

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

In the Matter of)	
)	
Wireless Telecommunications Bureau)	
Seeks Comment on the State of Mobile)	
Wireless Competition)	WT Docket No. 11-186
)	

COMMENTS OF CTIA-THE WIRELESS ASSOCIATION®

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EXECUTIVE SUMMARY

The wireless marketplace has been, and continues to be, robustly competitive. An objective and rational evaluation of the wireless marketplace leads to the conclusion that effective competition exists. The United States' position in the global mobile marketplace confirms it. Major market indicators illustrate that robust competition defines the wireless ecosystem and generates vast consumer value. These indicators include:

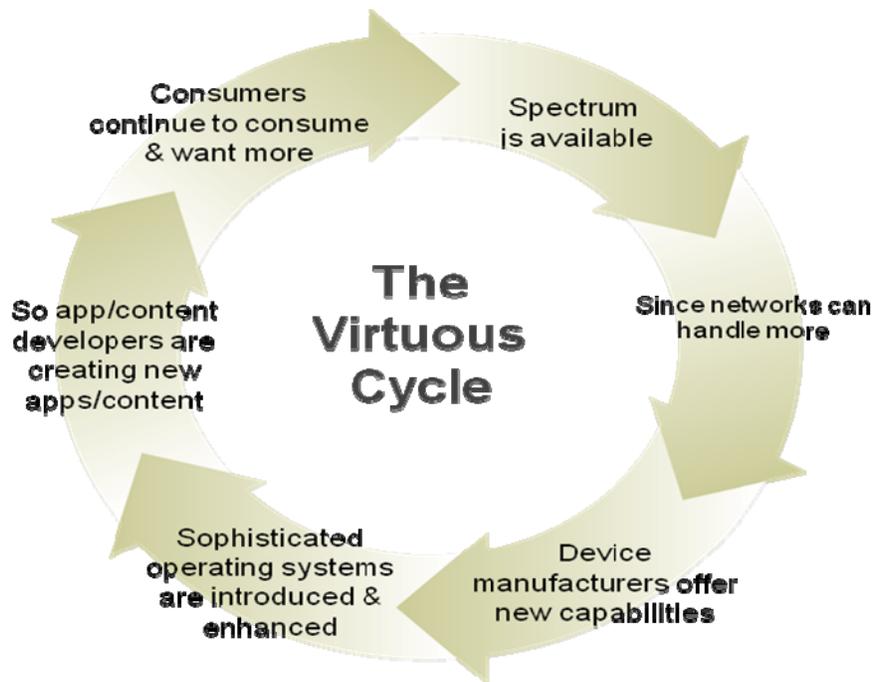
- capital expenditures and network investments;
- infrastructure deployments;
- subscribership levels;
- subscriber growth;
- number of devices manufactured for the U.S. market, including phones, smartphones, and tablets;
- growth of phone capabilities;
- a continued evolution of operating system choices;
- application development;
- consumer choice in calling plans, data plans, and other service offerings;
- network coverage;
- pricing trends; and
- enhancements in services, service policies, customer care, and transparency.

The wireless marketplace in the U.S. has evolved into a “virtuous cycle” driven by competition, innovation and investment. Innovation and investment are not constrained to one sector of the mobile wireless ecosystem. Rather, developments occur in each link of the wireless “value chain.” Advances in one segment lead to innovation and investment in others. CTIA’s key indicators show increasing competition in each segment of the virtuous cycle:

- Wireless providers continue to invest in, build-out, and upgrade networks to compete effectively on network quality. By mid-year 2011, U.S. wireless carriers’ cumulative capital expenditures totaled more than \$322 billion, an increase of more than \$27 billion over the preceding 12-month period despite the challenging economic climate.

