will be more productive for identifying and reallocating useful spectrum for wireless uses.

Specifically, NTIA and the Commission should focus its review on spectrum below 5 GHz that the ITU has concluded is best suited for mobile broadband services.⁴⁵⁶ The review should target those bands not already licensed for exclusive use, and seek to determine which bands represent the best opportunities for new exclusive use allocations. Those bands in close

⁴⁵² CTIA August 14 Letter at Attachment 13.

⁴⁵³ See Section V.A., *supra*.

⁴⁵⁴ *A National Broadband Plan for Our Future*, Notice of Inquiry, 24 FCC Rcd 4342, 4355-56 (¶ 44) (2009).

⁴⁵⁵ *NOI*, ¶ 25.

⁴⁵⁶ ITU Technical Report at 6.

spectral proximity to existing mobile bands and bands that could be harmonized with international allocations would be the best candidates, as they can be more easily integrated with existing CMRS networks and will better enable operators to take advantage of scale economies to drive down costs.

However, a general spectrum inventory that attempts to examine how every band regulated by the Commission is used would not be a productive use of agency resources. The Commission should focus its efforts on identifying those bands that represent the best opportunity for expanding its highly successful flexible use policies. That exclusive use model has proven to be the best means of promoting innovation and investment in wireless technologies, and future allocations of spectrum for wireless services should follow it.

6. The Commission Can Take Interim Steps to Free Up New Spectrum by Identifying and Auctioning Unused Spectrum.

Verizon Wireless recognizes the delays and complications associated with allocating new spectrum bands for wireless services. There are, however, steps that the Commission can take in the interim to ease existing spectrum congestion and promote innovation through the licensing of spectrum that is already allocated for wireless services but not currently assigned.

Verizon Wireless agrees with the NOI's suggestion that regularly scheduled auctions should be held. This would provide a more certain spectrum climate and thus encourage planning and investment in additional buildout.⁴⁵⁷ The Commission can promote spectrum access by continuing to monitor for and auction spectrum that has either become available due to license cancellations or has failed to receive an acceptable bid in a prior auction. With a routine

⁴⁵⁷ NOI, ¶ 31 (“For example, the Commission could frequently (*i.e.*, several times per year) announce an inventory of available spectrum licenses (*e.g.*, licenses previously auctioned but unsold), and then proceed to conduct an auction of mutually exclusive applications.”).

process for competitive bidding of available spectrum, parties will be able more easily and expeditiously to acquire spectrum license rights for new wireless services. Such auctions will also advance the Commission's goal of promoting greater access to spectrum.⁴⁵⁸

In 2008, the Commission auctioned 35 AWS-1 licenses and 20 Broadband PCS licenses that were either offered previously in other auctions but unsold, or were returned to the Commission as a result of license cancellation or termination.⁴⁵⁹ Fifty-three of these licenses were sold to 15 winning bidders, raising more than \$21 million for the Federal Treasury.⁴⁶⁰ This auction will contribute to innovation and competition in the markets where licenses were sold. Verizon Wireless applauds the Commission's efforts in enabling Auction No. 78, and urges it to repeat this process at regular intervals to ensure that all spectrum allocated for wireless services is made available to provide innovative services to the public.

E. The FCC Lacks Authority to Tax and Therefore Cannot Impose Spectrum User Fees.

One idea apparently under consideration, spectrum user fees,⁴⁶¹ would clearly exceed the Commission's delegated authority. The Commission does not possess statutory authority to impose such a fee. As explained below, the spectrum user fees described in the NOI clearly fall within the rubric of taxation, but the statute upon which the Commission would have to rely in

⁴⁵⁸ *Id.* ¶ 20.

⁴⁵⁹ Auction of AWS-1 and Broadband PCS Licenses Scheduled for July 29, 2008, Public Notice, DA 08-767, ¶¶ 1-2 (April 4, 2008).

⁴⁶⁰ Auction of AWS-1 and Broadband PCS Licenses Closes, Winning Bidders Announced for Auction 78, Public Notice, DA 08-1953 (Aug. 25, 2008).

⁴⁶¹ *NOI*, ¶ 42.

order to impose such a fee, the Independent Offices Appropriation Act of 1952 (“IOAA”),⁴⁶² has been read – out of constitutional necessity – to permit agencies to assess only fees. The statute does not authorize the assessment of taxes because Congress could not lawfully have enacted a blanket delegation of taxation authority to federal agencies.

The spectrum user fees apparently under consideration are not authorized by the IOAA as interpreted by the courts. The IOAA gives effect to “the sense of Congress that each service or thing of value provided by an agency . . . to a person . . . is to be self-sustaining to the extent possible”⁴⁶³ by granting “[t]he head of each agency” the authority to “prescribe regulations establishing the charge for a service or thing of value provided by the agency.”⁴⁶⁴ The Supreme Court has interpreted the statute “narrowly to avoid constitutional problems” that would arise if the statute were read simply as a delegation of Congress’ power to tax.⁴⁶⁵ As the Court explained, “taxation is a legislative function, and Congress . . . is the sole organ for levying taxes.”⁴⁶⁶ “It would be such a sharp break with our traditions to conclude that Congress had bestowed on a federal agency the taxing power that we read [the IOAA] narrowly as authorizing not a ‘tax’ but a ‘fee.’”⁴⁶⁷

⁴⁶² 31 U.S.C. § 9701; *see, e.g., Nat’l Cable Television Assoc., Inc. v. FCC*, 554 F.2d 1094, 1096 (D.C. Cir. 1976) (“The statutory authority and direction for the FCC to assess fees against members of the industries it regulates is the Independent Offices Appropriation Act of 1952.”) (“*Nat’l Cable*”).

⁴⁶³ 31 U.S.C. § 9701(a).

⁴⁶⁴ *Id.* at § 9701(b).

⁴⁶⁵ *Nat’l Cable Television Assoc. v. United States*, 415 U.S. 336, 342 (1974) (“*NCTA*”).

⁴⁶⁶ *Id.* at 340; *see* U.S. Const. art. I, § 8, cl. 1; *see also id.* at art. I, § 7, cl. 1 (requiring that all taxation measures originate in the House of Representatives).

⁴⁶⁷ *NCTA*, 415 U.S. at 341. In a companion case, the Court acknowledged that its construction “greatly narrows the [IOAA]” in order to “keep[] it within the parameters of the ‘fee’ system and away from the domain of ‘taxes.’” *Fed. Power Comm’n v. New England Power Co.*, 415 U.S. 345 (1974).

An unlawful tax is distinguished from a lawful fee based upon the nature and purpose of the charge at issue. “A fee . . . is incident to a voluntary act, e.g., a request that a public agency permit an applicant to . . . run a broadcast station. The public agency performing those services normally may exact a fee for a grant which, presumably, bestows a benefit on the applicant, not shared by other members of society.”⁴⁶⁸ In contrast, a tax may “disregard benefits bestowed by the Government on a taxpayer and go solely on ability to pay, based on property or income,”⁴⁶⁹ and may be designed exclusively to achieve a regulatory goal.⁴⁷⁰

Thus, “[u]nder the IOAA an agency may impose a fee only for a service that confers a specific benefit upon an identifiable beneficiary” and to recover the costs of administering that benefit system.⁴⁷¹ This “concept requires some nexus between the agency and the person assessed other than the mere fact of regulation or the adoption of some practice of general benefit to the industry as a whole.”⁴⁷² Furthermore, “[a]n agency may not charge more than the reasonable cost it incurs to provide a service, or the value of the service to the recipient, whichever is less,” and must “prorate” the fee to ensure that the specific beneficiary of the

⁴⁶⁸ *NCTA*, 415 U.S. at 340-41; *see also Nat’l Cable*, 554 F.2d at 1106 (“A ‘fee’ is a payment for a special privilege or service rendered, and not a revenue measure.”).

⁴⁶⁹ *NCTA*, 415 U.S. at 340.

⁴⁷⁰ *Id.* at 341.

⁴⁷¹ *Engine Mfrs. Ass’n v. EPA*, 20 F.3d 1177, 1180 (D.C. Cir. 1994).

⁴⁷² *Nat’l Cable*, 554 F.2d at 1097; *see also Engine Mfrs. Ass’n*, 20 F.3d at 1180 (“A general benefit conferred upon an industry, such as the public confidence that may attend the mere fact of its regulation, is insufficient to justify a fee.”).

service is not “charged for agency costs attributable to [an independent] public benefit” that also accrues from the service.⁴⁷³

The Supreme Court and the D.C. Circuit have previously invalidated fees adopted by the Commission in contravention of these principles.⁴⁷⁴ One example is the Commission’s 1975 fee schedule, which charged fees for various types of applications and also assessed “an annual authorization fee of 13 cents per subscriber” on cable television operators.⁴⁷⁵ The D.C. Circuit found the annual fee unlawful under the IOAA, explaining that the Commission had failed to “identify the activity which justify[ed]” the charge, “making it impossible for [the Court] to conclude that the [application and annual] fees do not charge the cable operators twice for the cost of the same service.”⁴⁷⁶ The Court also found the annual fee unlawful because it was not calculated to “be a reasonable approximation of the attributable costs which the Commission identifies as being expended to benefit the recipient.”⁴⁷⁷

A spectrum user fee would suffer a similar fate. Such a fee would lack a sufficient nexus to the Commission’s provision of a “specific benefit” to licensees, because it would be aimed at achieving the purely regulatory goal of promoting efficient use of the spectrum.⁴⁷⁸ Calculating

⁴⁷³ *Engine Mfrs. Ass’n*, 20 F.3d at 1180. A benefit is not “independent” if is “produced at no cost beyond that required to produce the private benefit.” *Id.*

⁴⁷⁴ *See NCTA*, 415 U.S. at 343-44; *Capital Cities Commc’ns, Inc. v. FCC*, 554 F.2d 1135 (D.C. Cir. 1976); *Nat’l Ass’n of Broadcasters v. FCC*, 554 F.2d 1118 (D.C. Cir. 1976); *Nat’l Cable*, 554 F.2d at 1096.

⁴⁷⁵ *Nat’l Cable*, 554 F.2d at 1099.

⁴⁷⁶ *Id.* at 1100; *see also id.* at 1106 (“The important step which the Commission has eliminated here is the identification of the specific items of cost and the criteria by which they are found to relate in the determined percentage to the service or benefit for which the fee is assessed.”).

⁴⁷⁷ *Id.* at 1106.

⁴⁷⁸ *See NCTA*, 415 U.S. at 343-44; *Nat’l Cable*, 554 F.2d at 1106.

the fee based upon the “market value” of the spectrum⁴⁷⁹ would exacerbate the fee’s unlawfulness by directly contravening the Supreme Court’s admonition that a fee must be measured by the value of a service provided by the agency to the payor.⁴⁸⁰ With respect to unauctioned spectrum, the fee would be improper because it would not be tied to any identifiable service or specific benefit provided by the Commission to the unauctioned spectrum licensees. And to charge auctioned spectrum licensees a fee in addition to the licensing and auction fees they have already paid would be to charge them “twice for the cost of the same service.”⁴⁸¹ Indeed, the Commission’s current fees are calculated to recover the costs of the services and benefits that the FCC provides to regulated entities,⁴⁸² so a spectrum user fee would be presumptively excessive.

Furthermore, Congress has specified that the means for ensuring efficient use of the spectrum and charging licensees for the value of the spectrum they use is by allocating spectrum to the highest bidder. The Commission is not authorized to pursue these goals in another way, but is rather “bound, not only by the ultimate purposes Congress has selected, but by the means it has deemed appropriate, and prescribed, for the pursuit of those purposes.”⁴⁸³ Congress has

⁴⁷⁹ See NOI at ¶ 42.

⁴⁸⁰ See *NCTA*, 415 U.S. at 343; see also *Nat’l Cable*, 554 F.2d at 1107 (holding that under the IOAA, “the agency must look not at the value which the regulated party may immediately or eventually derive from the regulatory scheme, but at the value of the direct and indirect services which the agency confers” upon the regulated party).

⁴⁸¹ *Nat’l Cable*, 554 F.2d at 1106. Indeed, fees due under the Commission’s current fee schedules do not vary depending upon whether a service is requested with respect to auctioned or unauctioned spectrum. See 47 C.F.R. §§ 1.1102, 1.1152. Thus, the imposition of a spectrum user fee has the potential to double charge all licensees subject to it.

⁴⁸² See 47 U.S.C. § 159(a)(1); *Assessment and Collection of Regulatory Fees for Fiscal Year 2008*, 73 Fed. Reg. 50201, (Aug. 26, 2008).

⁴⁸³ *MCI Telecomm. Corp. v. AT&T*, 512 U.S. 218, 231 n.4 (1994); accord, e.g., *Colorado River Indian Tribes v. National Indian Gaming Comm’n*, 466 F.3d 134, 139 (D.C. Cir. 2006) (holding that Congress established the end

mandated that the FCC use competitive bidding to “promote” its statutory objectives in the context of licensing,⁴⁸⁴ encourage “the development and rapid deployment of new technologies, products, and services,”⁴⁸⁵ “ensur[e] that new and innovative technologies are readily accessible to the American people,”⁴⁸⁶ promote “efficient and intensive use of the electromagnetic spectrum,”⁴⁸⁷ and “recover[] for the public of a portion of the value of the public spectrum.”⁴⁸⁸ The Commission itself has recognized that the “statutory goal of recovering a portion of the value of the public spectrum resource” requires “balancing essential goals of assigning licenses on terms that serve the public interest, both with respect to service provided by licensees and recovery of value, *rather than attempting to maximize revenue.*”⁴⁸⁹ In short, the Commission lacks authority to impose a spectrum user fee because Congress has already established a means for managing and determining the appropriate charge for use of the spectrum, *i.e.*, competitive bidding.

Numerous efforts by the Executive Branch and Congress over the years to provide the Commission authority to impose spectrum user fees confirm the FCC’s present lack of such authority. For example, President Obama included in his budget outline for Fiscal Year 2010 a

the agency sought to achieve and that “it is equally clear that Congress wanted to do this in a particular way” at odds with the agency’s interpretation); *Citicasters v. McCaskill*, 89 F.3d 1350, 1355 (8th Cir. 1996) (“Where Congress has provided a specific means for achieving its purpose, we must honor its decision[.]”).

⁴⁸⁴ See 47 U.S.C. § 309(j)(3) (providing that the Commission “shall seek to promote the purposes specified in section 151” via competitive bidding).

⁴⁸⁵ *Id.* at § 309(j)(3)(A).

⁴⁸⁶ *Id.* at § 309(j)(3)(B).

⁴⁸⁷ *Id.* at § 309(j)(3)(D).

⁴⁸⁸ *Id.* at § 309(j)(3)(C).

⁴⁸⁹ See, e.g., *700 MHz Report & Order*, ¶ 308 (emphasis added).

line-item proposal that the Commission have “new authority” to impose a “[s]pectrum license user fee.”⁴⁹⁰ And Congress has considered such proposals as far back as the 1950s. But none of these proposals have been enacted. It is thus clear that, if the Commission concludes that the public interest would be served by a spectrum user fee, it must first seek and obtain the necessary statutory authorization.

⁴⁹⁰ Office of Management and Budget, *The Fiscal Year 2010 Appendix* 1223 (2009), available at <http://www.whitehouse.gov/omb/budget/fy2010/assets/oia.pdf> (last visited Sept. 30, 2009); Office of Management and Budget, *A New Era of Responsibility: Renewing America’s Promise* 126 (2009), available at http://www.whitehouse.gov/omb/assets/fy2010_new_era/A_New_Era_of_Responsibility2.pdf (last visited Sept. 30, 2009). No indication as to which licenses would be subject to the fee or how the fee would be calculated was provided, though President Obama’s Fiscal Year 2010 Budget Overview forecasted that revenue from the proposed spectrum license user fee revenue would total nearly \$4.8 billion through 2019. President George W. Bush first sought a “spectrum license user fee” in his Fiscal Year 2004 Budget. Beginning with the Fiscal Year 2000 budget and continuing through the Fiscal Year 2006 budget, OMB suggested an “analog spectrum lease fee,” the purpose of which was to expedite the digital television transition

IV. THE COMMISSION SHOULD MAINTAIN ITS MARKET-BASED PARADIGM FOR WIRELESS SERVICES BECAUSE IT BEST ENABLES INNOVATION AND COMPETITION.

In the Omnibus Budget Reconciliation Act of 1993 (“OBRA”),⁴⁹¹ Congress mandated a deregulatory paradigm for wireless services. As the Commission has declared, the “overarching congressional goal” in OBRA was to “promot[e] opportunities for economic forces – not regulation – to shape the development of the CMRS market.”⁴⁹² The Commission has followed Congress’s mandate for nearly twenty years, through Democratic as well as Republican administrations. Time and again it has found that regulation should be used sparingly and only to correct, in the narrowest effective way, a demonstrated problem that adversely impacted customers.

Some parties may use these proceedings to advocate for a return to a regulatory model, or to press for government intervention through specific new rules that will benefit some players in the wireless ecosystem. The Commission should resist these requests, not only because it is not the agency’s job to protect or assist particular competitors, but because, more fundamentally, the Commission’s longstanding market-based paradigm has gone hand in glove with the robust competition and innovation that has distinguished the wireless industry. The wisdom of that paradigm is demonstrated by the indisputable – and accelerating – wireless competition and innovation. Given the overwhelming evidence that competition and innovation are thriving in a minimally regulated environment, changing course now would clearly be unjustified.

⁴⁹¹ See Pub. L. No. 103-66, Title VI, § 6002(b) (1993).

⁴⁹² *Implementation of Sections 3(n) and 332 of the Communications Act*, Third Report and Order, 9 FCC Rcd 7988, 8004 (¶ 29) (1994) (“*Third CMRS Report and Order*”). See also, e.g., *Petition of New York State Public Service Commission to Extend Regulation*, Report and Order 10 FCC Rcd 8187, 8190 (¶ 18) (1995) (noting Congress’ actions were designed to implement its “general preference in favor of reliance on market forces rather than regulation”) (“*Petition of New York State Public Service Commission*”).

Returning to regulation would not only be unwarranted, but would also be affirmatively harmful to the very goals of promoting innovation and competition that the Commission says it wants to pursue. The economics literature is replete with analyses demonstrating the harms of regulation.⁴⁹³ The literature also confirms that the mere *prospect* of regulation injects harmful uncertainty into markets, disincenting investment and frustrating long-term planning. It would be a signal mistake to pull back from continued fidelity to the deregulatory policy that has spurred the wireless industry’s growth and success.

Moreover, there are serious legal hurdles the Commission would face in changing course, either to move away from its longstanding policy or to adopt discrete new rules at the behest of some parties. The Commission must, for example, comply with the Administrative Procedure Act (“APA”), the limits Congress has imposed on its authority, and its own numerous precedents repealing regulation and finding that the deregulatory paradigm best serves the public interest.