- Responding to competitive forces, U.S. wireless carriers continue their commitment to advanced network technologies. Carriers' ongoing deployment of 4G network technologies as well as capital investments and improvements in deployed 3G networks demonstrate this commitment. While the total U.S. population makes up less than five percent of the world's total population and less than six percent of world's total wireless subscribers, the U.S. is home to twenty percent of the world's 3G and 4G subscribers and more than 63 percent of the world's LTE subscribers.
- The number of 3G and 4G subscribers continues to grow. By the end of 2010, there were more than 119 million unique 3G and 4G subscribers, an increase of 19 million since the end of 2009.
- At least 32 companies manufacture over 630 devices for the U.S. wireless market. The market has experienced an incredible proliferation and adoption of smartphones and wireless-enabled tablets. As U.S. consumers have continued to adopt smartphone technology, the average price of smartphones has dropped dramatically, down to its current average price level of \$135.
- Competition in the wireless marketplace spurs the development of new application stores, new applications, and open network initiatives. As of mid-year 2010, more than 240,000 apps were available on 7 operating systems from 7 different application stores; but, by mid-year 2011, over 1.19 million apps were available on at least 11 operating systems from more than 27 different non-carrier stores. By December 2011, there were more than 1.7 million application offerings from these independent non-carrier stores.
- Competition in the wireless marketplace continues to drive consumption and demand for wireless services. As of mid-year 2011, there were over 322 million active subscriber connections, approximately 22 million more than the previous year.

As innovation and investment occur, the wireless ecosystem, fueled by competition, becomes increasingly vibrant to the ultimate benefit of consumers.



Within the virtuous cycle, investment in, and deployment of, new spectrum spurs the roll-out of new services, these services fuel the construction of advanced networks, advanced networks stimulate the development of innovative devices and operating systems featuring new capabilities, new devices and operating systems spur the creation of novel applications and content, and applications and content result in increased consumer demand and adoption. This cycle, driven by competition, not regulation, has produced immense benefits for U.S. consumers who enjoy some of the most ubiquitous, least expensive and most advanced mobile networks, devices, services and applications in the world.

The virtuous cycle of mobile wireless produces extensive benefits for U.S. consumers. Consumers continue to enjoy a diverse array of innovative devices from numerous manufacturers as well as an ever growing number of apps and application stores, calling plans and widely

available sources of carrier and manufacturer information. Further, consumers benefit from access to new advanced networks as carriers deploy and upgrade network technology.

As a result of robust competition, the U.S. wireless marketplace leads the world in efficiency, competition and value for consumers. U.S. wireless carriers make the most efficient use of available spectrum despite generating the lowest revenue per minute among the countries in the Organisation for Economic Cooperation and Development (“OECD”). Additionally, the U.S. leads the world in wireless investment and mobile broadband deployment and adoption. Consumers in the U.S. are among the highest users of wireless services, paying some of the lowest prices for voice and data services in the world.

The objective data and metrics provided in the instant comments demonstrate that the wireless ecosystem is defined by vibrant competition. CTIA encourages the Commission, in its consideration of wireless competition for the *Sixteenth Report*, to find, based on the data provided herein, that the wireless industry has been, and remains, subject to effective competition throughout all sectors of the U.S. market.

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COMMENTS OF CTIA-THE WIRELESS ASSOCIATION®

CTIA – The Wireless Association® (“CTIA”) hereby submits the following comments in response to the November 3, 2011 *Public Notice* by the Federal Communications Commission (“Commission” or “FCC”) requesting input and data on mobile wireless competition for the Sixteenth Annual Report (“*Sixteenth Report*”) on the State of Competition in Mobile Wireless, including Commercial Mobile Radio Services.¹ In these comments, CTIA highlights data collected from trusted third party sources and CTIA’s own audited semi-annual survey. The data demonstrates the existence of a diverse and robust wireless ecosystem defined by innovation, investment and competition in each segment of the “virtuous cycle.” It also establishes that the United States leads the world in the provision of mobile services as a result of intense competition in the wireless ecosystem – an ecosystem composed of wireless carriers, infrastructure suppliers, wireless device manufacturers, operating system providers, and application developers. Since the last time the Commission made a determination that there is “effective competition” in the *Thirteenth Report*, prices have dropped by approximately five

¹ Wireless Telecommunications Bureau Seeks Comment on the State of Mobile Wireless Competition, *Public Notice*, WT Docket No. 11-186 (November 3, 2011) (“*Public Notice*”).

percent, investment has increased by almost 50 billion dollars, and innovation has exploded. Based on this extensive and persuasive data, the Commission should find that there is effective competition in the wireless market.

I. **INTRODUCTION**

In its *Public Notice*, the Commission “solicits input and data on mobile wireless competition for the Federal Communications Commission’s ... Sixteenth Annual Report on the State of Competition in Mobile Wireless, including Commercial Mobile Radio Services....”²

Based on the data provided in the instant comments, the Commission’s analysis of the U.S. wireless industry for the *Sixteenth Report* should find that every major market indicator establishes that there is vibrant and “effective” competition in the wireless ecosystem. These indicators include:

- capital expenditures and network investments;
- infrastructure deployments;
- subscribership levels;
- subscriber growth;
- number of devices manufactured for the U.S. market, including phones, smartphones, and tablets;
- growth of phone capabilities;
- a continued evolution of operating system choices;
- application development;
- consumer choice in calling plans, data plans, and other service offerings;
- network coverage;
- pricing trends; and

² *Id.*

- enhancements in services, service policies, customer care, and transparency.

As the market indicators for 2010 demonstrate, competition in the U.S. wireless ecosystem is even more robust than in previous years. Thus, the *Sixteenth Report* should find that there is effective competition in the wireless market.

VIRTUOUS CYCLE - INFRASTRUCTURE

II. CTIA'S LEADING INDICATORS FOR 2010 DATA SHOW INCREASING COMPETITION IN MOBILE SERVICES.

A. The Wireless Industry Competes Vigorously At Every Level For Customers.

CAPITAL EXPENDITURES

1. Wireless Providers Continue to Invest Considerably In Their Networks.
 - a. Capital Expenditure

Ongoing investment in advanced networks by wireless providers is at the core of wireless competition. Despite the challenging economic climate of recent years, wireless carriers have continued to commit billions of dollars to capital expenditures. By mid-year 2011, U.S. wireless providers' cumulative capital expenditures totaled more than \$322 billion, with wireless providers having spent over \$27 billion in the preceding 12-month period.³