A. Congress Has Mandated a Market-Based Approach to Wireless and the Internet.

As an administrative agency, the Commission must hew its actions to both the plain language of its statutory mandate and to statutory purpose.⁴⁹⁴ Thus, as it considers the various proposals parties may submit in this proceeding, the Commission should remain mindful of statutory directives regarding wireless and Internet regulation. Here, Congress has clearly mandated – and the Commission has consistently followed – a deregulatory approach to both

⁴⁹³ See Section IV.C. *infra*.

⁴⁹⁴ See, e.g., *American Financial Services Ass’n v. FTC*, 767 F.2d 957, 968 (D.C. Cir. 1985) (recognizing that the judiciary must “reject administrative agency actions which exceed the agency’s statutory mandate or frustrate congressional intent”).

wireless providers and the Internet. Accordingly, the FCC’s authority to take a different approach “must come specifically from Congress.”⁴⁹⁵

In the Omnibus Budget Reconciliation Act of 1993,⁴⁹⁶ Congress directed the FCC to take a deregulatory approach to the wireless industry. Prior to 1993, the Commission had heavily regulated wireless providers, subjecting them to the same Title II common carrier regulations as it applied to traditional wireline providers.⁴⁹⁷ OBRA rejected that paradigm. OBRA “dramatically revise[d] the regulation of the wireless telecommunications industry.”⁴⁹⁸ In the Commission’s own words, “the statutory plan is clear.”⁴⁹⁹ The “overarching congressional goal” in OBRA was to “promot[e] opportunities for economic forces – not regulation – to shape the development of the CMRS market.”⁵⁰⁰ Indeed, Congress specifically amended the Act to implement its “general preference in favor of reliance on market forces rather than regulation,”⁵⁰¹ and to permit the mobile wireless market to develop subject only to the degree of regulation “for which the Commission and the states demonstrate a clear-cut need.”⁵⁰² Not surprisingly, then, the FCC has interpreted Congress’s deregulatory mandate as setting out a requirement that regulatory authorities “‘clear substantial hurdles’” before imposing new regulatory requirements

⁴⁹⁵ *FCC v. Midwest Video Corp.*, 440 U.S. 689, 709 (1979) (“*Midwest Video II*”).

⁴⁹⁶ Pub. L. No. 103-66, Title VI, 6002(b) (1993).

⁴⁹⁷ *See Second CMRS Report and Order*, ¶ 3.

⁴⁹⁸ *Cellnet Communications, Inc. v. FCC*, 149 F.3d 429, 433 (6th Cir. 1998).

⁴⁹⁹ *Petition on Behalf of the State of Hawaii Public Utility Commission*, Report and Order, 10 FCC Rcd 7872, 7874 (¶ 10) (1995) (“*Petition of the State of Hawaii*”).

⁵⁰⁰ *Third CMRS Report and Order*, ¶ 29.

⁵⁰¹ *Petition of New York State Public Service Commission*, ¶ 18.

⁵⁰² *Petition of the State of Hawaii*, ¶ 10.

on the wireless industry.⁵⁰³ Thus, the Commission itself has interpreted OBRA to place a higher burden of justification on regulation than would normally adhere under baseline principles of administrative law.

Congress further embraced deregulation for the wireless industry and the Internet in the Telecommunications Act of 1996 (“1996 Act”). The 1996 Act was enacted to “promote competition and reduce regulation in order to secure lower prices and higher quality services for American telecommunications consumers and encourage the rapid deployment of new telecommunications technologies.”⁵⁰⁴ Congress also directed the Commission to take a hands-off approach to the Internet. When Congress amended the Act in 1996, it understood even at that early stage that the Internet was “flourish[ing] . . . with a minimum of government regulation.”⁵⁰⁵ Accordingly, Congress declared it “the policy of the United States . . . to preserve the vibrant and competitive free market that presently exists for the Internet . . . *unfettered* by Federal or State regulation.”⁵⁰⁶ This statement in Section 230(b) is an express limitation on the FCC’s jurisdiction over the Internet and a clear declaration of deregulatory congressional intent.

In Section 706 of the 1996 Act, Congress further directed the FCC to “encourage the deployment on a reasonable and timely basis of advanced telecommunications capabilities” – including broadband offerings – by, *inter alia*, “regulatory forbearance” and “methods that

⁵⁰³ *Petition of the Connecticut Department Public Utility Control To Regulate Control of the Rates of Wholesale Cellular Service Providers in the State of Connecticut*, Report and Order, 10 FCC Rcd 7025, 7027 (¶ 4) (1995) (“*DPUC Connecticut*”).

⁵⁰⁴ 1996 Act, Preamble.

⁵⁰⁵ 47 U.S.C. § 230(a)(4).

⁵⁰⁶ 47 U.S.C. § 230(b) (emphasis added).

remove barriers to infrastructure investment.”⁵⁰⁷ Section 706 confirms Congress’ intent that market forces be the primary regulator of the Internet. In sum, the 1996 Act “was an unusually important legislative enactment. . . . [whose] *primary purpose was to reduce regulation*”⁵⁰⁸ Indeed, the FCC has described the 1996 Act as “a clarion call for promoting competition and reducing regulation in all markets when competitive conditions exist.”⁵⁰⁹

B. The Commission Has Followed This Market-Based Paradigm and Has Consistently Found That It Promotes Competition and Innovation.

In recognition of “the clear and powerful directives from Congress,”⁵¹⁰ the Commission embraced deregulation for CMRS providers and has “systematically removed regulatory barriers.”⁵¹¹ In a long line of precedents, adopted during Democratic as well as Republican administrations, the Commission has repeatedly emphasized that “[t]he framework of . . . [its] CMRS regulatory policy [is] – moderate regulation . . . and a preference for curing market imperfections by lowering entry barriers in order to encourage competition rather than by regulating existing licensees”⁵¹² The FCC has also expressed a “commitment to rectify . . .

⁵⁰⁷ 1996 Act, § 706(a)-(b).

⁵⁰⁸ *Reno v. ACLU*, 521 U.S. 844, 857 (1997) (emphasis added) (quotation marks omitted).

⁵⁰⁹ Brief for Respondents, *Orloff v. FCC*, 352 F.3d 415 (No. 02-1189), 2003 WL 25588065, at *29 (D.C. Cir. Jan. 21, 2003).

⁵¹⁰ *Id.*

⁵¹¹ *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*, First Report, 10 FCC Rcd 8844, 8846 (¶ 5) (1995) (“*First Annual CMRS Competition Report*”).

⁵¹² *DPUC Connecticut*, ¶ 14; see also *Second CMRS Report and Order*, ¶ 15 (“establish[ing], as a principal objective, the goal of ensuring that unwarranted regulatory burdens are not imposed upon any mobile radio licensees who are classified as CMRS providers”).

[any imperfect market] conditions as quickly as possible by strengthening and expanding cellular competition rather than by resorting to heavy-handed regulation.”⁵¹³

The Commission has, on a non-partisan basis, taken numerous other actions based on its repeated finding that reducing regulation will promote innovation and investment that will in turn serve wireless consumers. For example:

- *Treatment of Wireless as a Nationwide Service.* The FCC has moved toward licensing wireless services on a broad geographic basis over the years, finding that geographic licensing fosters efficient utilization of the spectrum,⁵¹⁴ provides licensees with greater flexibility to respond to market demands without the need for additional licensing by the Commission,⁵¹⁵ facilitates aggregation by licensees of smaller service areas into seamless regional and national service areas, and provides licensees with greater build-out flexibility, all of which contribute to significant investment and innovation.⁵¹⁶
- *Preemption of State Regulation.* Consistent with its findings that wireless services are national in nature, the FCC has preempted certain state and local regulation as required by OBRA.⁵¹⁷ In doing so, the agency noted that state regulation could burden the development of competition and that preemption was not only consistent with the federal mandate for regulatory parity, but would also promote investment in wireless infrastructure.⁵¹⁸ The FCC has also preempted state regulation of wireless technical standards.⁵¹⁹ The FCC additionally has

⁵¹³ *DPUC Connecticut*, ¶ 13.

⁵¹⁴ *See Implementation of Sections 309(j) and 337 of the Communications Act of 1934 as Amended*, Report and Order and Further Notice of Proposed Rule Making, 15 FCC Rcd 22709, 22724 (¶29) (2000) (“*Section 332 R&O and FNPRM*”); *Amendment of the Commission’s Rules Regarding the 37.0-38.6 GHz and 38.6-40.0 GHz Bands*, Report and Order and Second Notice of Further Rule Making, 12 FCC Rcd 18600, 18647 ¶101 (1997); *Amendment of Part 90 of the Commission’s Rules to Facilitate Future Development of SMR Systems in the 800 MHz Frequency Band*, Second Report and Order, 12 FCC Rcd 19079, 19087 (¶10) (1997).

⁵¹⁵ *Rural Report and Order and FNPRM*.

⁵¹⁶ *See Section 332 R&O and FNPRM*, ¶29.

⁵¹⁷ *Second CMRS Report and Order*, ¶16.

⁵¹⁸ *Id.*, ¶23.

⁵¹⁹ *An Inquiry Into the Use of the Bands 825-845 MHz and 870-890 MHz for Cellular Communications Systems; and Amendment of Parts 2 and 22 of the Commission’s Rules Relative to Cellular Communications Systems*, 50 RR 2d 1673, 89 FCC 2d 58, ¶ 81 (1982) (“We affirm our preemption over the technical standards for cellular systems. We continue to regard this as being essential to the ‘assurance of compatible operation of equipment on both local and national levels.’” We have carefully developed the technical requirements essential for

prohibited state and local governments from regulating the placement, construction, modification, and operation of wireless facilities based on radio frequency (“RF”) emissions.⁵²⁰

- *Removal of Technical Mandates.* The FCC has rejected calls to require wireless providers to use specific technologies. For example, it permitted cellular carriers to utilize digital technology without specifying a digital standard.⁵²¹ In 2002, the Commission established a five-year transition period after which the analog standard would not be required, noting that market forces, and not government regulation, should determine whether and when analog service should be discontinued.⁵²² Under Chairman Hundt, the Commission similarly refused to adopt any interoperability standards for CMRS, finding that competition in the market “provides sufficient incentives for CMRS licensees to develop interoperable technology.”⁵²³ As a result, wireless providers offer a variety of technologies today and consumers can choose the one that best meets their needs.
- *Removal of Limitations on Business Operations.* The FCC has removed a variety of prior limitations on how wireless providers must provide service. For example, in 1992, the Commission allowed cellular carriers to bundle customer premises equipment (“CPE”) with cellular service.⁵²⁴ As expected, this decision provided the foundation for the way carriers provide service today by allowing for the sale of discounted CPE to customers, particularly low income consumers, promoting efficient spectrum utilization, allowing greater penetration of wireless services in

efficient spectrum re-use and nationwide compatibility, while providing sufficient flexibility to accommodate new technological innovations. It is imperative that no additional requirements be imposed by the states which could conflict with our standards and frustrate the federal scheme for the provision of nationwide cellular service.”) (internal citation omitted).

⁵²⁰ *Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation*, Report and Order, 11 FCC Rcd 15123, 15183 (¶ 166) (1996); *Procedures for Reviewing Requests for Relief From State and Local Regulations Pursuant to Section 332(c)(7)(B)(v) of the Communications Act of 1934*, Second Memorandum Opinion and Order and Notice of Proposed Rulemaking, 12 FCC Rcd 13494, 13529 (¶ 89) (1997), *aff’d sub nom. Cellular Phone Task Force v. FCC*, 205 F.3d 82 (2d Cir. 2000); *see also* 47 C.F.R. § 1.1307(e).

⁵²¹ *See Amendment of Parts 2 and 22 of the Commission’s Rules to Permit Liberalization of Technology and Auxiliary Service Offerings in the Domestic Public Cellular Radio Telecommunications Service*, Report and Order, 3 FCC Rcd 7033, 7040 (¶¶ 51-52) (1988).

⁵²² *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, 18410-11 (¶15) (2002).

⁵²³ *Third CMRS Report and Order*, ¶¶ 165-168.

⁵²⁴ *Bundling of Cellular Customer Premises Equipment and Cellular Service*, Report and Order, 7 FCC Rcd 4028 (1992) (Bundling R&O).

lower-income communities, and encouraging innovation in the handset market.⁵²⁵ Then, in 1994, the Commission chose to forbear from imposing any tariff filing obligations and other Title II requirements on CMRS providers.⁵²⁶ This decision resulted from the agency's determination that tariff filings and other Title II obligations would impede competition and price discounting. Noting that the competitive development of broadband PCS service would obviate the need for a resale prohibition, the FCC also eliminated the restrictions on resale by cellular, broadband PCS, and geographic area SMR providers in 1996.⁵²⁷

The agency's deregulatory trend continued into this decade as well. In 2001, the Commission eliminated the *per se* limit on the aggregation of CMRS spectrum, which restricted the amount of broadband spectrum that an entity could hold or have attributed to itself in a particular geographic area to 45 MHz (or 55 MHz in rural areas).⁵²⁸ This decision was based on a finding that that mobile telephony markets had experienced and continued to experience strong growth, increased competition and active innovation, and that consumers had realized the benefits of competition in the form of increased output, lower prices, and increased diversity of service offerings.⁵²⁹ Finally, in 2007, the Commission classified wireless broadband Internet access service as an information service.⁵³⁰ The agency noted that this action established not only a minimal regulatory environment for wireless broadband Internet access service, but also a consistent regulatory framework across broadband platforms by regulating like services in a similar manner.⁵³¹

⁵²⁵ *Id.* ¶ 7.

⁵²⁶ *Section 332 Second R&O*, 9 FCC Rcd at 1418 ¶ 16, 1475-81 ¶¶ 165-182, 1482-85 ¶¶ 188-197 (exercising its forbearance authority with respect to tariff filing requirements and Sections 214, 204, 205, 211, and 212 of the Communications Act).

⁵²⁷ *Interconnection and Resale Obligations Pertaining to Commercial Mobile Radio Services*, First Report and Order, 11 FCC Rcd 18455, 18468-69 (¶¶ 23-24) (1996) (Resale R&O), *aff'd on recon.*, 14 FCC Rcd 16340 (1999), *aff'd sub nom. Cellnet v. FCC*, 149 F.3d 429 (6th Cir. 1998). *See also Commencement of Five-Year Period Preceding Termination of Resale Rule Applicable to Certain Covered Commercial Mobile Radio Service Providers*, Public Notice, 13 FCC Rcd 17427 (1998). The wireless resale rule sunset in November 2002.

⁵²⁸ *2000 Biennial Regulatory Review Spectrum Aggregation Limits For Commercial Mobile Radio Services*, Report and Order, 16 FCC Rcd 22668 (2001). The Commission also eliminated the cellular cross-interest rule in Metropolitan Statistical Areas (MSAs), which limited the ability of parties to have interests in cellular carriers on different channel blocks in a single geographic area. *Id.* ¶¶ 82-87.

⁵²⁹ *Id.* ¶¶ 30, 35.

⁵³⁰ *Wireless Internet Access Order*, ¶¶ 22-28.

⁵³¹ *Id.* ¶ 2.

- *Additional Flexibility in How Carriers Provide Service.* Over the years, the Commission has increasingly accorded wireless licensees additional flexibility to provide service in the most effective and efficient way they see fit. For example, in 1996, the Commission allowed CMRS licensees to provide fixed wireless services on a co-primary basis with commercial mobile services.⁵³² In doing so, the Commission noted that, “regulatory restrictions on use of the spectrum could impede carriers from anticipating what services customers most need, and could result in inefficient spectrum use and reduced technological innovation.”⁵³³

Summarizing its consistently deregulatory approach to CMRS providers, the Commission has stated that it relies “on market forces, rather than regulation, except when there is market failure.”⁵³⁴ This light regulatory approach has worked, most importantly by preserving the incentives for wireless providers to invest in their networks, knowing that their own competitive decisions will determine their success or failure.⁵³⁵

FCC precedent firmly establishes that it will also take a deregulatory approach to broadband offerings. Faithfully implementing its statutory mandate, the Commission has stated that “broadband services should exist in a minimal regulatory environment”⁵³⁶ and has declared that “[i]n no respect are we considering regulating the Internet.”⁵³⁷ Indeed, in a ruling affirmed

⁵³² *Amendment of the Commission’s Rules to Permit Flexible Service Offerings in the Commercial Mobile Radio Services*, First Report and Order and Further Notice of Proposed Rulemaking, 11 FCC Rcd 8965 (1996) (CMRS Flex First Report and Order).

⁵³³ *Id.*, ¶22.

⁵³⁴ *Orloff v. Vodafone Airtouch Licenses LLC, d/b/a/ Verizon Wireless*, 17 FCC Rcd 8987, 8998 n.69 (¶ 22) (2002).

⁵³⁵ NOI, ¶ 11 (seeking comment on the Commission’s role in supporting and encouraging innovation and investment and asking what elements of its rules and policies have been successful in stimulating and promoting innovation and investment).

⁵³⁶ *See, e.g., Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities Internet Over Cable Declaratory Ruling Appropriate Regulatory Treatment for Broadband Access to the Internet Over Cable Facilities*, 17 FCC Rcd 4798, 4802 (¶ 5) (2002) (quotation marks omitted) (“*Cable Modem Declaratory Ruling*”).

⁵³⁷ *Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion*, First Report, 14 FCC Rcd 2398, 2405 (¶ 18) (1999).

by the Supreme Court, the Commission determined that cable modem service should be classified as an information service – and thus left largely unregulated – and not treated as a heavily-regulated common carrier service.⁵³⁸ In the years since that decision, the Commission has extended its deregulatory approach to a number of other broadband platforms, including wireline broadband, broadband over power line, and wireless broadband services.⁵³⁹ In summarizing its approach to these offerings, the Commission recently stated that it has “adopt[ed] a pro-competitive, deregulatory regime for these services.”⁵⁴⁰ In each instance, the Commission recognized that Congress intended the agency to pursue a deregulatory approach to broadband offerings by classifying them as information services – a category of services that Congress itself has determined should be lightly regulated, if at all.⁵⁴¹

C. New Regulation and Regulatory Uncertainty Risk Stifling Competition, Innovation and Investment.

Increased regulation or regulatory uncertainty will constrain future wireless innovation and investment. The dynamic wireless marketplace has thrived, and consumers have benefited, under the watchful, but relatively deregulatory, eye of the FCC. As demonstrated throughout

⁵³⁸ See *Cable Modem Declaratory Ruling*, 4802 (¶ 7); see also *NCTA v. Brand X Internet Services*, 545 U.S. 967 (2005).

⁵³⁹ *Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities*, Report and Order and Further Notice of Proposed Rulemaking, 20 FCC Rcd 14853, 14855 (¶ 1) (2005) (“establish[ing] a minimal regulatory environment for wireline broadband Internet access services”) (“*Wireline Broadband Internet Access Order*”); *United Power Line Council’s Petition for Declaratory Ruling Regarding the Classification of Broadband Over Power Line Internet Access Service as an Information Service*, 21 FCC Rcd 13281, 13281 (¶ 2) (2006) (“establish[ing] a minimal regulatory environment for BPL-enabled Internet access service”) (“*BPL Internet Access Order*”); *Wireless Internet Access Order*, ¶ 2 (“establish[ing] a minimal regulatory environment for wireless broadband Internet access service”).