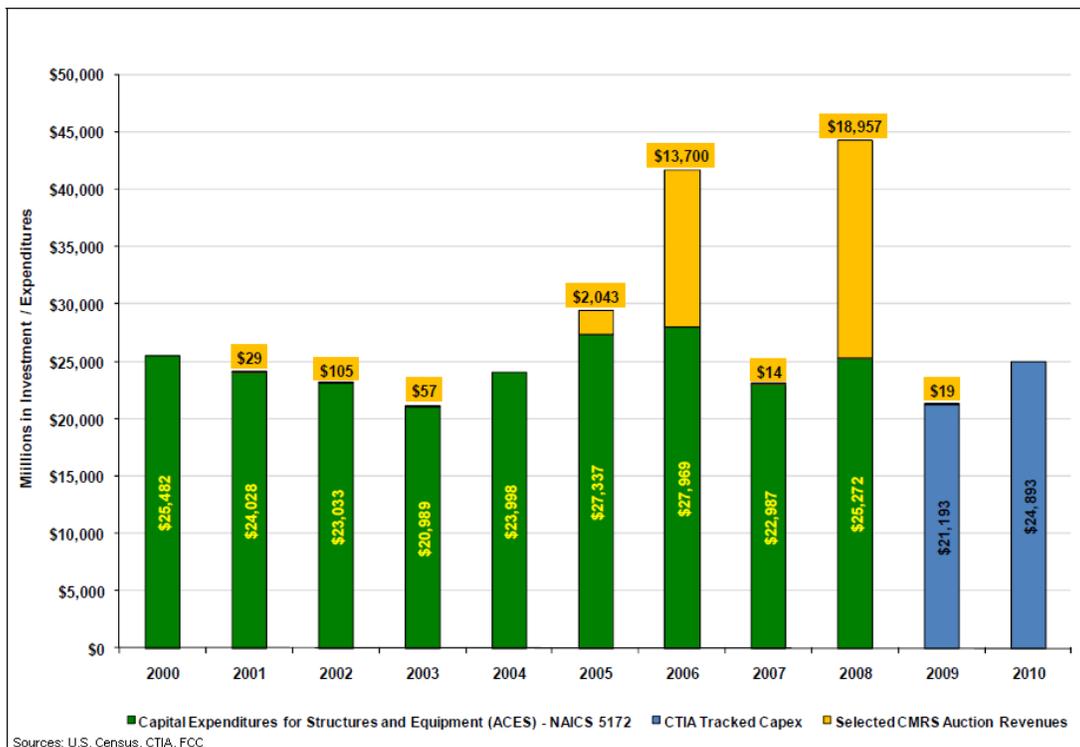
³ CTIA—The Wireless Association®, *Mid-Year Data Survey Results Revised* (Nov. 11, 2011), available at http://files.ctia.org/pdf/CTIA_Survey_MY_2011_Graphics.pdf. See also *CTIA's Wireless Industry Indices, Semi-Annual Data Survey Results: A Comprehensive Report From CTIA Analyzing the U.S. Wireless Industry. Mid-Year 2011 Results* ("CTIA Semi-Annual Report 2011") (Nov. 21, 2011) at 8.

The Annual Capital Expenditures Survey (“ACES”) conducted by the U.S. Census Bureau tracks expenditures related to wireless investment. In “Capital Expenditures for Structures and Equipment for Companies with Employees by Industry: 2009,” released February 8, 2011, the ACES reported that wireless carriers invested more than \$20 billion in 2009.⁴ Of that \$20 billion, carriers spent more than \$16 billion on equipment and more than \$3 billion on structures.⁵ Actual investment figures are even higher when the \$19 billion spent by wireless carriers in auctions to acquire spectrum is included, as seen in the chart below.⁶ Although ACES data is not yet available for 2010, CTIA data from its semi-annual survey shows capital expenditures of almost \$25 billion in 2010. This amount equates to almost a 20 percent increase over 2009.

⁴ U.S. Census Bureau, Annual Capital Expenditures Survey, *Capital Expenditures for Structures and Equipment for Companies with Employees by Industry: 2009* (Feb. 8, 2011), available at http://www.census.gov/econ/aces/xls/2009/full_report.html.

⁵ *Id.*

⁶ Please note that the 2009 and 2010 data included in the referenced chart is CTIA Tracked Capex data and not ACES data.