⁵⁴⁰ *Wireless Internet Access Order*, ¶ 4.

⁵⁴¹ See 47 U.S.C. § 153(20) (defining offerings that should be regulated as “information services”); see also *Brand X*, 545 U.S. at 975-76 (recognizing that Congress has determined that information services should be subjected to a lighter regulatory touch than telecommunications services).

these comments, network, handset, and application innovation has exploded. The mobile industry has revolutionized how consumers interact with one another, gather information, and view content, and these new paradigms are directly related to the deregulatory approach Congress and the FCC have undertaken. Tinkering with this successful regime would deter future investment, stifle innovation, and hinder the further development of competition in the wireless market.

It is axiomatic that, where there is no demonstrable market failure and/or consumer harm, there is no justification for regulation.⁵⁴² It is likewise axiomatic that regulations adopted in the absence of market failure or regulations not narrowly tailored to redress identifiable harms only serve to impose costs, alter incentives, and distort competition to the detriment of consumers.⁵⁴³

Indeed, “it is by now well appreciated that even well meaning regulation is a blunt instrument, which can impose its own considerable harm . . . [and] unacceptable collateral

⁵⁴² See, e.g., Julian Epstein, A Lite Touch on Broadband: Achieving the Optimal Regulatory Efficiency in the Internet Broadband Market, 38 Harv. J. on Legis. 37 (Winter, 2001) (“Premature regulation where no market failure exists could prove counterproductive by deterring investment in competing networks, and by establishing inefficient price regulations whose terms would be subject to intense controversy and arbitrariness. Such a heavy-handed approach could also, ironically, create undesirable “network effects” by fostering a single industry standard in an industry where competing architectures are likely to spawn more innovation than a single standard.”); Robert W. Hahn, Robert E. Litan, Hal J. Singer, AEI-Brookings Joint Center for Regulatory Studies, *The Economics of ‘Wireless Net Neutrality’* at 6, 9 (April 2007) (“[i]n the absence of direct or indirect evidence of a market failure, it is generally not prudent to interfere with a well-functioning market;” “In dynamically competitive markets . . . the government should be very reluctant to regulate.”); see also Comments of Institute for Policy Innovation, WC Docket No. 07-52, at 3 (Feb. 13, 2008) (“Institute for Policy Innovation Comments”) (“Regulatory bodies should restrain themselves to only those instances where public health and safety requires it, or rarely, to strengthen competition when new entry into the market is impaired by some factor other than normal costs, and perhaps in some other rare circumstances.”).

⁵⁴³ See, e.g., William R. Drexel, Telecom Public Policy Schizophrenia: Schumpeterian Destruction Versus Managed Competition, 9 Va. J.L. & Tech. 5 (Spring, 2004) (“competition managed by regulation is handicapped by a regulatory lag driven both by traditional due process notions as well as a desire for accurate market data, the collection of which significantly lags market reality. This regulatory lag is particularly acute and imposes high societal costs in an environment of rapid technological change that has permeated the telecommunications industry since the adoption of the FTA in 1996.”).

damage.”⁵⁴⁴ “Regulations create costs and constraints for market participants.”⁵⁴⁵ And “[r]egulation diminishes entrepreneurial incentives to lower costs, improve quality, and develop new products and services.”⁵⁴⁶ When compared with regulation, “[d]eregulation can achieve greater efficiency in entry and investment decisions, lower administrative costs, elimination of pricing distortions, increased innovation, and greater opportunities for customer choice.”⁵⁴⁷ Indeed, “regulation can discourage innovation and capital investments,” whereas “[d]eregulation promotes innovation.”⁵⁴⁸

Professor Thomas Hazlett has stated that “[t]o revive regulatory mandates long ago abandoned would disrupt the ability of wireless networks to craft their packages, organizing investments, technologies, infrastructure, equipment, applications, business models, and customer service.”⁵⁴⁹ He further noted that such regulation “would [indeed] render impossible the high degree of economic development that is on display in the wireless marketplace.”⁵⁵⁰

The Commission has long recognized these regulatory externalities. In the broadband context, the Commission has made clear that regulatory intervention may interfere with

⁵⁴⁴ Marius Schwartz, Professor of Economics, Georgetown University, and Federico Mini, Senior Consultant, Bates White LLC, *Hanging up on Carterfone: The Economic Case Against Access Regulation in Mobile Wireless* at 2 (May, 2, 2007).

⁵⁴⁵ J. Gregory Sidak, and Daniel F. Spulber, *Deregulation and Managed Competition in Networked Industries*, 15 Yale J. on Reg. 117, 125 (1998).

⁵⁴⁶ Jerry Ellig, *Costs and Consequences of Federal Telecommunications Regulations*, 58 Fed. Comm. L.J. 37, 43 (2006) (explaining that regulation may not in practice deliver intended benefits to consumers and estimating that the total cost of regulation to providers and consumers is as much as \$118 billion per year).

⁵⁴⁷ Sidak, *Deregulation* at 120.

⁵⁴⁸ *Id.* at 121, 140.

⁵⁴⁹ See, e.g., Thomas W. Hazlett, Professor of Law and Economics, George Mason University, “Wireless *Carterfone*: An Economic Analysis,” at 20-21 (April 30, 2007).

⁵⁵⁰ *Id.* See also Institute for Policy Innovation Comments at 3 (“The goal [in regulation] should be to find ways to allow innovation and competition to proceed without government intrusion.”).

consumers' ability to access to new and innovative offerings.⁵⁵¹ Indeed, the Commission has stated that imposing "heightened regulatory obligations could lead [broadband providers] . . . to raise their prices and postpone or forego plans to deploy new broadband infrastructure, particularly in rural or other underserved areas . . . [and] could also discourage investment in facilities."⁵⁵² In the wireless arena, the Commission has recognized that regulation can interfere with the deployment of advanced services and the ability of consumers to reap the benefits of robust competition. For example, the Commission concluded that "tariffs can harm consumers" because "in a competitive environment" tariffs can "(1) take away carriers' ability to make rapid,

⁵⁵¹ *Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities Internet Over Cable Declaratory Ruling Appropriate Regulatory Treatment for Broadband Access to the Internet Over Cable Facilities*, Declaratory Ruling and NPRM, 17 FCC Rcd 4798, 4802 (¶ 5) (2002) (determining that "broadband services should exist in a minimal regulatory environment that promotes investment and innovation in a competitive market") (quotation marks omitted) ("*Cable Modem Declaratory Ruling*"; *Wireline Broadband Internet Access Order*, ¶ 1 ("establish[ing] a minimal regulatory environment for wireline broadband Internet access services to benefit American consumers and promote innovative and efficient communications"); *BPL Internet Access Order*, ¶ 2 ("establish[ing] a minimal regulatory environment for BPL-enabled Internet access service that promotes our goal of ubiquitous availability of broadband to all Americans"); *Wireless Internet Access Order*, ¶ 2 ("establish[ing] a minimal regulatory environment for wireless broadband Internet access service that promotes our goal of ubiquitous availability of broadband to all Americans").

⁵⁵² Brief of the Federal Petitioners at 31, *NCTA v. Brand X Internet Services*, 545 U.S. 967 (2005); see also Reply Brief of the Federal Petitioners at 18, *NCTA v. Brand X Internet Services*, 545 U.S. 967 (2005) (emphasizing that the broadband market "has shown enormous growth under a hands-off regulatory regime"); see also *Wireless Internet Access Order* at 5903 (¶ 4) (rejecting calls for imposing greater regulatory requirements because imposing them "could have slowed development of these broadband services"); *Wireline Broadband Internet Access Order*, ¶ 72 (finding that reduced regulation of the wireline broadband industry will make it "more likely that wireline network operators will take more risks in investing and deploying new technologies than they are willing and able to take under the existing regime"). The Commission should be especially careful not to stifle investment in broadband Internet access services because doing so would be antithetical to Congress's and the FCC's desire to expand broadband services to unserved and underserved areas. See, e.g., American Recovery and Reinvestment Act of 2009, § 6001(k)(2), Pub. L. No. 111-5, 123 Stat. 115 (2009) (charging the Commission with developing a national broadband plan that "shall seek to ensure that all people of the United States have access to broadband capability and shall establish benchmarks for meeting that goal"); *Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996*, Notice of Inquiry, GN Docket No. 09-137, FCC 09-65 (rel. Aug. 7, 2009) (discussing Congress's directive that the FCC encourage the deployment of broadband offerings); see also *A National Broadband Plan for Our Future*, Notice of Inquiry, FCC 09-31 (2009); *Wireless Internet Access Order*, ¶ 27 ("Through this classification, we provide the regulatory certainty needed to help spur growth and deployment of [wireless broadband] services. Particularly, the regulatory certainty we provide through this classification will encourage broadband deployment in rural and underserved areas, where wireless broadband may be the most efficient broadband option.").

efficient responses to changes in demand and cost, and remove incentives for carriers to introduce new offerings; (2) impede and remove incentives for competitive price discounting, since all price changes are public, which can therefore be quickly matched by competitors; and (3) impose costs on carriers that attempt to make new offerings.”⁵⁵³ Indeed, the FCC has noted “Congress’s recognition that the marketplace rather than extensive regulation would better promote continued investment in wireless infrastructure, while at the same time ensuring that consumers enjoy reasonable rates and high quality services.”⁵⁵⁴

The obvious conclusion that regulation imposes costs is not new or unique to the wireless and Internet contexts. Decades ago, “the Commission determined that regulation imposes costs on common carriers and the public, and that a regulation should be eliminated when its costs outweigh its benefits.”⁵⁵⁵ The FCC has also made it clear that “regulation imposes costs on consumers to the extent it denies [a provider the] . . . flexibility it needs to react to market conditions and customer demands.”⁵⁵⁶

⁵⁵³ Brief for Respondents, *Orloff v. FCC*, 352 F.3d 415 (No. 02-1189), 2003 WL 25588065, at *7 (D.C. Cir. Jan. 21, 2003) (citing *CMRS Second Report and Order*, 9 FCC Rcd at 1479, para. 177).

⁵⁵⁴ *Id.* at *5.

⁵⁵⁵ *Access Charge Reform*, Fifth Report and Order and Further Notice of Proposed Rulemaking, 14 FCC Rcd 14221, 14297 (¶ 144) (1999) (citing *Policy and Rules Concerning Rates for Competitive Common Carrier Services and Facilities Authorizations Therefor*, First Report and Order, 85 FCC 2d 1, 3 (1980) (“*Competitive Carrier First Report and Order*”); see also *id.* (“the new service rules currently in effect limit incumbents’ incentives to innovate” and “respon[d] to market forces,” thus “impos[ing] costs on society by perpetuating inefficiencies in the market for interstate access services.”); *Competitive Carrier First Report and Order*, ¶ 11 (“[E]nforcement of a system of regulation of business conduct imposes costs. These costs can be identified in two classes. There are the less significant administrative costs of compiling, maintaining, and distributing information necessary to comply with agency licensing and reporting requirements. More significant costs, however, are inflicted on society by the loss of dynamism which can result from regulation. Indeed, regulation sometimes creates what can only be called perverse incentives for the regulated firms.”).

⁵⁵⁶ *Revisions to Price Cap Rules for AT&T Corp.*, Report and Order, 10 FCC Rcd 3009, 3018 (¶ 27) (1995).

Courts also have long recognized the costs of regulation, the importance of competition, and the need for agencies properly to balance those tradeoffs, particularly in the communications context. Justice Breyer, for example, looked askance at the Commission’s attempts to impose shared access of facilities, reminding the Commission that “rules that go too far . . . risk costs that, in terms of the Act’s objectives, may make the game not worth the candle.”⁵⁵⁷ In a context – wireline unbundling – that offers some lessons for today’s FCC, Justice Breyer was concerned about the “significant administrative and social costs”⁵⁵⁸ imposed by regulation. And he noted that “a sharing requirement” would “diminish the original owner’s incentive” to “undertake the investment necessary to produce complex technological innovations knowing that any competitive advantage deriving from those innovations will be dissipated by the sharing requirement.”⁵⁵⁹ He explained that “[i]ncreased sharing by itself does not automatically mean increased competition. It is in the *un* shared, not in the shared, portions of the enterprise that meaningful competition would likely emerge.”⁵⁶⁰ He was rightly concerned that extensive obligations would “create not competition, but pervasive regulation, for the regulators, not the

⁵⁵⁷ *AT&T v. Iowa Utils. Bd.*, 525 U.S. 366, 430 (1998) (Breyer, J., concurring in part and dissenting in part).

⁵⁵⁸ *Id.* at 428.

⁵⁵⁹ *Id.* at 429. Justice Breyer reiterated these concerns in his partial concurrence and partial dissent in *Verizon Communications, Inc. v. FCC*, 535 U.S. 467, 551 (2002), addressing the FCC’s pricing methodology for unbundled network elements, which Justice Breyer concluded sufficiently undermined the statutory goal and prescribed means – competition through deregulation – that they should be deemed arbitrary and capricious. “The rules seem to say that the incumbent will share with competitors the cost-reducing benefits of a successful innovation, while leaving the incumbent to bear the costs of most unsuccessful investments on its own. Why would investment not then stagnate? *See, e.g.,* Jorde, Sidak, & Teece, *Innovation, Investment, and Unbundling*, 17 *Yale J. Reg.* 1, 8 (2000) (“It makes no economic sense for the [incumbent] to invest in technologies that lower its own marginal costs, so long as competitors can achieve the identical cost savings by regulatory fiat.”); Sidak & Spulber, *Deregulation and Managed Competition in Network Industries*, 15 *Yale J. Reg.* 117, 124-125 (1998) (“If deprived of a return to capital facilities after capital has been sunk in irreversible investments, or if faced with reduced returns to investments already made, any economically rational company will eliminate or reduce similar capital investments in the future.”)).

⁵⁶⁰ *Id.* at 429.

marketplace, would set the relevant terms.”⁵⁶¹ Because of these costs and the inconsistency between heavy-handed regulation and Congress’s “emphasi[s]” on “the importance of competition,” the rules went “too far . . . [were] inconsistent with Congress’ approach . . . [and were not] adequately justified in terms of the statute’s mandate, read in light of its purposes.”⁵⁶²

The D.C. Circuit has similarly reminded the FCC of the need to recognize the costs of regulation and tread lightly. In rejecting the FCC’s uniform national impairment standard for wireline unbundling, the court criticized the Commission for its “indifference to petitioners’ contentions about the state of competition in the market”⁵⁶³ and concluded that “nothing in the Act appears a license to the Commission to inflict on the economy the sort of costs noted by Justice Breyer under conditions where it had no reason to think doing so would bring on a significant enhancement of competition.”⁵⁶⁴ The D.C. Circuit later explained that the Act’s purpose “is to stimulate competition – preferably genuine, facilities-based competition. Where competitors have access to necessary inputs at rates that allow competition not only to survive but to flourish, it is hard to see any need for the Commission to impose the costs of mandatory unbundling.”⁵⁶⁵ While the Commission enjoyed a statutory mandate to order unbundling in the wireline context, no such mandate exists with respect to wireless broadband offerings.

Accordingly, the Commission cannot gloss over the enormous costs of regulation. Nor should it assume it can deftly regulate to tweak or improve upon the success stories already

⁵⁶¹ *Id.*

⁵⁶² *Id.* at 430-31.

⁵⁶³ *USTA v. FCC*, 290 F.3d 415, 429 (D.C. Cir. 2002).

⁵⁶⁴ *Id.* at 430.

⁵⁶⁵ *USTA v. FCC*, 359 F.3d 554, 576 (D.C. Cir. 2004).

written about the wireless and Internet markets, without harming consumers, competition and innovation.

As deregulation proceeds, some urge regulators to take an activist role, to manage the transition so as to ‘promote’ or ‘protect’ competition. That view is misguided. Regulation should recede as competition progresses Indeed, an attempt to manage competition not only entails administrative costs, but can also prevent the market from achieving the benefits of competition that regulators wish to attain for consumers.⁵⁶⁶

This is particularly so in highly technical and dynamic fields such as the wireless, broadband, and Internet markets, where innovation and growth move substantially faster than administrative and regulatory processes.⁵⁶⁷ Here, the true costs of regulation may be invisible precisely because they come in the form of potential innovations stifled. As it proceeds to evaluate and promote innovation, and implement what it deems sound “competition policy,”⁵⁶⁸ the Commission must remain mindful of the substantial costs associated with imposing new regulations and how those costs will inhibit competition, and reduce innovation.

Regulation is especially problematic in today’s economic climate because access to capital is increasingly difficult. Regulatory mandates, even well-intentioned regulations meant to spur innovation, could create highly counterproductive and unintended consequences, such as disincenting wireless carriers and others from investing in critical last-mile development. The FCC’s failed D Block auction, described above, is a case-in-point. There, the many regulatory

⁵⁶⁶ J. Gregory Sidak, and Daniel F. Spulber, *Deregulation and Managed Competition in Networked Industries*, 15 *Yale J. on Reg.* 117, 120 (1998).

⁵⁶⁷ *See, e.g., In the Matter of Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service*, 11 *FCC Rcd* 6235, 6272 (1996) (“Given the rapid pace of technological change, isn’t it inevitable that there will be innovations that even the flexible ATSC Standard cannot accommodate?”) (Separate Statement of Chairman Reed E. Hundt).

⁵⁶⁸ *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*, Notice of Inquiry, FCC 09-67, at Statement of Chairman Julius Genachowski (Aug, 27, 2009) (stating that the Commission is laying a “foundation” for “predictable, fact-based competition policy in the wireless sector”).

requirements to be imposed on the D Block licensee and uncertainty regarding possible additional regulatory requirements completely chilled interest in bidding for these licenses. Similarly, additional mandates on the wireless industry would undoubtedly stifle broadband expansion and would be antithetical to the FCC's oft-mentioned goal of widespread ubiquitous broadband deployment, as well as the agency's charge to develop a national broadband plan.⁵⁶⁹ Carriers, including Verizon Wireless, are currently investing billions of dollars in order to achieve widespread deployment of 4G next generation technologies within a short timeframe.

Unnecessary regulation, or uncertainty in regulatory oversight, will be perceived by investors as increasing risk, thereby undermining confidence that their investments will result in a reasonable and timely return, and could limit the availability of capital for necessary infrastructure improvements.⁵⁷⁰ Indeed, regulatory uncertainty of the type engendered by vague rules or the threat of changes in longstanding policy also imposes costs and harms competition.⁵⁷¹ As Professor Hazlett has written:

Where firms – entrants or incumbents – have been allowed wide latitude in constructing new networks, robust investment incentives have resulted

⁵⁶⁹ See American Recovery and Reinvestment Act of 2009, § 6001(k)(2), Pub. L. No. 111-5, 123 Stat. 115 (2009) (“ARRA”) (charging the Commission with developing a national broadband plan that “shall seek to ensure that all people of the United States have access to broadband capability and shall establish benchmarks for meeting that goal”).