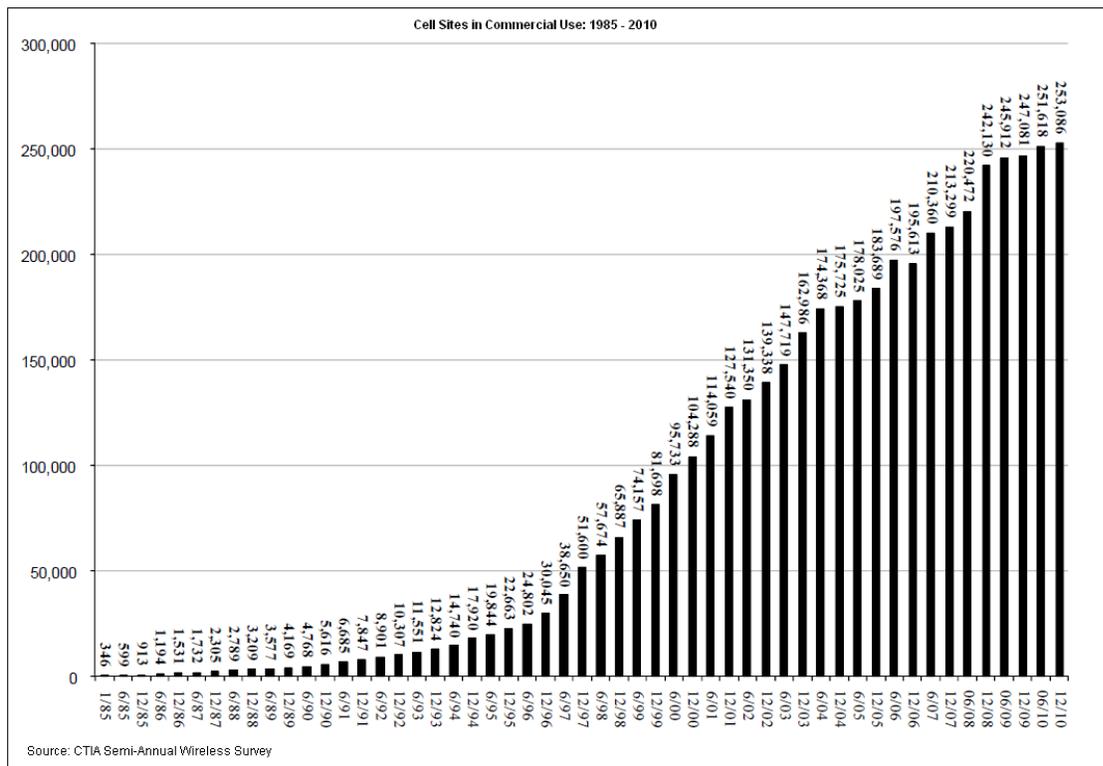
TOWER / ANTENNA DEPLOYMENT

b. Build-Out

Investment in equipment and structures has contributed to the expanding availability of wireless services, with new cell sites continually being deployed. By the end of 2010, 253,086 cell sites were operational in the U.S., up from 247,081 in 2009.⁷ As additional cell sites are deployed, competition among facilities-based wireless providers continues to flourish and

⁷ CTIA – The Wireless Association®, CTIA’s Wireless Industry Indices, *Semi-Annual Data Survey Results: A Comprehensive Report From CTIA Analyzing the U.S. Wireless Industry, Year-End 2010 Results* (“CTIA Semi-Annual Report 2010”) (May 2011) at 166.

wireless users across the U.S. benefit from increased and improved access to networks.



c. Improvement to the Siting Process

CTIA recognizes recent steps taken by the Commission to encourage investment and expedite build-out by wireless carriers. These efforts include the adoption of the following two rulings:

- *Shot Clock Declaratory Ruling*. FCC decision providing a clear standard for when an applicant can appeal a state or local zoning authority’s failure to act.⁸

⁸ Petition for Declaratory Ruling to Clarify Provisions of Section 332(c)(7)(B) to Ensure Timely Siting Review and to Preempt under Section 253 State and Local Ordinances that Classify All Wireless Siting Proposals as Requiring a Variance, *Declaratory Ruling*, 24 FCC Rcd 13994 (2009) (“*Shot Clock Declaratory Ruling*”).

- *Pole Attachment Ruling*. FCC reformation of regulations implementing the important goals of (1) guaranteeing wireless carrier access to utility poles and (2) expediting the pole attachment process.⁹

However, additional certainty and acceleration of the siting process is crucial to ensuring that wireless providers can continue to meet the growing demand for mobile broadband through network investment and build-out. The Commission should act on its commitments to streamline regulations affecting wireless infrastructure build-out and focus on working with local and state authorities to alleviate burdens and delays imposed on communications providers.¹⁰ Further, the Commission should adopt interim rules revising the Antenna Structure Registration process.¹¹ By taking these additional steps, the Commission can further encourage investment and build-out by wireless carriers, thereby improving consumer access to wireless services and increasing competition in the wireless market.