⁵⁷⁰ Robert W. Hahn, Robert E. Litan, Hal J. Singer, AEI-Brookings Joint Center for Regulatory Studies, “The Economics of ‘Wireless Net Neutrality,’” at 9 (April 2007) (“The problem for regulators is that dynamic incentives to invest are important to wireless operators. Inefficient regulation threatens to jeopardize the investment needed to upgrade the existing third generation (3G) wireless platform to support broadband services and to launch the fourth generation (4G) network to support real-time applications such as mobile video, remote monitoring, and mobile commerce.”).

⁵⁷¹ See, e.g., *AT&T Inc. v. FCC*, 452 F.3d 830, 836 (D.C. Cir. 2006) (noting that “even the Commission recognizes that ‘regulatory uncertainty . . . in itself may discourage investment and innovation’”) (quoting *Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities*, 17 FCC Rcd 4798, 4802 (¶ 5) (2002)); *Amendment of the Commission's Space Station Licensing Rules and Policies*, 18 FCC Rcd 10,760, 10,781 (¶ 45) n. 115 (2003) (“The Commission has noted on several occasions that regulatory uncertainty can discourage investment, and so unnecessary regulatory uncertainty should be avoided.”).

and consumer gains have been realized. Where regulators have, alternatively, ambitiously regulated incumbents through network sharing obligations designed to ease entry barriers, an unsustainable level of entry has occurred that has resulted in widespread losses across the industry without countervailing consumer benefits.⁵⁷²

Moreover, as the Commission under Chairman Hundt long ago noted, in the absence of “burdensome” regulations in the wireless industry “investors will be able to make funding decisions based upon their assessment of market forces and their analysis of the strengths and weaknesses of the various telecommunications companies competing in the mobile services marketplace.”⁵⁷³ Lauding its regulatory treatment of CMRS, the FCC noted that it was creating “a stable and predictable federal regulatory environment. . . [which] is conducive to continued investment in the wireless infrastructure”⁵⁷⁴ and “minimiz[ed] regulatory uncertainty and any consequent chilling of investment activity.”⁵⁷⁵

The FCC bears the burden of justifying any new regulation it seeks to impose on these dynamic and functioning markets. Given the risk that regulation will stunt investment, stymie innovation, and stifle competition, Congress’ deregulatory approach that wireless services, as well as the Internet, remain free from government regulation,⁵⁷⁶ and the Commission’s own

⁵⁷² *Id.* ¶ 4.

⁵⁷³ *Second CMRS Report and Order*, ¶ 24.

⁵⁷⁴ *Id.*, ¶ 25.

⁵⁷⁵ *Id.*

⁵⁷⁶ *See* 47 U.S.C. § 230(b). Congress “found that the Internet and interactive computer services ‘have flourished, to the benefit of all Americans, with a minimum of government regulation.’ Congress further stated that it is ‘the policy of the United States ... to preserve the vibrant and competitive free market that presently exists for the Internet and other interactive computer services, unfettered by Federal or state regulation.’ [...] Congress acted to *keep government regulation of the internet to a minimum* [...]” *Zeran v. America Online, Inc.*, 129 F.3d 327, 330 (1997) (citing 47 U.S.C. Section 230(a)(3), (a)(4), and (b)(2)) (emphasis added); *see also America Online, Inc. v. GreatDeals.Net*, 49 F.Supp.2d 851, 856 (E.D. Va. 1999) (noting that “the Telecommunications Act sets forth Congress’s explicit desire to have the Internet remain without regulation by federal or state government,” and noting

holding that, under OBRA, any regulation of the wireless industry be minimal and only adopted where there is a “clear-cut need,”⁵⁷⁷ the FCC will have severe difficulties justifying new regulation. Given the extensive evidence of robust and intensifying innovation and competition, there is, in any event, no reason for it to embark on a re-regulatory path.

D. The APA Limits the FCC’s Ability to Change Past Policy and Regulate in these Competitive and Innovative Areas.

In addition to following Congress’ deregulatory mandates, the FCC must adhere to the APA and the limits it imposes on the agency.⁵⁷⁸ As noted above, the FCC has a number of established precedents that affect wireless and broadband providers, and the APA limits the FCC’s ability to depart from these precedents. In particular, “[i]f the FCC changes course, it ‘must supply a reasoned analysis’ establishing that prior policies and standards are being deliberately changed”⁵⁷⁹ because “a rational person acts consistently, and therefore changes course only if something has changed.”⁵⁸⁰ “Indeed, where an agency departs from established precedent without a reasoned explanation, its decision will be vacated as arbitrary and

that “FCC Chairman William Kennard as well as other FCC representatives have all stated that the Internet will not be regulated by the FCC.”) (citations omitted).

⁵⁷⁷ *Petition of the State of Hawaii*, ¶ 10.

⁵⁷⁸ See 5 U.S.C. § 706(2)(A) (requiring a reviewing court to set aside agency action that is “arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law”).

⁵⁷⁹ *Verizon Telephone Companies v. FCC*, 570 F.3d 294, 301 (D.C. Cir. 2009) (quoting *Motor Vehicle Mfrs. Ass’n, Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 57 (1983); see also *Wisc. Valley Improvement v. FERC*, 236 F.3d 738, 748 (D.C. Cir. 2001) (“[A]n agency acts arbitrarily and capriciously when it abruptly departs from a position it previously held without satisfactorily explaining its reason for doing so.”); *Telecommunications Research and Action Center v. FCC*, 800 F.2d 1181, 1184 (D.C. Cir. 1986) (“When an agency undertakes to change or depart from existing policies, it must set forth and articulate a reasoned explanation for its departure from prior norms.”).

⁵⁸⁰ *Schurz Communications, Inc. v. FCC*, 982 F.2d 1043, 1053 (7th Cir. 1992).

capricious.”⁵⁸¹ The Supreme Court’s recent decision in *FCC v. Fox Television Stations, Inc.*,⁵⁸² underscores the importance of this APA requirement. There, the Court made it clear that the FCC must “display awareness that it *is* changing position” and that it may not “depart from a prior policy *sub silentio* or simply disregard rules that are still on the books”; otherwise, its actions will not survive APA review.⁵⁸³ *Fox* also makes it clear that the Commission would have to provide a “more detailed justification” for departing from agency precedent in this case than it would in other instances.⁵⁸⁴ As the D.C. Circuit has explained most recently, “[i]f the FCC changes course, it ‘must supply a reasoned analysis’ establishing that prior policies and standards are being deliberately changed.”⁵⁸⁵ It is clear then that “an agency acts arbitrarily and

⁵⁸¹ *ANR Pipeline Co. v. FERC*, 71 F.3d 897, 901 (D.C. Cir. 1995); *Verizon Telephone Companies*, 570 F.3d at 304 (“[I]t is arbitrary and capricious for the FCC to apply such new approaches without providing a satisfactory explanation when it has not followed such approaches in the past.”).

⁵⁸² 129 S. Ct. 1800 (2009).

⁵⁸³ *Fox*, 129 S.Ct. at 1810-12. In *Fox*, the Court determined that the FCC satisfied these requirements because “the Commission forthrightly acknowledged that its recent actions have broken new ground” and supplied a sufficiently reasoned basis for doing so. *Id.* at 1812-13.

⁵⁸⁴ *See Fox*, 129 S.Ct. at 1811 (stating that an agency must provide a “more detailed justification” for its new policy when the “new policy rests upon factual findings that contradict those which underlay its prior policy; or when its prior policy has engendered serious reliance interests that must be taken into account”). In this case, if the FCC were to depart from its applicable precedents, doing so would require the agency to contradict prior factual findings and upset reasonable reliance interests, thus triggering both prongs of heightened scrutiny under *Fox*.

⁵⁸⁵ *Verizon Telephone Co. v. FCC*, 570 F.3d 294 (D.C. Cir. 2009) (quoting *Motor Vehicle Mfrs. Ass'n, Inc.*, 463 U.S. 29, 57 (1983)). The agency must provide a “principled explanation” for departures from its longstanding practices. *National Black Media Coalition v. FCC*, 775 F.2d 342 (D.C. Cir. 1985). There, Judge Wald observed, “an agency may not repudiate precedent simply to conform with a shifting political mood. Rather, the agency must demonstrate that its new policy is consistent with the mandate with which Congress has charged it. . . . While an agency may properly rely on an ‘incumbent administration’s views of wise policy to inform its judgments,’ it may not casually substitute those considerations for a rational evaluation of the merit and efficacy of its policies.” *Id.* at 356 n.17.

capriciously when it abruptly departs from a position it previously held without satisfactorily explaining its reason for doing so.”⁵⁸⁶

As detailed above, a long line of Commission precedents establish that the agency will rely on competition – rather than regulation – to shape the wireless market and regulate only where there is a clear-cut need. Similarly, and also as noted above, Commission precedent firmly establishes that “broadband services should exist in a minimal regulatory environment that promotes investment and innovation in a competitive market.”⁵⁸⁷ There would be no basis to depart from these precedents now given the evidence of robust, increasing innovation and competition that characterize the wireless ecosystem today. In fact, there is significantly more competition, investment and innovation today than when the Commission first determined that it would rely on market forces instead of regulation.⁵⁸⁸ Therefore, changing the Commission’s deregulatory paradigm – whether for traditional or broadband wireless services – would constitute an unjustifiable change of course that would not withstand APA review.

In addition to its limits on the FCC’s ability to abandon past policies, the APA constrains the FCC in other important ways. For example, it requires the Commission to justify any

⁵⁸⁶ *Id.* (quoting in a parenthetical *Wisc. Valley Improvement v. FERC*, 236 F.3d 738, 748 (D.C. Cir. 2001)). So too must the Commission be mindful of its obligations to respect its previous practices and approaches in evaluating calls to change its methodologies or conclusions on competition in the wireless industry. “[I]t is arbitrary and capricious for the FCC to apply such new approaches without providing a satisfactory explanation when it has not followed such approaches in the past.” *Verizon Telephone Companies v. FCC*, 570 F.3d 294, 304 (D.C. Cir. 2009) (finding arbitrary and capricious the agency’s inadequately explained departure from its precedents setting forth the agency’s approach to market share evaluations, which had relied on actual *and* potential competition).

⁵⁸⁷ *Cable Modem Declaratory Ruling* at 4802 (¶ 5) (quotation marks omitted); *see also supra* Section IV.B. (identifying additional FCC precedents where the agency has stated that it will take a light regulatory approach to broadband offerings).

⁵⁸⁸ In 1994, for example, when there were only two cellular licensees operating in each market, the Commission decided to deregulate the industry because “market forces are generally sufficient,” and “[d]espite the fact that the cellular service market [at that time] ha[d] not been found to be fully competitive, there [wa]s no record evidence that indicate[d] a need for full-scale regulation of cellular or any other CMRS offerings.” *Second CMRS Report and Order*, ¶¶ 173-74.

regulations on the basis of record evidence of a problem in need of solution, and to demonstrate that its solution is rationally connected to that problem and promotes – rather than undermines – the Commission’s statutory and stated objectives.

As a threshold matter, the APA prohibits the Commission from adopting new regulations unless its decision is supported by substantial record evidence.⁵⁸⁹ The FCC must identify substantial record evidence of a market failure or some other problem in need of regulatory solution.⁵⁹⁰ As the D.C. Circuit has explained, “review would be a relatively futile exercise in formalism if no inquiry were permissible into the existence or nonexistence of the condition which the Commission advances as the predicate for its regulatory action. A regulation perfectly reasonable and appropriate in the face of a given problem may be highly capricious if that problem does not exist.”⁵⁹¹ When reviewing the factual basis for an agency’s action under this standard, the “lodestar is the question whether the record as a whole provides substantial evidence to support the agency action.”⁵⁹² Here, there is substantial evidence that these markets are thriving, marked by robust competition, and rapid innovation, which evidence the FCC

⁵⁸⁹ See, e.g., *Burlington Truck Lines, Inc. v. United States*, 371 U.S. 156, 168 (1962) (“The agency must make findings that support its decision, and those findings must be supported by substantial evidence.”).

⁵⁹⁰ See, e.g., *Eagle Broad. Group, Ltd. v. FCC*, 563 F.3d 543, 551 (D.C. Cir. 2009) (noting the applicability of the substantial evidence standard to agency factfinding). Substantial evidence is “more than a mere scintilla. It means such relevant evidence as a reasonable mind might accept as adequate to support a conclusion.” *Universal Camera Corp. v. NLRB*, 340 U.S. 474, 477 (1951) (quotation marks omitted).

⁵⁹¹ *City of Chicago v. Fed. Power Comm’n*, 458 F.2d 731, 742 (D.C. Cir. 1972); see also *Home Box Office, Inc. v. FCC*, 567 F.2d 9, 36 (D.C. Cir. 1977).

⁵⁹² *Morall v. DEA*, 412 F.3d 165, 178 (D.C. Cir. 2005); *Safe Extensions, Inc. v. FAA*, 509 F.3d 593, 606 (D.C. Cir. 2007) (“In sum, because the agency’s decision . . . finds no support in the evidence the agency considered, we find it arbitrary and capricious.”). Indeed, the agency may not find substantial evidence for its position by focusing solely on the evidence that supports its decision. See *Lakeland Bus Lines, Inc. v. NLRB*, 347 F.3d 955, 962 (D.C. Cir. 2003).

cannot simply ignore.⁵⁹³ There is no evidence of market failure that, under the FCC’s own approach, would support a decision to impose new regulation.⁵⁹⁴ Indeed, not only is there no evidence justifying a regulatory solution, there is evidence that regulation here would impose costs of its own and undermine the Commission’s statutory goal of encouraging competition as well as its stated goals of promoting innovation.⁵⁹⁵

⁵⁹³ See, e.g., *Ill. Pub. Telecomms. Ass’n v. FCC*, 117 F.3d 555, 563-64 (D.C. Cir. 1997) (holding that the FCC acted arbitrarily and capriciously in adopting a rule unsupported by the evidence and without acknowledging contradictory evidence).

⁵⁹⁴ See, e.g., *Orloff v. Vodafone Airtouch Licenses LLC, d/b/a/ Verizon Wireless*, 17 FCC Rcd 8987, 8998 n.69 (2002) (stating that the Commission will generally “rel[y] on market forces, rather than regulation, except when there is a market failure”); see also *Second CMRS Report and Order* at 1478 (¶ 173) (“[I]n a competitive market, market forces are generally sufficient to ensure the lawfulness of . . . terms and conditions of service by carriers who lack market power.”).

⁵⁹⁵ See, e.g., *Office of Commc’n of United Church of Christ v. FCC*, 779 F.2d 702, 707 (D.C. Cir. 1985) (“Rational decisionmaking also dictates that the agency simply cannot employ means that actually undercut its own purported goals.”).

V. THE FCC SHOULD TAKE CERTAIN ACTIONS TO REMOVE REGULATORY BARRIERS TO WIRELESS INNOVATION AND INVESTMENT.

The Commission has asked what steps it can take to facilitate innovation and investment in the wireless sector. As discussed previously, the wireless industry is already extremely innovative, enabled by the Commission's regulatory policies to date. Nevertheless, there are certain impediments to innovation and investment that exist today in the wireless industry. Verizon Wireless urges the Commission to take steps to help remove these barriers that deter investment, slow the introduction of new services, and/or stifle the growth of capacity-rich applications. Specifically, the Commission should take the following actions, discussed in more detail below: (1) identify spectrum suitable for wireless broadband services, (2) work with Congress to enact a national framework for wireless consumers, (3) streamline tower siting and historic preservation processes to expedite investment in wireless infrastructure, (4) support congressional efforts to eliminate unnecessary taxes and fees on wireless services, (5) address remaining questions affecting the use of the 700 MHz spectrum, including the urgent need to relocate wireless microphones, and (6) commit to expediting the review process for applications.

A. The FCC Should, Together with NTIA, Identify Spectrum Suitable for Wireless Broadband Services.

As discussed in Section III.D. of these Comments, continued wireless innovation will require significant amounts of additional spectrum. And, as consumers' reliance on wireless devices for broadband services continues to grow, so too will their need for more bandwidth. Wireless providers need suitable and sufficient radio spectrum in order to meet this need, and the government has the responsibility to identify and license that spectrum in the public interest. Verizon Wireless thus supports the conduct of a survey, by NTIA as well as the Commission, to

identify spectrum that can be auctioned.⁵⁹⁶ The Commission's and the industry's experience with repurposing spectrum from federal to commercial use teaches that this will be a multi-year process. Reallocating the AWS spectrum, for example, consumed many years, yet portions of that band still remain uncleared of federal agency users. The sooner candidate spectrum bands are identified, the sooner more spectrum can be made available for the growing bandwidth demands of consumers and businesses.

The Commission should also identify which non-federal bands can be reallocated for commercial wireless services. While several bands have recently been made available for broadband services (such as the AWS, 700 MHz, and BRS bands), the anticipated growth of bandwidth-intensive services will require additional spectrum allocations. The Commission should take steps to ensure such spectrum is available when it is needed by conducting a spectrum inventory to determine which bands suitable for broadband can be made available for that purpose.

The Commission need not conduct an exhaustive inventory of all spectrum bands it manages, as many of those bands would not be suitable for broadband, and some are already allocated and available for such services. Rather, a targeted effort that focuses on spectrum suitable for mobile broadband would be most productive, cost-effective and swift. As discussed earlier, the review should be limited to spectrum between 300 MHz and 5 GHz that can effectively support mobile broadband. Similarly, conducting a detailed inventory of spectrum bands already used for commercial mobile radio services would not produce useful information that would lead to the identification of more spectrum for broadband. Some of these bands have

⁵⁹⁶ A bill introduced in the Senate as the Radio Spectrum Inventory Act (S. 649), and its companion bill H.R. 3125, would direct the FCC and NTIA to do precisely that.

already been widely deployed for broadband services (*e.g.*, cellular and PCS), while others have not yet been cleared and made available for use (*e.g.*, AWS and 700 MHz).

Moreover, the agencies should focus on identifying spectrum bands that can be harmonized with spectrum allocations in other parts of the world. Global harmonization of spectrum allocations can lead to significant public benefits, including lower equipment cost, more rapid deployment, and greater interoperability of advanced wireless systems worldwide. Targeting bands in spectral proximity to existing mobile bands would also be appropriate as such spectrum can most easily and cost-effectively put into use.

B. The Commission Should Work with Congress to Enact a National Framework for Wireless Consumers.

While wireless services are increasingly nationwide, and allow customers to benefit from national rate plans that offer the same prices and services across state boundaries, some states continue to attempt to assert monopoly utility-type regulation over the wireless industry.⁵⁹⁷ Left unchecked, these re-regulatory efforts will force wireless carriers to follow different rules in different states and undermine the incentives for investment and innovation that deregulation creates – a result antithetical to Congress’s goal when it established a deregulatory framework for the wireless industry.⁵⁹⁸

⁵⁹⁷ For example, Minnesota sought to regulate wireless prices through a detailed set of requirements for contracts. Although the U.S. Court of Appeals for the Eighth Circuit struck down the law in *Cellco Partnership v. Hatch*, 431 F.3d 1077 (8th Cir. 2005), the wireless industry had to fight this attempt to impose utility-type regulation for two years. Minnesota is now proposing another set of wireless-specific rules. The California PUC is proposing onerous rules that would impose outage reporting rules at variance from the comprehensive FCC outage reporting system and require particular materials to be available in stores. New Mexico prohibits certain types of charges on bills that require carriers to have different bill formats and limit products and services carriers can offer to customers in that state.

⁵⁹⁸ Omnibus Budget Reconciliation Act of 1993, Pub. L. No. 103-66, 107 Stat. 312. As the Commission has stated, the “overarching congressional goal” of this statute was “promoting opportunities for economic forces – not regulation – to shape the development of the CMRS market.” *Third CMRS Report and Order*, ¶ 42.

The wireless industry is an intensely competitive consumer electronics business, no different than Apple and Dell and other high-tech businesses – yet state PUCs do not regulate those companies. Wireless providers should not receive special treatment, only the same treatment accorded other competitive businesses. There is no palpable justification for discriminatory regulation.

The answer to patchwork, utility-type regulation is for the Commission to work with Congress to adopt a *national framework* for wireless oversight. Under that framework, the Commission would set national wireless consumer protection standards in areas including disclosure of the terms of customer service agreements, service coverage, and billing practices. State PUCs would no longer have authority to impose utility-style regulation on a competitive industry that is nothing like a utility. But the states would retain all of their power through their Attorneys General to protect against unfair and deceptive consumer practices if and when they determine such practices exist, under their generally applicable consumer protection statutes.⁵⁹⁹ The 2004 Assurance of Voluntary Compliance (“AVC”) entered into among Verizon Wireless, Cingular Wireless (now AT&T Mobility), Sprint and thirty-three state attorney generals could serve as a model for these national standards.⁶⁰⁰ Pursuant to the AVC, the signatory carriers have agreed, among other things, to provide a significant amount of specific information at the

⁵⁹⁹ Two witnesses, testifying before Congress (House Committee on Energy and Commerce, Subcommittee on Communications, Technology and the Internet) on May 7, 2009, discussed the harms to consumer welfare of state-by-state regulation and the benefits of a single set of rules, and supported national framework legislation. Written Statement of George S. Ford, Chief Economist, Phoenix Center for Advanced Legal and Economic Public Policy Studies; Written Statement of Victor H. “Hu” Meena, President and CEO, Cellular South, Inc., at 11.

⁶⁰⁰ *In the Matter of Cellco Partnership d/b/a Verizon Wireless*, Assurance of Voluntary Compliance (June 29, 2004).

point of sale, including information regarding the minutes in the plan, any early termination fee, and the fact that certain taxes or monthly discretionary charges may be added.

National regulation serves the public interest because it benefits *all* consumers in *all* states by setting uniform protection and service quality standards for wireless consumers, thereby creating a stable platform for innovation. Individual state-by-state regulation cannot do that. National regulation also avoids disparate state requirements that raise operational costs and cause uncertainties for companies, create confusion and inconvenience for consumers, delay new services or options that consumers would otherwise enjoy, and discourage investment.⁶⁰¹

States would not lose their power to address unfair and deceptive practices. Under the national framework, states would continue to enforce their consumer protection statutes of general applicability, but would not be able to impose state specific wireless regulations. State Attorneys General would thereby lose none of their authority to go after practices that they believe are unfair or deceptive. States may also adopt consumer education programs, refer complaints to carriers for resolution, bring formal complaints against carriers they believe are acting unlawfully, and investigate wireless practices. This new framework will maximize protections to all consumers nationwide, while avoiding the harms of patchwork state-by-state regulation.

⁶⁰¹ T. Randolph Beard, George S. Ford, Thomas M. Koutsky, and Lawrence J. Spiwak, “Developing a National Wireless Regulatory Framework: A Law and Economics Approach,” *CommLaw Conspectus – Journal of Communications Law and Policy*, Vol 16, No. 2, p. 396 (2008) (“[A] regulatory environment that differs from state-to-state can erode a provider’s ability to offer cost-efficient service through uniform national service and pricing plans. . . .”). *See* CTIA, *Impact on Consumers of State-by-State Regulation* (Dec. 2005) (demonstrating how state-by-state regulation of the wireless industry can undermine many of the consumer benefits the FCC and the industry have worked to achieve), *available at* http://files.ctia.org/pdf/PositionPaper_CTIA_ImpactonConsumerStatebyState_12_05.pdf (last visited Sept. 30, 2009).

Last year, Congress developed a discussion draft of a national wireless consumer protection bill.⁶⁰² The Commission should work with Congress to refine that bill to achieve a single set of national consumer protection standards while preserving states' ability to challenge what they believe to be unfair and deceptive practices.

C. The Commission Should Streamline Tower Siting to Expedite Investment in Wireless Infrastructure.

One of the biggest barriers wireless companies face in reaching consumers in unserved and underserved areas, or in adding capacity to meet consumers' needs for more bandwidth, are the costs and delays associated with the laborious tower siting process. Investment suffers from long and unreasonable waiting times for new sites to gain state or local zoning approval as well as to clear historic preservation review. This is a public safety problem as well. Thousands of public safety agencies and first responders depend on reliable and expansive wireless networks to help citizens and respond to emergencies. Public safety agencies also depend on access to new or modified towers to meet their growing needs. Verizon Wireless urges the Commission to act now to help streamline the tower zoning and historic preservation review processes.

1. The Commission Should Place Limits on the State and Local Zoning Process.

The Commission should take steps to eliminate barriers to public safety as well as commercial wireless deployment by working with Congress to place and enforce meaningful bounds on the state and local zoning process. These steps would not prohibit lawful zoning practices. They would simply expedite actions to allow investments in wireless infrastructure, thereby meeting the Commission's goals of encouraging investment in order to expand

⁶⁰² Available at http://markey.house.gov/docs/telecomm/draft_wireless_legislation.pdf (last visited Sept. 30, 2009).

broadband availability and lay the groundwork for further innovation. There are three aspects of the state and local process that need to be fixed.

First, the Commission should urge Congress to amend Section 332 of the Act to exempt certain antenna collocations and tower modifications from zoning approval. Companies are often required to seek zoning approval to add new antennas to an existing building or structure or to replace existing antennas, even if the change in appearance of the tower is minor and often invisible. These requirements impact broadband buildout because deploying broadband in new areas often involves locating antennas on existing towers. Section 332(c)(7) of the Communications Act should be amended to limit state and local authorities' ability to require zoning approval for collocations that do not result in a "substantial increase" in the tower.⁶⁰³ Similarly, antenna modifications that do not constitute a "substantial increase" should be excluded from the zoning process.

Second, the Commission should impose a "shot clock" on the zoning process. Zoning delays frustrate wireless company efforts to meet Commission buildout requirements and slow deployment of broadband services that will benefit consumers. In July 2008, CTIA thus filed a *Petition for Declaratory Ruling* ("CTIA Petition") asking the Commission to define when a state or local zoning authority has "failed to act" on a zoning application.⁶⁰⁴ CTIA, Verizon Wireless, and others provided many examples of unreasonable zoning delays and the resulting harm to

⁶⁰³ The term "substantial increase" has been defined by the FCC in the context of historic preservation reviews on existing towers to include significant changes in appearance of the tower or its site. *Nationwide Programmatic Agreement for the Collocation of Wireless Antennas*, 16 FCC Rcd 5574, 5577 (Wireless Tel. Bur. 2001) ("*Collocation Agreement*").

⁶⁰⁴ *Petition for Declaratory Ruling to Clarify Provisions of Section 332(c)(7)(B) to Ensure Timely Siting Review and to Preempt under Section 253 State and Local Ordinances that Classify All Wireless Siting Proposals as Requiring a Variance*, WT Docket No. 08-165 (2008) ("CTIA Petition").

broadband services.⁶⁰⁵ They demonstrated that these delays are particularly unjustified and harmful for changes to existing tower sites in order to improve coverage, add broadband capability, or expand the number of wireless competitors in a community.

To curb these delays and give effect to Section 332(c)(7) of the Act, the Commission should grant CTIA's petition as soon as possible, and declare that a "failure to act" under this Section has occurred if a zoning authority fails to render a final decision within 45 days on a wireless facilities siting application proposing to collocate on an existing structure or within 75 days for all other applications.⁶⁰⁶ If a zoning authority fails to issue a decision within these timeframes, the application will be deemed granted. In the alternative, the Commission could establish a presumption that when a zoning authority cannot explain a failure to act within these time frames, a reviewing court should find a violation of Section 332(c)(7)(B)(ii) and issue an injunction granting the underlying application. Action on CTIA's petition will greatly help to avoid unreasonable zoning delays, which impede expanded public safety as well as commercial communications, and slow investment in infrastructure, directly undermining the Commission's broadband objectives.

Third, the Commission should confirm that zoning ordinances that materially interfere with wireless services violate Section 253. Another cause of delay in expanding wireless coverage is the proliferation of zoning ordinances that are designed to make wireless facilities siting far more difficult or to extract unreasonable fees from wireless companies. The effect of

⁶⁰⁵ CTIA Petition at 13-16; Comments of Verizon Wireless, WT Docket No. 08-165, at 6-7 (September 29, 2008); Reply Comments of Verizon Wireless, WT Docket No. 08-165, at 4-6 (October 14, 2008) (citing examples from other party comments).

⁶⁰⁶ CTIA Petition at 24-26.

many of these ordinances is to prohibit wireless facilities siting in a particular area, impeding expansion of public safety as well as commercial wireless networks.⁶⁰⁷

Wireless companies should be able to challenge and overturn particularly egregious zoning ordinances by showing that the ordinances violate and are preempted by Section 253(a) of the Act where they impose requirements that “prohibit or have of the effect of prohibiting the ability of any entity to provide any interstate or intrastate telecommunications service.”⁶⁰⁸ Interpreting Section 253, the Commission, joined by several circuits, has required a carrier challenging a state or local legal requirement to show that the challenged requirement materially inhibits a carrier’s ability to compete in a fair and balanced legal and regulatory environment.⁶⁰⁹ Last year, however, the U.S. Court of Appeals for the 9th Circuit reversed its prior interpretation of Section 253(a) and held that that “a plaintiff suing a municipality under Section 253(a) must show actual or effective prohibition, rather than the mere possibility of prohibition.”⁶¹⁰ Some language in the court’s ruling could be read to impose a stricter standard for demonstrating a Section 253(a) violation than the Commission has set. The 9th Circuit’s decision may

⁶⁰⁷ Examples include ordinances which dictate use of a particular technology, set forth no standards for approving wireless tower applications and reserve unfettered authority to the zoning authority, impose unreasonable or impractical minimum parcel size or tower fall zone requirements, impose severe height or coverage limitations, and mandatory review by a consultant (often the very consultant who assisted the locality in drafting the ordinance) with excessive fees for the consultant’s services.

⁶⁰⁸ 47 U.S.C. § 253(a).

⁶⁰⁹ *California Payphone Ass’n*, 12 FCC Rcd 14191, 14206 ¶ 31 (1997); *see also In the Matter of Public Utility Commission of Texas*, 13 FCC Rcd 3460, 3463, 3470, 3500 (¶¶ 3, 22, 81) (1997). The FCC’s interpretation of Section 253(a) has been endorsed by the First, Second and Tenth Circuits. *See Puerto Rico Tel. Co., Inc. v. Municipality of Guayanilla*, 450 F.3d 9, 18 (1st Cir. 2006); *TCG N.Y., Inc. v. City of White Plains*, 305 F.3d 67, 76 (2nd Cir. 2002); *Qwest Corp. v. City of Santa Fe*, 380 F.3d 1258, 1270 (10th Cir. 2004).

⁶¹⁰ *Sprint Telephony PCS v. County of San Diego*, 543 F.3d 571 (9th Cir. 2008). *See also Level 3 Commc’ns, L.P. v. City of St. Louis*, 477 F.3d 528 (8th Cir. 2007).

effectively require a showing that the ordinance creates an insurmountable barrier to entry, despite the clear intent of Congress to reduce barriers to entry in any form.

The Commission’s previous construction of Section 253(a) is consistent with both the language and intent of the statute. The statute’s preemption of local requirements that “have the effect of prohibiting the *ability* of any entity to provide” service does not naturally lend itself to a strict concept of “prevent” or “preclude.”⁶¹¹ Indeed, the statute’s preemption both of requirements that “prohibit” and those that “have the effect of” prohibiting indicates that less than a complete prohibition comes within Section 253’s preemption. Moreover, the statutory purpose of eliminating barriers to entry would be thwarted if preemption was not available for local actions that materially inhibit the efficient functioning of competitive markets. The FCC should reiterate its interpretation of Section 253(a) as preempting local actions that materially inhibit a carrier’s ability to compete in a fair and balanced legal and regulatory environment.⁶¹²

2. The Commission Should Take Steps to Expedite Historic Preservation Reviews.

Another area where the Commission can act to remove roadblocks to wireless innovation is with respect to historic preservation reviews. Under the FCC’s rules implementing the National Historic Preservation Act, wireless carriers are required to consider the effect that new towers or antenna sites may have on historic properties.⁶¹³ While the Programmatic Agreement

⁶¹¹ See *Nixon v. Missouri Mun. League*, 541 U.S. 125, 132 (2004).

⁶¹² Congress could amend the statute to reinforce these conclusions, but such legislative action is not necessary if the Commission is faithful to the obvious deregulatory and pro-competitive goals of the statute. Congress and the FCC should consider adopting the arguably more permissive standard of *City of Auburn*, 260 F.3d 1160 (9th Cir. 2001), which courts around the country followed as the seminal treatment of Section 253(a) for eight years. If the rapid deployment of infrastructure to support advanced mobile communications and wireless broadband services is truly federal policy, the Commission should consider adopting such a standard, or working with Congress to do so.

⁶¹³ 47 CFR § 1.307(a)(4).

on Collocations⁶¹⁴ and the 2004 Nationwide Programmatic Agreement (“NPA”)⁶¹⁵ have helped to standardize and, in some cases, streamline historic preservation reviews, situations regularly arise where an issue regarding a new site is either not covered in those agreements, where the meaning of those agreements must be interpreted, or where a party to the Agreement is not properly implementing the Agreement.⁶¹⁶

In these cases, applicants must petition the Commission to render an opinion in order for the historic preservation review process to be completed or to conclude. Verizon Wireless’ experience, however, has been that the Commission typically takes several months, and in some cases, over a year, to act on such requests. These delays impose additional costs on providers, delay the benefits of wireless services, including broadband, to consumers, and may, in some cases, lead carriers to abandon the site in favor of other projects.

In order to minimize these delays and speed the implementation of wireless services, including broadband, to new areas, there are steps the Commission can and should take. *First*, Commission Wireless Telecommunications Bureau staff should commit to resolving historic preservation matters brought before the Bureau within 30 days. The NPA requires State Historic Preservation Officers and Tribes to conduct reviews and render opinions in most cases within 30 days, and there is no reason why FCC should not be able to conduct its reviews in the same

⁶¹⁴ Nationwide Programmatic Agreement for the Collocation of Wireless Antennas, Federal Communications Commission, National Conference of State Historic Preservation Officers, and Advisory Council on Historic Preservation (March 2001), available at <http://wireless.fcc.gov/releases/da010691a.pdf> (last visited Sept. 30, 2009).

⁶¹⁵ *Nationwide Programmatic Agreement Regarding the Section 106 National Historic Preservation Act Review Process*, Report and Order, 20 FCC Rcd 1073, 1140, (App. B) (2004).

⁶¹⁶ Examples include situations where a State Historic Preservation Officer may ask an applicant to conduct reviews not required under the NPA, where an applicant may seek to collocate antennas on a tower that did not undergo the proper historic preservation review process, or where an Indian Tribe expresses an interest in becoming a consulting party, but then fails to conduct its reviews in a reasonable period of time.

period of time. *Second*, the FCC should work with the other signatories of the NPA to amend the Agreement to address some of the situations that frequently require Wireless Telecommunications Bureau reviews. One such area is where an Indian Tribe notifies an applicant that the Tribe wishes to be a consulting party, but then fails thereafter to consult with the applicant.⁶¹⁷ The Commission, the other signatories to the NPA and Tribes should work together to develop a solution, similar to the solution adopted by the FCC in 2007 to allow carriers to proceed with a project when a Tribe failed to respond to an initial consultation request.⁶¹⁸ There is no reason why a similar procedure cannot be adopted to address situations where a Tribe indicates it wants to consult, then fails to do so.

D. The Commission Should Support Congressional Efforts to Eliminate Unnecessary Taxes and Fees on Wireless Services.

States and local governments continue to impose onerous and discriminatory taxes and fees on wireless companies and subscribers, placing a disproportionate and unnecessary barrier to greater investment and innovation. The average combined rate for federal, state, and local taxes is more than 15 percent, and over 20 percent in Florida, Nebraska, New York, and Washington.⁶¹⁹ These rates are well above the rates imposed on other competitive goods and

⁶¹⁷ Over the last two years, Verizon Wireless has submitted 65 requests to the Wireless Bureau for assistance with Tribes that indicate they want additional information about a proposed site, thus qualifying the Tribe for consulting party status. In each of these cases, the Tribes then failed to respond regarding the impacts of the proposed sites on Tribal religious, cultural or historic properties. While the Bureau has been helpful in getting these matters resolved, in each case the siting proposals were delayed because there is no process that allows the applicant to continue if the Tribe fails to respond.

⁶¹⁸ Wireless Telecommunications Bureau and Consumer & Governmental Affairs Bureau Announce Enhancement and Provide Clarifications Regarding Use of Tower Construction Notification System, Public Notice, 20 FCC Rcd 7546 (2005).

⁶¹⁹ See Scott Mackey, *Excessive Taxes and Fees on Wireless Service: Recent Trends*, Tax Analysts, Feb. 18, 2008, at 519, 522, available at http://files.ctia.org/pdf/MackeyExcessiveTaxesFeesWireless_2_18_08.pdf (last visited Sept. 30, 2009).

services.⁶²⁰ A national policy that prevents discriminatory taxes would benefit consumers greatly not only by lowering the cost of wireless services, but also by allowing the unnecessarily taxed funds to be diverted toward greater investment and innovation.

The discriminatory taxes and fees imposed by state and local governments on wireless services are particularly detrimental because they put wireless at a comparative disadvantage to other goods and services in attracting investment. One recent study has shown that between 2003 and 2007, “taxes and fees on wireless service increased four times faster than taxes on other goods and services,” showing that “[b]y any measure, wireless service was targeted for a disproportionate share of tax increases when compared to broad-based consumption taxes.”⁶²¹ This imbalance illustrates that, notwithstanding local budget concerns, “tax policy and economic development policy are working at cross-purposes in some states because higher consumer taxes reduce cash flow for network investments.”⁶²² The current tax scheme is thus directly at odds with the Commission’s goal of encouraging more rapid broadband deployment. Hence, as the study concludes, “not only is it bad tax policy to single out one industry for excessive taxation, but it is bad economic policy to impose burdensome taxes on an industry that is investing in infrastructure that helps businesses improve productivity.”⁶²³

The Commission can help reduce this obstacle to investment and innovation by encouraging Congress to pass proposed legislation recently introduced in the U.S. House of

⁶²⁰ See Hearing on H.R. 5793, the “Cell Tax Fairness Act of 2008, before the House Committee on the Judiciary, Subcommittee on Commercial and Administrative Law, Testimony of Scot Mackey, Kimbell Sherman Ellis LLP, September 18, 2008.