⁹ Implementation of Section 224 of the Act, *Report and Order and Order on Reconsideration*, 26 FCC Rcd 5240 (2011)(“*Pole Attachment Ruling*”).

¹⁰ Comments of CTIA – The Wireless Association®, GN Docket No. 11-121, (filed Sept. 6, 2011).

¹¹ See Wireless Telecommunications Bureau Seeks Comment and Announces Public Meeting on Its Draft Programmatic Environmental Assessment of the Antenna Structure Registration Program, WT Docket Nos. 08–61 & 03–187, *Public Notice*, 26 FCC Rcd 13841 (WTB 2011).

NETWORK UPGRADES

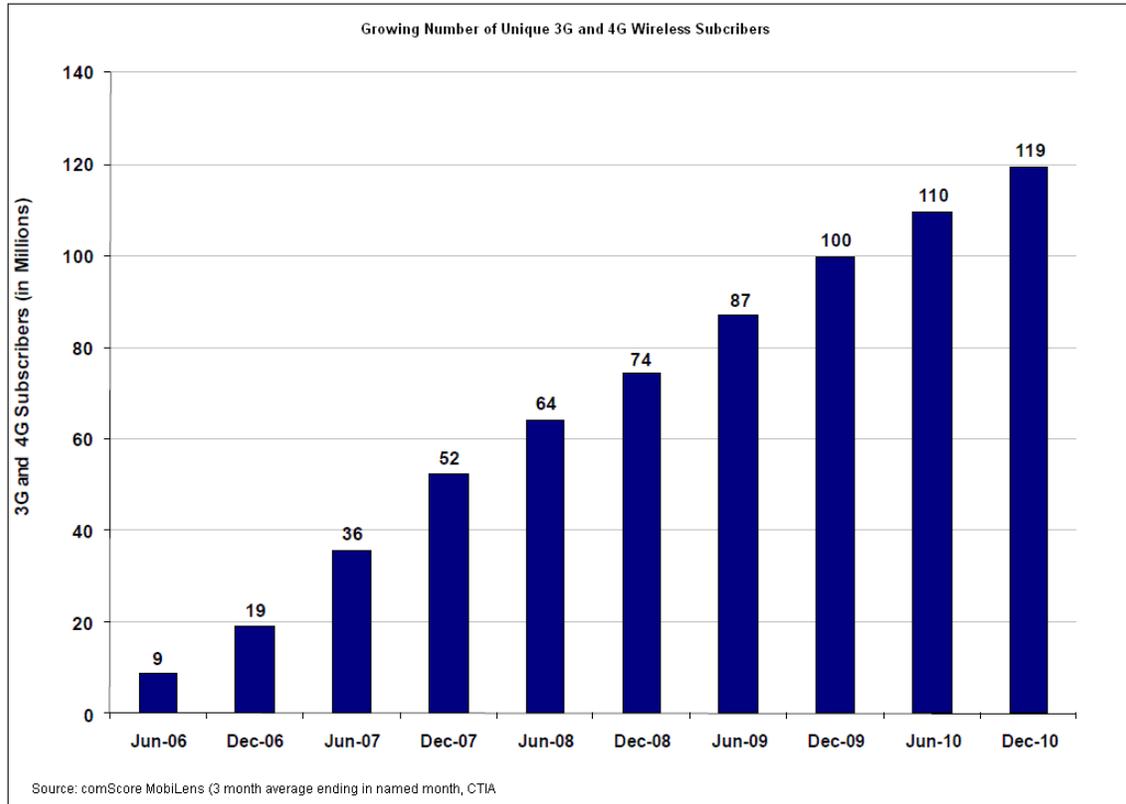
2. Wireless Providers Continue To Deploy Advanced Networks, Improve Already Deployed Networks, and Compete On Network Quality.
 - a. Consumer Demand For, and Adoption of, Smartphones and Mobile Broadband Services.