⁶²¹ Mackey, *supra* note 619, at 521. For additional data and examples of excessive state and local taxes on wireless services, see CTIA, Taxation of Wireless – Stop the Discrimination: A State of the States (April 2006).

⁶²² Mackey, *supra* note 619, at 520.

⁶²³ *Id.* at 523.

Representatives as the “Cell Tax Fairness Act of 2009” (H.R.1521) and a companion bill in the Senate, the “Mobile Wireless Tax Fairness Act of 2009” (S.1192). These bills would prevent any new discriminatory taxes and fees for five years while states and local authorities work to reform the existing tax system. Eliminating excessive taxes and fees would be one of the most effective ways to spur investment and encourage innovation.

E. The Commission Should Act to Promote Public Safety and Commercial Broadband Services on the 700 MHz Spectrum.

The allocation of the 700 MHz band has made available much needed spectrum to meet growing customer demand and to provide a fertile field for the introduction and growth of new wireless services. However, in order to realize the full panoply of opportunities inherent in this spectrum, the Commission needs to address two key lingering issues that continue to restrict its use. First, the Commission needs to resolve the question of what to do with the D Block. As detailed below, Verizon Wireless urges the Commission to encourage Congress to designate this spectrum for a nationwide public safety network. Second, the Commission needs to relocate wireless microphones out of the 700 MHz band, as their continued presence threatens to cause interference to new commercial wireless systems in this spectrum.

1. The Commission Should Encourage Congress to Designate the 700 MHz D Block Spectrum for Public Safety Use.

The 700 MHz auction is generally viewed as a tremendous success, raising nearly \$20 billion for the U.S. Treasury and licensing new spectrum to meet growing consumer demand and to provide a fertile field for the introduction and growth of new wireless services. It failed, however, on one important objective: it did not address public safety’s dire need for a modern wireless broadband network that is both national and interoperable. It has been more than eight years since the 9/11 attacks exposed the serious limitations in the nation’s public safety

communications networks, particularly in terms of interoperability. Our nation's first responders require a modern broadband network that is interoperable across the nation and can support the full panoply of innovative applications that help these brave men and women best do their jobs. The Commission can help to address this national security imperative by encouraging Congress to designate the D Block for a nationwide public safety network.

Licensing the D Block through another auction is the wrong path. The D Block auction failed for many reasons. For one thing, its economics were fundamentally flawed. The unavoidable problem with the concept that someone would be willing to build a network for public safety, in exchange for gaining access to public safety's adjoining spectrum, is that the cost of building such a network far exceeds the value of the spectrum, particularly given first responders' desire for stringent performance standards. The auction also failed because the rules created far too much uncertainty for bidders. Too many essential details were left to post-auction negotiation, leaving prospective bidders not knowing what obligations they might incur.

Public safety can benefit when government and commercial interests develop effective partnerships. But a "redo" of the failed D Block auction is not the answer because the goal of auctioning spectrum to the highest bidder is fundamentally at odds with the goal of building a state-of-the-art public safety broadband network that can support the innovative applications public safety requires and deserves. The more the Commission tips the rules to encourage broad and vigorous participation by bidders, the less it can ensure public safety's objectives. The D Block "conditioned license" approach is not the solution, as the last auction results made clear. It is economically flawed and fraught with inevitable uncertainty and risk – both for public safety and for bidders.

A new public-private partnership approach, put forward by New York City and other large cities, would ensure that control over the process remains in the hands of those that best understand public safety's needs – state and local law enforcement and first-responder agencies.⁶²⁴ This approach would ensure that public safety receives the services and applications it requires, while benefiting from the continuing investments and innovations of commercial carriers. It has four key, interdependent principles, which the Commission can work with Congress to accomplish.

First: the D Block should be reallocated to Public Safety directly. Providing public safety with both access to sufficient spectrum *and* direct control over its use would ensure that the D Block is used to meet public safety's expanding communications needs.

Second: the Commission should establish rules that facilitate the deployment of dedicated and/or shared regional networks that will enable state and local public safety entities to more effectively consider local factors such as geography, population distribution, public safety capacity needs, and available existing commercial networks.

Third: the Commission should adopt a national technical framework that will ensure nationwide interoperability. While local or regional networks may be the best way to satisfy diverse public safety needs, letting them develop independently without any guiding national principles would repeat the mistakes of the past. This problem can be avoided by using IP-based solutions and establishing national technical standards that ensure these IP networks work together as one.

⁶²⁴ Comments of Verizon Wireless, WT Docket No. 06-150, PS Docket No. 06-229, WT Docket No. 96-86, at 11-22 (June 20, 2008).

Fourth: public safety entities should be free to select the commercial partner or partners of their choice, using an RFP process or similar competitive approach. Local or regional partnerships that are tailored specifically to meet the needs of individual public safety agencies across the country are more likely to succeed than attempting to establish a single national partnership through an auction, which would require public safety entities to commit to a single model that may not satisfy local agencies' needs.

Establishing a national plan that follows these principles, and working with Congress to provide state and local governments with federal funding to implement the plan, will put the country in the best position to address emergency communications needs. Public safety agencies get control over use of the spectrum, control over how the networks are built, and control over who they partner with. By partnering with the private sector, these agencies leverage the tremendous investment and innovation in networks that have already been made and will continue to be made, eliminating significant costs for state and local government. This approach would best meet the urgent need to achieve interoperable public safety networks.

2. The Commission Should Act Now to Address the Harms From Continued Operation of Wireless Microphones in the 700 MHz Band.

As demonstrated earlier in these comments, to encourage investments in innovative technologies the Commission must provide well-defined regulatory environments that clearly establish the rights and interference protections afforded to all users. Ensuring such regulatory certainty is particularly important for the recently auctioned 700 MHz band, which has the potential to be a hotbed for innovative products and applications that will provide dramatic improvements to this nation's wireless broadband infrastructure. However, this potential innovation is threatened by the FCC's unwillingness to order Low Power Auxiliary Service ("LPAS") devices, such as wireless microphones, to vacate the 700 MHz frequencies even 18

months after winning bidders in Auction 73 paid nearly \$20 billion dollars to the United States Treasury for unfettered use of this spectrum.

The Commission recognized a full year ago the need to relocate wireless microphones out of the 700 MHz band.⁶²⁵ But it has not yet done so. The record in that proceeding confirms that the presence of these devices – nearly all of which have no authority to operate at all -- imposes a risk of impeding the launch of public safety and commercial systems, creating consumer confusion, disrupting existing wireless microphone uses, and potentially causing life-threatening interference to first responder communications.⁶²⁶ Commercial operators are ready to begin the aggressive deployment that the FCC worked so hard to promote in crafting its 700 MHz rules.⁶²⁷ Verizon Wireless is already testing LTE in its licensed 700 MHz spectrum and plans to launch commercial service in 25 to 30 markets in 2010. Pre-launch testing and network optimization requires that the spectrum be cleared well in advance of that date.

While most of the wireless microphone users have no lawful right to operate at 700 MHz, they also have no authority to operate in the new TV bands below 700 MHz and thus no ability to seek out alternative lawful operations that would avoid the otherwise inevitable harmful interference that will occur at 700 MHz. Unless the Commission is planning to suspend continued operation of wireless microphones by anyone other than those currently eligible to hold a Low Power Auxiliary Service license, it should provide users with the right to operate such devices in TV spectrum below 700 MHz.

⁶²⁵ *Revisions to Rules Authorizing the Operation of Low Power Auxiliary Stations in the 698-806 MHz Band, Notice of Proposed Rulemaking and Order*, 23 FCC Rcd. 13106 (2008).

⁶²⁶ *See, e.g.*, Letter from Adam D. Krinsky, Counsel to Verizon Wireless, to Marlene H. Dortch, Secretary, FCC, filed in WT Docket Nos. 08-166 and 08-167 (July 27, 2009).

⁶²⁷ *700 MHz Report & Order*, ¶¶ 153-177.

F. The Commission Should Expedite the Review Process for Spectrum Applications.

Timely approvals of applications to assign, transfer, lease or modify spectrum licenses are essential for providing new services and facilitating investment and innovation. Although the Commission has made progress in streamlining its review process, many applications that raise routine issues not requiring extensive review are still subject to extended processing times, resulting in unnecessary delay. Verizon Wireless urges the Commission to commit to processing such applications within 45 days of public notice so that consumers can access new, innovative services without delay.

The Commission recognized the importance of quick, efficient processing of routine spectrum applications in 1998 when it streamlined its license transfer and assignment review procedures. The Commission reasoned that streamlining would help minimize administrative delays, reduce transaction costs, encourage more efficient use of spectrum, promote spectrum fungibility, and otherwise facilitate the movement of spectrum toward new and higher-valued uses.⁶²⁸ Accordingly, the agency adopted new procedures under which transfer and assignment applications that do not raise public interest concerns are often granted automatically. Applications that do raise potential concerns – such as those related to eligibility and use restrictions, foreign ownership restrictions, or competition issues – are subject to a 21-day processing period. The Commission adopted a similar process for spectrum lease applications.⁶²⁹

⁶²⁸ See *Biennial Regulatory Review – Amendment of Parts 0, 1, 13, 22, 24, 26, 27, 80, 87, 90, 95, 97, and 101 of the Commission’s Rules to Facilitate the Development and Use of the Universal Licensing System in the Wireless Telecommunications Services; Amendment of the Amateur Service Rules to Authorize Visiting Foreign Amateur Operators to Operate Stations in the United States*, Report and Order, 13 FCC Rcd 21027, 21078-83 (¶¶ 109-122) (1998).

⁶²⁹ 47 C.F.R. § 1.9030(e)(1).

In many cases, however, applications raising routine public interest concerns are not processed within 21 days but are “off-lined” from streamlined procedures, resulting in unnecessary or open-ended regulatory delays.

Moreover, while the Commission does not require most commercial wireless licensees to submit applications to modify their networks (except where a modification might raise an issue under the National Environmental Policy Act (“NEPA”)), modification applications are still required for cellular licensees who seek to change their system in a way that might affect their Cellular Geographic Service Area or Service Area Boundary. Such applications are currently subject to 30-day public notice, but then may sit for months prior to being acted upon. Particularly where the application involves a routine change and does not involve NEPA issues, such an extended processing time does not appear warranted.

These delays for offlined assignment, transfer and lease applications and for cellular modification applications can have a paralyzing effect on the introduction of new services or improvements to existing services, such as network modifications to accommodate upgrades to 3G technology. For example, local zoning and environmental authorities often will not review (let alone approve) a new site proposal until the FCC takes action on the underlying spectrum application. Regulatory delays also compound deployment delays in areas where construction can only take place during the warmer or drier months. Hence, even short-term regulatory delays can have a significant impact on the deployment of new services. Delays on applications to acquire, exchange, or sell spectrum rights are particularly disruptive, often spilling over into deployment schedules. If unnecessary delays caused by the existing process are not soon resolved, they will limit the ability to quickly roll out 4G networks as well.

A Commission policy to process assignment, transfer, lease and modification applications that involve routine issues within 45 days of public notice would go a long way in solving these existing delays. Routine issues would be those that do not involve requests for waiver of Commission rules or require additional review by triggering the Commission's competitive screens for spectrum aggregation. Verizon Wireless also submits that a 14-day public notice is sufficient for such routine applications. For example, where an applicant with a previously-approved, unchanged foreign ownership structure seeks to acquire additional spectrum rights in the same radio service, extensive staff review is simply not necessary. Accordingly, Verizon Wireless asks the Commission to instruct the Wireless Telecommunications Bureau, *first*, to distinguish between applications that raise significant public interest concerns and those that do not, and *second*, to process within 45 days those applications that require only minimal review. This single step would tremendously aid efforts to deploy new services in a timely and efficient manner.

VI. CONCLUSION

In this NOI, the Commission requested facts and data on innovation and investment in wireless services. Verizon Wireless submits that the facts and data it is supplying herein irrefutably show that the tremendous innovation and investment that have long characterized the wireless ecosystem are robust and have been accelerating. The Commission can take several actions to promote innovation, but it should not adopt new regulation that would put this important sector of the economy at risk. It should stay the course and maintain its longstanding policies of limited regulation and flexible, exclusive use spectrum licensing. These policies are a proven success, and they remain the right ones for the future.

Respectfully submitted,

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ATTACHMENT A

WHITE PAPER

LTE: The Future of Mobile Broadband Technology



LTE: The Future of Mobile Broadband Technology

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1. Introduction

This paper provides an overview of Long Term Evolution (LTE) and Worldwide Interoperability for Microwave Access (WiMAX)—the leading technologies for next-generation mobile broadband. The information presented here will help readers understand how the two technologies differ, why Verizon Wireless chose LTE, and what advantages LTE offers customers. The following executive summary gives a quick overview of the paper's contents and its subject matter. The remaining sections go into greater technical detail about LTE and WiMAX wireless technologies.

1.1 Audience

This paper has been developed for independent customers, enterprise customers, IT administrators, decision makers, and other personnel. It is assumed that the reader has an understanding of earlier generations of wireless technology, as well as an understanding of computer and network concepts.

2. Executive Summary

Driving the evolution of wireless broadband technology is customers' increasing expectations for speed, bandwidth, and global access. Customers want more information, such as business and consumer applications, and entertainment available through their mobile devices, but with greater speeds. For wireless carriers to achieve greater speeds and pervasive connectedness, their networks need to start behaving more like landline IP-based networks. This line of thinking represents a fundamental shift in perspective—from mobile services to broadband connections—for customers and service providers alike. Enter the fourth-generation (4G) wireless network. Unlike earlier wireless standards, 4G technology is based on TCP/IP, the core protocol of the Internet. TCP/IP enables wireless networks to deliver higher-level services, such as video and multimedia, while supporting the devices and applications of the future.

Verizon Wireless chose LTE over WiMAX as the technological foundation for its 4G wireless broadband network. The company believes that LTE offers a number of significant technological and business advantages over WiMAX that make it a superior networking standard. Verizon Wireless customers want to be truly untethered with advanced communication devices that provide a similar immersive experience as found in today's wired networks—whether it's downloading or uploading large files, video, gaming, downloading music, or social networking. They want to be able to communicate in new and innovative ways whenever and wherever they choose around the globe. For these reasons, Verizon Wireless believes LTE is the best technology with the global scale needed to deliver such experiences.

3. The Benefits of LTE

- Provides a global ecosystem with inherent mobility
- Offers easier access and use with greater security and privacy
- Dramatically improves speed and latency
- Delivers enhanced real-time video and multimedia for a better overall experience
- Enables high-performance mobile computing
- Supports real-time applications due to its low latency
- Creates a platform upon which to build and deploy the products and services of today and those of tomorrow
- Reduces cost per bit through improved spectral efficiency

Within the Verizon Wireless network, LTE will operate in the 700 MHz spectrum, giving it vast potential for greater broadband speeds and access.

3.1 Verizon Wireless and LTE Mobile Broadband Technology

Wireless carriers are keenly interested in choosing the best technology for their customers—for both today and tomorrow. For Verizon Wireless, selecting the right technology is imperative. As a leader in the wireless industry, Verizon Wireless is committed to the potential technology advances offered by LTE. Verizon Wireless is currently conducting laboratory and field tests using LTE technology and plans to launch its 4G mobile network in 2010. This deployment will help the company realize its goal of delivering improved wireless Internet connectivity and mobility to its customers. For the mobile user, connectivity means an untethered experience and true mobility. Users can work and communicate almost whenever and wherever they want. LTE's improved speeds will allow wireless carriers to offer a number of business-specific applications and services, such as video conferencing, direct connectivity, and mobile applications that bring the desktop experience to mobile devices.

4. Wireless Technology Overview

Wireless technologies enable one or more devices to communicate without an actual wired connection. Radio frequency is used to transmit the data. Such technologies are rapidly evolving to meet a variety of communications needs, from simple to complex.

Wireless communications needs can all be classified in one of three ways, based on the distance they are meant to cover. These include: wireless personal area networks (WPAN), wireless local area networks (WLAN), and wireless wide area networks (WWAN).

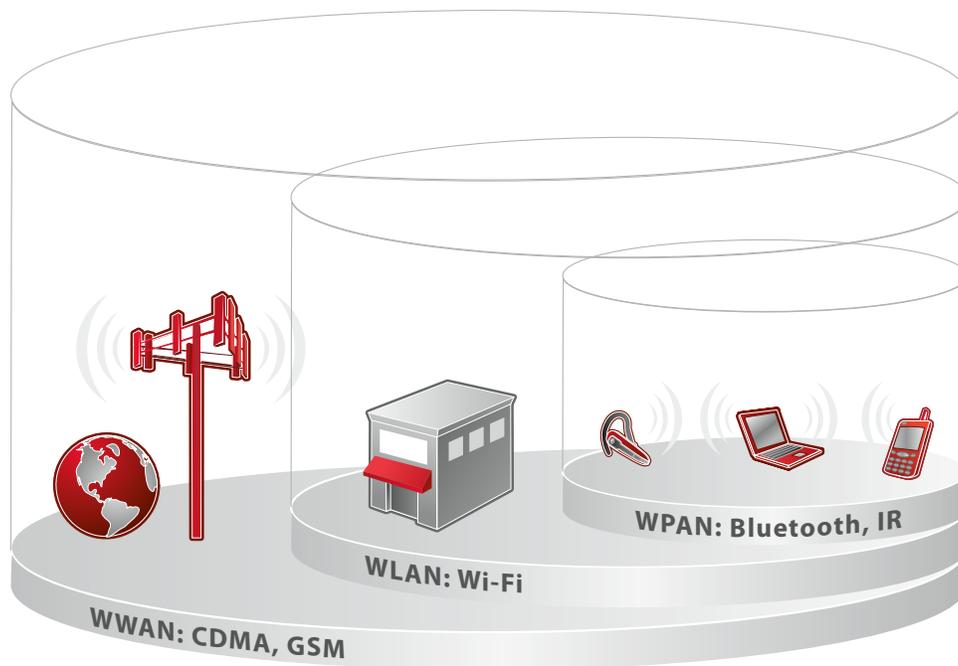


Figure 1: Wireless network technologies.

Wireless networks form the transport mechanism between devices and traditional wired networks. WPANs are limited to distances under about 10 meters and include technologies such as infrared (IR), Bluetooth® technology, and ultra-wideband (UWB). WLANs cover a local area with distances of individual access points reaching to about 100 meters, and include technologies such as Wi-Fi (802.11a/b/g/n). WWANs cover even larger areas, using cellular data networks. This section discusses some of the most popular and widely used wireless technologies to provide readers with a point of reference for the use of 3G technology.

WPAN

WPANs typically provide *ad hoc* network connections designed to dynamically connect devices to other devices within close range of each other. These connections are termed *ad hoc* because they do not generally need to connect to any network infrastructure to operate. They can simply connect to each other and perform necessary communications without the need of any access network devices, such as access points or base stations.

Bluetooth

Bluetooth has emerged as the most widely used WPAN network standard. The Bluetooth standard is an industry specification that describes how mobile phones, headsets, computers, handhelds, peripherals, and other computing devices should interconnect with each other. Bluetooth network applications include wireless headsets, hands-free operation, wireless synchronization, wireless printing, advanced stereo audio, dial-up networking, file transfer, and image exchange, to name a few.

WLAN

WLANs provide connections designed to connect devices to wired networks. Unlike a wired LAN, a WLAN does not require cabling to connect the device to a switch or router. Devices connect wirelessly to nearby wireless access points that are attached to the local network using an Ethernet connection. A single access point communicates with nearby WLAN devices in a coverage area of about 100 meters. This coverage area allows users to move freely within range of an access point with their notebook computers, handhelds, or other network devices. Multiple access points can be coordinated together by a network WLAN switch to allow users to hand off between access points.

Wi-Fi

Wi-Fi (or IEEE 802.11) is the set of standards established to define wireless LANs. A number of different protocols are defined in the 802.11 family of standards, addressing various operating frequencies and maximum throughputs. The 802.11g standard is currently the predominant protocol deployed in WLAN implementations.

WWAN

WWANs provide broadband data networks with a far greater range, using cellular technologies such as GPRS, HSPA, UMTS, 1xRTT, 1xEV-DO, and LTE. Wireless data devices connect to a wireless broadband network through a commercial carrier's data network, allowing broadband performance without the need for a cabled connection to a network infrastructure (much like a WLAN), while providing end users with far greater mobility. These WWANs typically incorporate sophisticated user identification techniques to ensure that only authorized users are accessing the network. Multiple base stations are coordinated by base station controllers to allow users to hand off between base stations (cell sites).

1xEV-DO Rev. A

1xEV-DO is the broadband wireless network standard developed by the Third-Generation Partnership Project 2 (3GPP2) as part of the CDMA2000 family of standards. EV-DO networks were first launched based on release 0 of the standard. The standard is currently in revision A, which has been deployed nationally by Verizon Wireless, and provides average download speeds of 600 Kbps to 1.4 Mbps, and average upload speeds of 500 to 800 Kbps, with low latency, typically between 150 and 250 milliseconds.

5. WWAN Evolution: A Choice of Upgrade Paths

As the use and number of wireless devices increased, more and more demands were placed on the underlying technologies to deliver enhanced capabilities and services. This section discusses the evolution of WWAN technologies and their capabilities.



Figure 2: The Verizon Wireless upgrade path to LTE.

5.1 WWAN Evolution: CDMA to LTE

1G

First-generation (1G) radio networks were analog-based and limited to voice services and capabilities only. 1G technology was vastly inferior to today's technology. 1G devices were easily susceptible to cloning and one channel supported only one device at a time. Today's technology allows multiple devices to be supported by a single channel at the same time.

cdmaOne

Second-generation (2G) CDMA-based wireless networks, known as cdmaOne, proved their effectiveness in delivering high-quality voice traffic to subscribers. 2G networks made the transition from analog signals to all-digital signals, expanding network capabilities to include both voice and data services. With cdmaOne technology, services such as email and text messaging became possible.

CDMA2000

In response to subscriber growth and demand for data services that require high-speed access, 3G wireless network technology, known as CDMA2000, was implemented. CDMA2000 offered users increased voice and data services and supported a multitude of enhanced broadband data applications, such as broadband Internet access and multimedia downloads. This technology also doubled user capacity over cdmaOne, and with the advent of 1xRTT, packet data was available for the first time. In addition, CDMA2000 networks supported higher numbers of voice and data customers at higher data rates and at a lower cost, compared to 2G-based networks.

CDMA2000 1xEV-DO

CDMA2000 1xEV-DO introduced high-speed, packet-switched techniques designed for high-speed data transmissions, enabling peak data rates beyond 2 Mbps. 1xEV-DO expanded the types of services and applications available to end users, enabling carriers to broadcast more media-rich content, while users could enjoy near-wireline speeds on mobile devices. CDMA2000 1xEV-DO was initially released as release 0 (Rel. 0) and has undergone one upgrade, known as 1xEV-DO Revision A (Rev. A).

CDMA2000 1xEV-DO Rel. 0

Rel. 0 provides peak speeds of up to 2.4 Mbps with an average user throughput of between 400 and 700 Kbps. The average uplink data rate is between 60 and 80 Kbps. Rel. 0 makes use of existing Internet protocols, enabling it to support IP-based connectivity and software applications. In addition, Rel. 0 allows users to expand their mobile experience by enjoying broadband Internet access, music and video downloads, gaming, and television broadcasts.

CDMA2000 1xEV-DO Rev. A

Rev. A supports the framework for future quality of service (QoS) applications, reduces latency, and features peak speeds of 3.1 Mbps for downloads, and 1.8 Mbps for uploads. Rev. A technology's increased bandwidth capabilities further improve a user's ability to send large files, email attachments, pictures, and video from mobile devices. Average speeds of Rev. A are 600 to 1,400 Kbps for downloads and 500 to 800 Kbps for uploads.

LTE

As mentioned previously in this paper, LTE is a 4G wireless technology that Verizon Wireless and numerous leading wireless carriers have chosen as their upgrade path beyond 3G technologies. Verizon Wireless will operate LTE in the 700 MHz spectrum, which translates to unprecedented performance and data access.

	1xRTT	1xEV-DO Rel. 0	1xEV-DO Rev. A	3GPP LTE
Peak speeds	153 Kbps (downlink) 153 Kbps (uplink)	2.4 Mbps (downlink) 153 Kbps (uplink)	3.1 Mbps (downlink) 1.8 Mbps (uplink)	100 Mbps (downlink) 50 Mbps (uplink)
Average user throughput	60–80 Kbps (downlink)* 60–80 Kbps (uplink)*	400–700 Kbps (downlink)* 60–80 Kbps (uplink)*	600–1,400 Kbps (downlink)* 500–800 Kbps (uplink)*	5–12 Mbps (downlink)** 2–5 Mbps (uplink)**

Figure 3: The evolution of CDMA to LTE.

5.2 WWAN Evolution: GSM to LTE

1G

Please see section 5.1, *WWAN Evolution: CDMA to LTE*, for a description of 1G WWAN technology.

GSM

Global System for Mobile Communications (GSM) is 2G technology that offers both voice and data capabilities. GSM differs from 1G by using digital cellular technology and time division multiple access (TDMA) transmission methods, rather than CDMA. GSM offers data transmission rates of up to 9.6 Kbps, while enabling such services as short messaging service (SMS) or text messaging, as it is more commonly known, and international roaming.

W-CDMA

Wideband Code Division Multiple Access (W-CDMA) brings GSM into 3G. W-CDMA is a type of 3G cellular network and is a high-speed transmission protocol used in Universal Mobile Telecommunications System (UMTS). UMTS offers packet-based transmission for text, digitized voice, video, and multimedia content.

* Based on advertised Verizon Wireless average user throughput.

** Based on preliminary analysis by multiple wireless vendors and Verizon Wireless.

HSPA

High-Speed Packet Access (HSPA) is a mobile telephony protocol that helps improve the performance of UMTS. HSPA uses improved modulation schemes, while refining the protocols that mobile devices and base stations use to communicate. These processes improve radio bandwidth utilization provided by UMTS.

HSDPA

High-Speed Downlink Packet Access (HSDPA) is a 3G mobile telecommunications protocol from the HSPA mobile protocol family. HSDPA enables higher data transfer speeds and capacity in UMTS-based networks. The standard currently supports peak downlink speeds of up to 14.4 Mbps in 5 MHz bandwidth.

HSUPA

High-Speed Uplink Packet Access (HSUPA) is also a 3G mobile telecommunications protocol from the HSPA mobile protocol family. The HSUPA protocol enables peak uplink speeds of up to 5.76 Mbps.

HSPA+

Evolved HSPA (HSPA+) is a wireless broadband standard that provides peak speeds of up to 42 Mbps on the downlink and 22 Mbps on the uplink, using multiple-input multiple-output (MIMO) technology and higher order modulation.

LTE

Please see section 5.1, *WWAN Evolution: CDMA to LTE*, for a description of LTE.

	W-CDMA	HSPA	HSPA +	3GPP LTE
Peak speeds	2 Mbps (downlink)*	1.8 Mbps–14.4 Mbps (downlink) 384 Kbps–2 Mbps (uplink)	42 Mbps (downlink) 22 Mbps (uplink)	100 Mbps (downlink) 50 Mbps (uplink)
Average user throughput	100 Kbps–320 Kbps (downlink)* Less than 100 Kbps (uplink)*	Up to 2 Mbps (downlink only)* Uplink speeds vary by device	5 Mbps (downlink)* 3 Mbps (uplink)*	5–12 Mbps (downlink)** 2–5 Mbps (uplink)**

Figure 4: The evolution of GSM to LTE.

6. 4G Mobile Broadband Technologies

4G mobile broadband technologies will allow wireless carriers to take advantage of greater download and upload speeds to increase the amount and types of content made available through mobile devices.

6.1 Defining 4G Mobile Broadband Technology

4G networks are comprehensive IP solutions that deliver voice, data, and multimedia content to mobile users anytime and almost anywhere. 4G technology standards offer greatly improved data rates over previous generations of wireless technology. Faster wireless broadband connections enable wireless carriers to support higher-level data services, including business applications, streamed audio and video, video messaging, video telephony, mobile TV, and gaming.

* Based on *Data Capabilities: GPRS to HSDPA and Beyond* white paper; 3G Americas.org.

** Based on preliminary analysis by multiple wireless vendors and Verizon Wireless.

6.2 Trends Driving the Transition to 4G Technology

Unified Technology

Today's global economy needs a "borderless" or unified wireless platform. The world is shrinking and mobile users conduct business all across the world, much like they used to do with people around the corner. Users need the ability to communicate, conduct business, and move around the globe as easily and seamlessly as they did with the "around the corner" set.

Diverse Use

As capabilities advance and prices become more competitive, more people use wireless networks for heavier data and application access. As a result, bandwidth demand continues to rise. Also, people are becoming increasingly mobile, further changing the way they access and use the Internet.

Increasing Expectations

Today, customers require the same broadband experience they get at the office or at home, regardless of their locations. They want easy access and use, high speed and low latency, better security and privacy, and seamless, global mobility.

Rich Media

Music and video downloads, high-quality video conferencing, high-definition movie downloads, video on demand, and other trends are driving the need for 4G networks and their increased data capacity.

Personal Expression

Mobile users today want to do more than simply consume information. They want to create things and share them. They also want to do it anytime, anywhere through blogs, social networks, and similar applications they use with fixed-line Internet connections.

7. LTE Overview and Development Background

Various technology standards bodies began to explore options for their 4G wireless technology offerings. Two groups, the Third Generation Partnership Project (3GPP), representing the family of networks generally referred to as GSM, and the Third Generation Partnership Project 2 (3GPP2), representing the family of networks generally referred to as CDMA, are working together to lay the foundation for LTE.

Established in 1998, 3GPP is a collaborative agreement that brought together multiple telecommunications standards bodies known as Organizational Partners. This group initiated the 3GPP LTE standards project to improve the UMTS mobile phone standard and to better meet future wireless technology needs. UMTS is one of the many 3G wireless technologies in use today. The most common form of UMTS uses W-CDMA as its underlying air interface and represents the European answer to the ITU IMT-2000 requirements for 3G cellular radio systems.

3GPP2 represents a collaboration between the numerous telecommunications associations that helped develop CDMA standards for 3G.

LTE is a global 4G standard, with researchers and development engineers throughout the world participating in the joint-LTE radio access standardization effort, involving more than 60 operators, vendors, and research institutes. This is the same standards body that researched and established the GSM, GPRS, W-CDMA, and HSPA wireless standards. The LTE standard is tightly integrated with GPRS/UMTS networks and represents an evolution of radio access technologies and networks for UMTS.

7.1 LTE Standards Evolution

The 3GPP body began its initial investigation of the LTE standard as a viable technology in 2004. In March 2005, 3GPP began a feasibility study whose key goals were to agree on network architecture and a multiple access method, in terms of the functional split between the radio access and the core network. The study concluded September 2006 when 3GPP finalized selection of the multiple access and basic radio access network architecture. 3GPP decided to use OFDMA in the downlink direction and use SC-FDMA in the uplink direction.

The specifications for the LTE standard were approved by 3GPP in January 2007. The specifications are now under change control, leading to their inclusion in 3GPP Release 8. While the LTE requirements are finalized, the standard is not fully completed. LTE Release 8 was completed by late 2008.

7.2 LTE Performance Estimates and Technical Attributes

Once fully deployed, LTE technology offers a number of distinct advantages over other wireless technologies. These advantages include increased performance attributes, such as high peak data rates and low latency, and greater efficiencies in using the wireless spectrum. Improved performance and increased spectral efficiency will allow wireless carriers using LTE as their 4G technology to offer higher quality services and products for their customers.

Benefits expected from LTE technology:

- High peak speeds:
 - 100 Mbps downlink (20 MHz, 2x2 MIMO)—both indoors and outdoors
 - 50 Mbps uplink (20 MHz, 1x2)
- At least 200 active voice users in every 5 MHz (i.e., can support up to 200 active phone calls)
- Low latency:
 - < 5 ms user plane latency for small IP packets (user equipment to radio access network [RAN] edge)
 - < 100 ms camped to active
 - < 50 ms dormant to active
- Scalable bandwidth:
 - The 4G channel offers four times more bandwidth than current 3G systems and is scalable. So, while 20 MHz channels may not be available everywhere, 4G systems will offer channel sizes down to 5 MHz, in increments of 1.5 MHz.
- Improved spectrum efficiency:
 - Spectrum efficiency refers to how limited bandwidth is used by the access layer of a wireless network. Improved spectrum efficiency allows more information to be transmitted in a given bandwidth, while increasing the number of users and services the network can support.
 - Two to four times more information can be transmitted versus the previous benchmark, HSPA Release 6.
- Improved cell edge data rates:
 - Not only does spectral efficiency improve near cell towers, it also improves at the coverage area or cell edge.
 - Data rates improve two to three times at the cell edge over the previous benchmark, HSPA Release 6.
- Packet domain only
- Enhanced support for end-to-end quality of service:
 - Reducing handover latency and packet loss is key to delivering a quality service. This reduction is considerably more challenging with mobile broadband than with fixed-line broadband. The time variability and unpredictability of the channel become more acute. Additional complications arise from the need to hand over sessions from one cell to another as users cross coverage boundaries. These handover sessions require seamless coordination of radio resources across multiple cells.

Figure 5 provides a quick glance at LTE's technical specifications and attributes.

Peak performance downlink	Power-efficient uplink	Scalable and compatible with 3G networks	Flat all-IP architecture for performance and efficiency
<ul style="list-style-type: none"> • Efficiency OFDM/OFDMA in the downlink <ul style="list-style-type: none"> – Spectral efficiency (2–5 times, Rel.6) – Resistant to multi-path interference • MIMO antennas <ul style="list-style-type: none"> – Doubles the throughput – Deployment simplicity 	<ul style="list-style-type: none"> • SC-FDMA <ul style="list-style-type: none"> – Lower peak-to-average ratio – Longer mobile battery life – Larger cell coverage • Collaborative (multi-user or virtual) MIMO <ul style="list-style-type: none"> – Simplifies mobile implementation – Increases uplink capacity 	<ul style="list-style-type: none"> • Scalable spectrum allocation (1.4, 3, 5, 10, 15, 20 MHz) <ul style="list-style-type: none"> – Great for in-band deployment • Mobility with 3GPP and non-3GPP access <ul style="list-style-type: none"> – Smooth network migration to LTE and beyond • Global roaming with other 3GPP networks 	<ul style="list-style-type: none"> • High performance network <ul style="list-style-type: none"> – Efficient IP routing reduces latency – Increased throughput – Fast state transition time (enhanced always-on) – Less than 50 ms transition from dormant to active

Figure 5: A summary of LTE capabilities.

7.3 Testing and Deployment

Many of the major global wireless carriers have lined up to support LTE as the foundation for their 4G network deployments. These global carriers include Verizon Wireless, as well as Vodafone, China Mobile, AT&T, China Telecom, KDDI, MetroPCS, NTT DoCoMo, and T-Mobile—plan to deploy LTE at some point in the future. Verizon Wireless and its European partner Vodafone have been among the most aggressive carriers in terms of LTE deployment timelines. Verizon Wireless has spent the past few years working with 3GPP standards in an effort to ensure interoperability between LTE and its current CDMA EV-DO Rev. A wireless broadband network.

LTE field demonstrations in realistic urban scenarios were conducted starting in December 2007. These field trials proved that future LTE-based wireless networks can operate using existing base station sites. Also in 2007, LTE test calls were completed between infrastructure and device vendors using mobile prototypes. These calls were the first test of multi-vendor, over-the-air LTE interoperability.

In April 2008, the first public announcements of LTE being demonstrated at high vehicular speeds were made with download speeds of 50 Mbps in a moving vehicle at 110 Kmph. Live 2x2 LTE solutions in 20 MHz were demonstrated at both Mobile World Congress 2008 and CTIA Wireless 2008. Among the new applications demonstrated on LTE networks (at various bands, including the new 1.7/2.1 GHz AWS band) were high-definition video blogging, high-definition video on demand and video streaming, multi-user video collaboration, video surveillance, and online mobile gaming. A handover between CDMA and LTE was also demonstrated, showcasing migration possibilities between the two generations of wireless technologies. Beginning third quarter 2008, UMTS/HSPA base stations were upgradable to LTE. Many bands are supported by these base stations, including the 1.7/2.1 GHz AWS band and the recently auctioned 700 MHz bands by the FCC in the United States.

Verizon Wireless, Vodafone, and China Mobile conducted laboratory and over-the-air tests of LTE in early 2008, followed by successful field tests in northern New Jersey; Columbus, Ohio; and Minneapolis, Minnesota. The final phase of LTE testing began in the second quarter of 2009, and 700 MHz tests commenced in June 2009 after the Digital Television (DTV) transition. Verizon Wireless will continue LTE testing throughout most of 2009, and will offer service in some 30 markets in 2010.