Wireless service providers are deploying and enhancing mobile broadband networks across the U.S. in response to astounding consumer demand and increased competition in mobile broadband service. According to Nielsen’s monthly analysis of cellphone bills for 65,000+ lines, smartphone owners – especially those with iPhones and Android devices — are consuming more data than ever before on a per-user basis.¹² In just the last 12 months, the amount of data the average smartphone user consumes per month has grown by 89 percent from 230 Megabytes (MB) in Q1 2010 to 435 MB in Q1 2011.¹³

As adoption of smartphone technology increased, so did subscribership to mobile broadband services. By the end of 2010, there were 119 million Third Generation (“3G”) and Fourth Generation (“4G”) subscribers, an increase of 19 million such subscribers since the end of 2009, as reflected in the chart below.

¹² See *Average U.S. Smartphone Data Usage Up 89% as Cost per MB Goes Down 46%*, Nielsen Wire, available at http://blog.nielsen.com/nielsenwire/online_mobile/average-u-s-smartphone-data-usage-up-89-as-cost-per-mb-goes-down-46/.

¹³ *Id.*

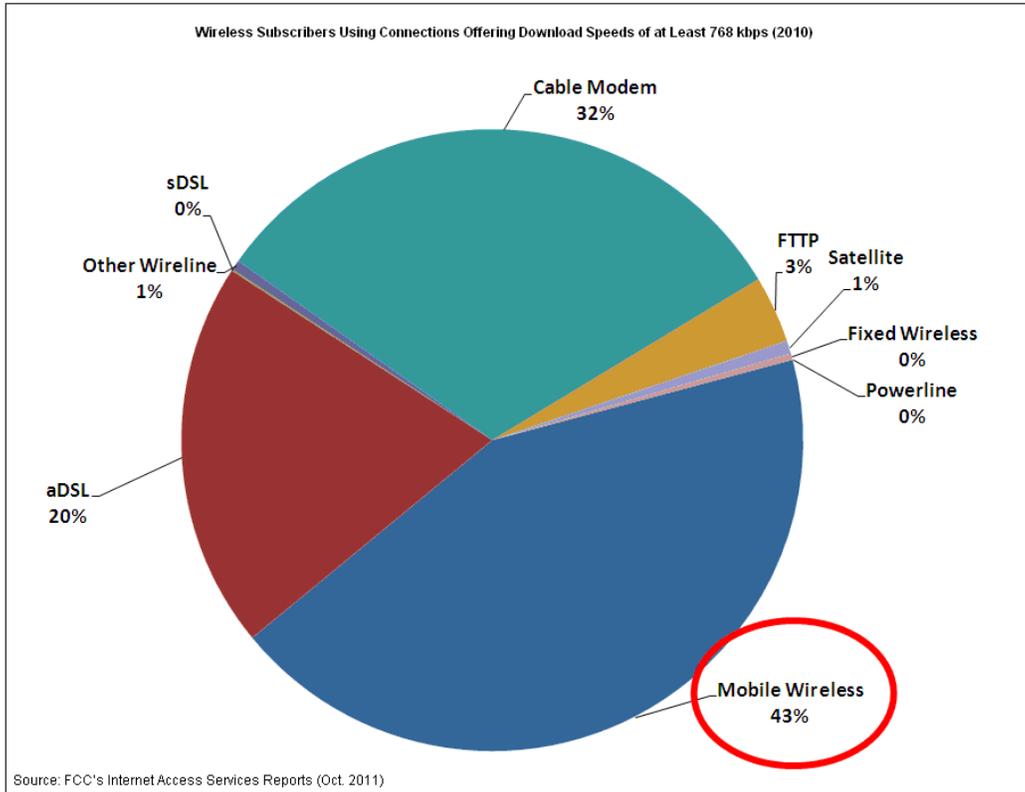


b. High Speed Subscriber Additions

Consumers seeking faster service and download speeds continue to choose wireless to fill this need. Between the end of 2009 and 2010, wireless subscribers using connections offering download speeds of at least 768 kbps grew from 31 percent to 43 percent of users of all technologies offering those speeds.¹⁴ During the same time period, wireless accounted for more