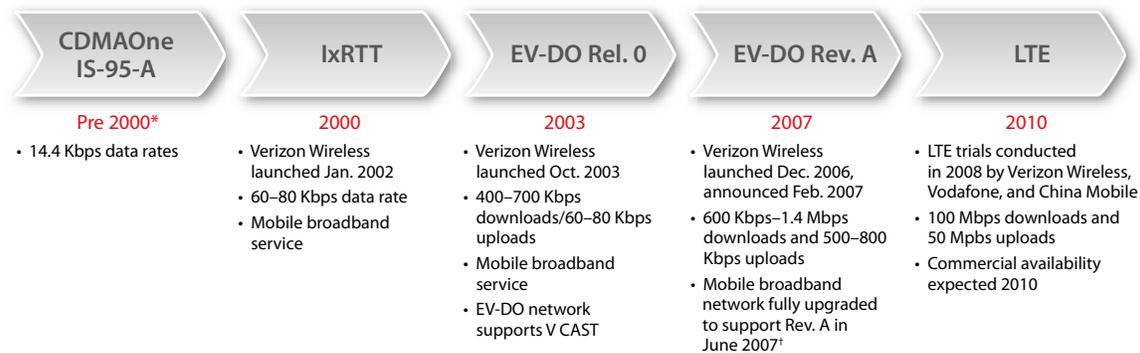


Figure 6: LTE evolution and roadmap.

7.4 LTE Supporting Technologies

The following information describes the various supporting technologies that make up LTE.

MIMO

Multiple-input and multiple-output (MIMO) employs multiple transmit and receive antennas to substantially enhance the air interface. It uses space-time coding of the same data stream mapped onto multiple transmit antennas. This offers a substantial improvement over traditional reception diversity schemes where only a single transmit antenna is deployed to extend the coverage of the cell. MIMO processing also uses spatial multiplexing, allowing different data streams to be transmitted simultaneously from different transmitter antennae. Spatial multiplexing increases the end-user data rate and cell capacity. In addition, when knowledge of the radio channel is available at the transmitter, such as through feedback information from the receiver, MIMO can implement beam-forming to further increase available data rates and spectrum efficiency. Multiple antennas are also used to transmit the same data stream, thus providing redundancy and improved coverage, especially close to cell edge.

OFDM

In the downlink, orthogonal frequency-division multiplexing (OFDM) was selected as the air interface for LTE. OFDM is a particular form of multicarrier modulation (MCM). In general, MCM is a parallel transmission method that divides a radio frequency channel into several, more narrow-bandwidth subcarriers and transmits data simultaneously on each subcarrier. OFDM is well suited for high data rate systems that operate in multipath environments because of its robustness to delay spread. The cyclic extension enables an OFDM system to operate in multipath channels without the need for a complex Decision Feedback Equalizer (DFE) or Maximum Likelihood Sequence Estimation (MLSE) equalizer. As such, it is straightforward to exploit frequency selectivity of the multipath channel with low-complexity receivers. This allows frequency-selective scheduling, as well as frequency-diverse scheduling and frequency reuse one-deployments. Furthermore, due to its frequency domain nature, OFDM enables flexible bandwidth operation with low complexity.

Smart antenna technologies are also easier to support with OFDM, because each subcarrier becomes flat faded and the antenna weights can be optimized on a per-subcarrier or block of subcarriers basis. In addition, OFDM enables broadcast services on a synchronized single frequency network (SFN) with appropriate cyclic prefix design. This allows broadcast signals from different cells to combine over the air, thus significantly increasing the received signal power and supportable data rates for broadcast services.

* All dates reflect commercial launch dates.

† Information reflects the state of the Verizon Wireless network prior to the acquisition of Alltel.

SC-FDMA

Single-carrier FDMA (SC-FDMA) was chosen to reduce Peak to Average Ratio (PAR), which has been identified as a critical issue for use of OFDMA in the uplink where power-efficient amplifiers are required in mobile devices. Another important requirement was to maximize the coverage. For each time interval, the base station scheduler assigns a unique time-frequency interval to a terminal for the transmission of user data, thereby ensuring intracell orthogonality. Slow power control, for compensating path loss and shadow fading, is sufficient as no near-far problem is present due to the orthogonal uplink transmissions. Transmission parameters, coding, and modulation are similar to the downlink transmission.

The chosen SC-FDMA solution is based on using a cyclic prefix to allow high-performance and low-complexity receiver implementation in the eNodeB. As such, the receiver requirements are more complex than in the case of OFDMA for similar link performance, but this is not considered to be a problem in the base station. The terminal is only assigned with contiguous spectrum blocks in the frequency domain to maintain the single-carrier properties and thereby ensure power-efficient transmission. This approach is often referred to as blocked or localized SC-FDMA.

8. WiMAX Overview

WiMAX refers to the standards developed by the Institute of Electrical and Electronics Engineers Inc. (IEEE) for 802.16 wireless networks. IEEE is a developer and one of the governing bodies that determine international standards for many of today's telecommunications, information technology, and power generation products and services. IEEE developed the set of standards for WLAN, commonly known as "Wi-Fi" (IEEE 802.11). 802.16 is the set of IEEE standards for broadband WLAN and WMAN (wireless metro area networks). Although the 802.16 family of standards is officially called WirelessMAN, it has been dubbed "WiMAX" by an industry group called the WiMAX Forum.

WiMAX is available in two versions—fixed and mobile. Fixed WiMAX, which is based on the IEEE 802.16-2004 standard, is ideally suited for delivering wireless, last-mile access for fixed broadband services. It is similar to DSL or cable modem service. Mobile WiMAX, which is based on the IEEE 802.16-2005 standard, supports both fixed and mobile applications while offering users improved performance, capacity, and mobility.

8.1 WiMAX Standards Evolution

In 1998, the IEEE formed a group called 802.16, which was tasked to develop a standard for what would become known as WMAN. Over the past few years, the 802.16 standard has evolved as follows:

- IEEE Std 802.16–2001: Line-of-sight fixed operation in 10 to 66 GHz
- IEEE Std 802.16a–2003: Air interface support for 2 to 11 GHz
- IEEE Std 802.16d–2004: High-speed data rates for fixed wireless and nomadic access
- IEEE Std 802.16e–2005: Improved air interface and capability for limited mobility

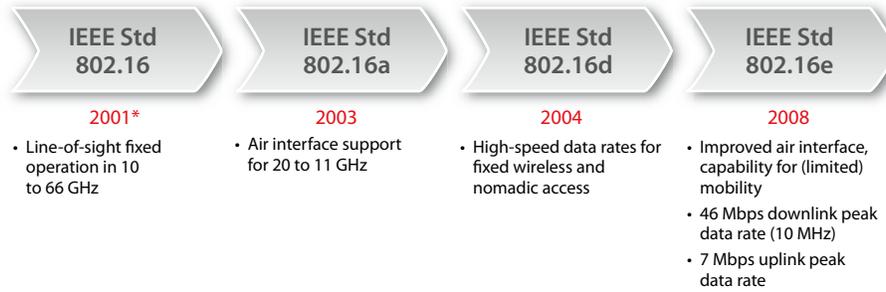


Figure 7: The evolution of WiMAX.

8.2 WiMAX (802.16e–2005) Performance Estimates and Technical Attributes

Benefits expected from WiMAX technology:

- 46 Mbps downlink peak data rate (within 10 MHz bandwidth)
- 7 Mbps uplink peak data rate (within 10 MHz bandwidth)
- Scalable bandwidth (1.25 to 20 MHz)
- Enhanced support for end-to-end quality of service

8.3 WiMAX Supporting Technologies

MIMO—Please see section 7.4, *LTE Supporting Technologies*, for a description of this technology.

OFDM—Please see section 7.4, *LTE Supporting Technologies*, for a description of this technology.

8.4 WiMAX Deployment

WiMAX's deployment began in September 2004 when Intel shipped the first WiMAX chipset, called Rosedale. In January 2006, the first WiMAX Forum-certified product was announced for fixed applications.

Sprint-Nextel and Clearwire have formed a partnership with the intention of deploying WiMAX services covering several major cities in North America. In addition, Intel continues to support the WiMAX standard by including WiMAX-based radios alongside 802.11n-based Wi-Fi radios in its Centrino Pro notebooks. Eventually, Intel plans to position WiMAX as part of its core Centrino platform offering.

9. A Technology Comparison between LTE and WiMAX

LTE and WiMAX have many features and functions in common; more so than one might think. Both are 4G wireless technologies designed to move data rather than voice. Both are all-IP technologies that strictly separate the wireless network from the applications that run on them. In terms of how they operate, both LTE and WiMAX have more in common with Wi-Fi and the Internet than with traditional cellular networks that exist today. Rather than being rival wireless technologies, such as GSM and CDMA, WiMAX and LTE are more like siblings.

* All dates reflect commercial launch dates.

Figure 8 provides a quick comparison of LTE and WiMAX and what each technology offers:

	LTE*	WiMAX 802.16e
Technology	MIMO Downlink: OFDM Uplink: SC-FDMA	MIMO Downlink: OFDM Uplink: OFDM
Peak speeds	Downlink: 100 Mbps (20 MHz, 2x2 MIMO) Uplink: 50 Mbps (20 MHz, 1x2)	Downlink: 46 Mbps Uplink: 7 Mbps
Average user throughput	5 Mbps–12 Mbps (downlink) 2 Mbps–5 Mbps (uplink)	2 Mbps–4 Mbps (downlink) 500 Kbps–1.5 Mbps (uplink)
One-way airlink latency	15 ms	50 ms
Bandwidth	20 MHz, 15 MHz, 10 MHz, 5 MHz, and <5 MHz	3.5 MHz, 5 MHz, 7 MHz, 8.75 MHz, 10 MHz
Spectrum	Verizon Wireless will use 700 MHz, but LTE can be deployed in various frequencies. Using the 700 MHz frequency helps increase in-building coverage for wireless signals.*	2.3, 2.5, 3.5, 5.8 GHz
Mobility	Targeted mobility up to 350 kmph	Targeted mobility up to 120 kmph

Figure 8: Technical differences between LTE and WiMAX.

10. The Advantages of LTE

Despite their similarities, Verizon Wireless has chosen to deploy LTE because it offers a number of distinct advantages over WiMAX. Higher data rates and lower latency make LTE connections more responsive, enabling real-time multicast applications, such as online gaming and video conferencing. Choosing the 700 MHz frequency as the basis of the Verizon Wireless network results in a longer range from the base station, compared with systems operating at 2.5 GHz or 3.5 GHz. In addition, using the 700 MHz frequency allows for better in-building penetration and coverage by wireless signals, helping to improve network conditions. LTE also offers mobile users better coverage as they travel by providing seamless handover and roaming for true mobility.

LTE is better suited for global adoption than WiMAX. Although 2.5 GHz, 3.5 GHz, and 5.8 GHz bands are allotted in many regions of the world, many growth markets require new allocations to service their populations. Given the diverse requirements and regulations of various governments, it will be a challenge for WiMAX to achieve global harmonization.

LTE has strong and widespread support from the mobile industry, including support from a majority of the industry's key players. Many vendors will enable operator transition to LTE in a progressive, scalable, and cost-effective way—protecting investments in existing technologies made by today's GSM and CDMA carriers. GSM is the most popular mobile communications standard currently in use. Carriers on the GSM standard predominate around the globe and will use LTE as their wireless network upgrade pathway. According to an April 2008 report from Gartner Inc., the GSM family will account for 89% of the global market in 2011. In addition, LTE figures to enjoy widespread device support as most major device vendors have publicly announced the development of products to take advantage of LTE.

* Based on preliminary analysis by multiple wireless vendors and Verizon Wireless. One distinction is that LTE uses Frequency Division Duplex (FDD), but WiMAX uses Time Division Duplex (TDD).

10.1 Business Considerations for Using LTE

As an industry leader, Verizon Wireless must carefully consider both the technical and business implications of adopting new technologies for network deployment. LTE will offer a number of technological advantages over WiMAX:

- LTE features higher peak rates and shorter/lower latency to support real-time applications, such as video conferencing and mobile gaming.
- WiMAX suffers from coverage challenges (especially indoors) due to high frequency bands.
- LTE provides better global coverage and roaming capabilities, while maintaining compatibility with existing 2G and 3G wireless networks.
- Numerous vendors worldwide have publicly announced the development of user equipment based on the LTE standard; having a plentiful supply of equipment and devices will help drive down the costs of using the technology.
- LTE enjoys strong, widespread support from the mobile industry, both from wireless carriers and vendors alike.
- Multiple vendors, operators, and research institutes are participating in standardizing LTE. This provides a good base for creating a healthy technological ecosystem.
- The Verizon Wireless IMS/IMS core network is access-technology agnostic and supports LTE.

Figure 9 provides an overview of why businesses should consider adopting LTE:

	LTE	WiMAX 802.16e
Interoperability	Global roaming	Limited international roaming
Backwards compatibility	Connects to legacy 3GPP networks	None; new build out
Market momentum	Examples include: Verizon Wireless, Vodafone, AT&T, T-Mobile, Nokia, Qualcomm, Alcatel-Lucent, Ericsson, MetroPCS, KDDI, China Mobile, DoCoMo	Examples include: Sprint-Nextel, Clearwire, Intel, Google

Figure 9: Business considerations for using WiMAX or LTE.

11. Conclusion

LTE is the future of the Verizon Wireless wireless broadband network. This technology will allow Verizon Wireless to offer users more of what they want, which is untethered mobility. Plus, LTE will support more of the products and services in use today, because of its backward compatibility to 3GPP networks. Verizon Wireless is fully committed to LTE mobile technology and improving its wireless network. To that end, the company actively participates in the development of technology standards to ensure that future standards will greatly benefit its customers. Verizon Wireless believes in the viability of the LTE standard and its future potential, having spent countless hours researching and testing 4G technologies to determine the best fit for its network. For these reasons, Verizon Wireless chose LTE as the technology to deliver the next generation of mobile services and applications to its customers.

12. Additional Resources

Verizon Wireless offers resources, products, and technical support specifically for IT managers who plan to implement wireless solutions for their organizations. These resources include:

IT Solutions Guides

A comprehensive overview of wireless services and solutions offered by Verizon Wireless and its partners.

Technical White Papers

Technical overviews that help IT managers quickly grasp the fundamentals of wireless technology, including security, connectivity, and more.

Case Studies

Real-world stories of customer experiences that illustrate success factors and practical results.

13. Glossary of Terms

1xRTT (*One times Radio Transmission Technology*)—The first version of CDMA2000 technology that has peak downlink speeds of 307 Kbps and uplink speeds of 144 Kbps.

1xEV-DO (*One times Evolution Data Optimized*)—The first phase of 1xEV technology that increases peak download speeds to 2.4 Mbps.

2G (*second generation*)—The second generation of mobile phone technology introduced during the 1990s. This generation added data capabilities to mobile phones, including Internet and email access.

3G (*third generation*)—Third-generation mobile phone technology appeared in the 2000s and forms the foundation of our current mobile phone capabilities. 3G technology offers even faster Internet access, plus enables worldwide roaming capabilities.

4G (*fourth generation*)—The next generation of wireless technology that goes beyond what is currently available. The various industry groups driving development expect 4G technology to offer increased voice, video, and multimedia capabilities; a higher network capacity; improved spectral efficiency; and high-speed data rates over current 3G benchmarks.

Access network—A network that grants end users access to the network core and network services.

AIMS (*Advances to IP Multimedia Subsystem*)—Advances proposed to the subsystem supporting multimedia sessions, standardized by 3GPP.

Air interface—The radio link between a user's mobile device and the wireless carrier's base station.

AWS (*Advanced Wireless Services*)—The wireless telecommunications spectrum band that's used for wireless voice, data, messaging services, and multimedia.

CDMA (*Code Division Multiple Access*)—A method for sending multiple voice and/or data signals simultaneously across the radio spectrum.

DFE (*Decision Feedback Equalizer*)—A channel equalization technology of MIMO to help deliver good performance and high data rates.

eNodeB (*Evolved Node B*)—An integrated LTE base station and radio network controller that manages radio resources, performs subscriber scheduling, and initiates connections to the air interface.

FDD (*Frequency Division Duplex*)—A duplexing scheme in wireless communications used in voice-only applications that supports two-way radio communications by using two distinct radio channels.

GPRS (*General Packet Radio Service*)—A packet-based wireless communications service that offers peak data rates of 56 Kbps to 114 Kbps, while maintaining a continuous Internet connection for mobile devices.

GSM (Global System for Mobile Communications)—A 2G digital wireless telephony system that uses a variation of TDMA (Time Division Multiple Access) for network access.

HSDPA (High-Speed Downlink Packet Access)—A 3G wireless telephony protocol derived from the HSPA protocols that enable UMTS-based networks to have higher data transfer speeds and capacity.

HSPA (High-Speed Packet Access)—A collection of wireless telephony protocols that improve upon the performance offered by UMTS. HSPA consists of two existing protocols: HSDPA and HSUPA.

HSUPA (High-Speed Uplink Packet Access)—A 3G wireless telephony protocol derived from the HSPA protocols that offer peak uplink speeds of up to 5.76 Mbps.

IMS (IP Multimedia Subsystem)—The network architectural framework for delivering multimedia to mobile devices.

LTE (Long Term Evolution)—A 4G technology proposed and developed by 3GPP to improve the UMTS wireless standard.

MIMO (Multiple-Input and Multiple-Output)—A smart antenna technology that uses multiple antennas at the transmitter and receiver to improve communications performance.

MLSE (Maximum Likelihood Sequence Estimator)—An algorithm that is one of a number of techniques developed for processing signals with intersymbol interference. MLSE is used to minimize the probability of error within the radio channel.

OFDM (Orthogonal Frequency-Division Multiplexing)—A frequency-division multiplexing scheme used as a digital multi-carrier modulation method primarily used to carry data across a number of subcarriers. OFDM helps negate severe channel conditions and offers greater spectral efficiency.

OFDMA (Orthogonal Frequency-Division Multiple Access)—A multi-user version of OFDM.

PAR (Peak to Average Ratio)—The ratio of the instantaneous peak value or maximum magnitude of a signal parameter to its time-averaged value.

RAN (Radio Access Network)—The part of the wireless network that is positioned between mobile devices and the wireless carrier's core network. The term RAN is often used to describe GSM, UMTS, and other wireless technology standards.

RTD (Round Trip Delay)—RTD is a measurement of the overall delay encountered on both the transmit and receive direction.

SC-FDMA (Single Carrier Frequency-Division Multiple Access)—Similar to OFDM, SC-FDMA is a frequency-division multiplexing scheme that can operate either as a linearly precoded OFDMA scheme or a single-carrier multiple access scheme. SC-FDMA is the uplink multiple access scheme in LTE.

SFN (Single Frequency Network)—A broadcast network where multiple transmitters send the same signal simultaneously over the same frequency channel.

TCP/IP (Transmission Control Protocol/Internet Protocol)—A collection of communications protocols used to connect hosts to each other on the Internet.

TDD (Time Division Duplex)—A duplexing scheme in wireless communications that uses a single radio frequency to transmit in both the downstream and upstream directions.

UMTS (Universal Mobile Telecommunications System)—A 3G broadband service that allows for the packet-based transmission of text, digitized voice, video, and multimedia content.

UWB (Ultra-Wideband)—A wireless technology that enables the transmission of data over a large bandwidth (greater than 500 MHz).

WiMAX (Worldwide Interoperability for Microwave Access)—A technology proposed by IEEE as a wireless standard for point-to-point communications and cellular access.

14. Contact Information

For more information about Verizon Wireless, speak to a Verizon Wireless business specialist, visit www.verizonwireless.com, or call 1.800.VZW.4BIZ.

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