¹⁴ Internet Access Services: Status as of December 31, 2010, *Report*, (2011), available at http://transition.fcc.gov/Daily_Releases/Daily_Business/2011/db1011/DOC-310261A1.pdf; Internet Access Services: Status as of December 31, 2009, *Report*, (2010), available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-303405A1.pdf.

than 85 percent of all new connections offering download speeds of at least 768 kbps, regardless of technology.¹⁵

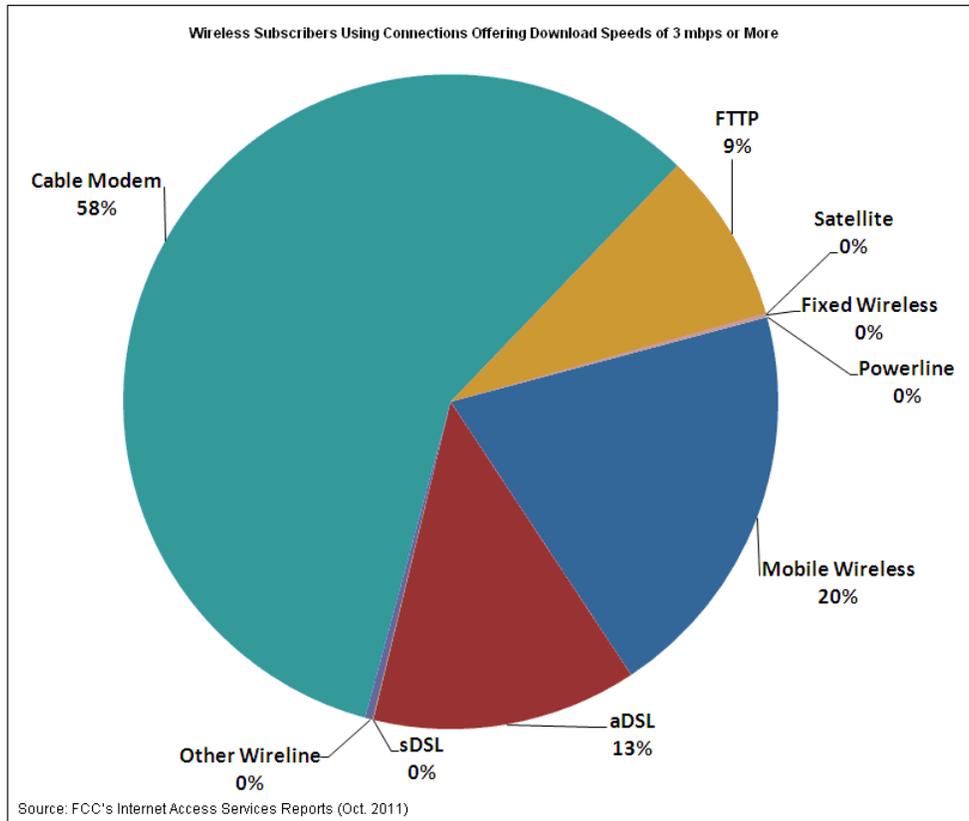


Additionally, between the end of 2009 and 2010, wireless subscribers using connections offering download speeds of 3 Mbps or more grew from 5 percent to 20 percent of users of all technologies offering those speeds.¹⁶ During the same period, wireless accounted for 61 percent of all new connections offering download speeds of 3 Mbps or more, regardless of technology.¹⁷

¹⁵ *Id.*

¹⁶ *Id.*

¹⁷ *Id.*



c. Wireless 3G Upgrades and 4G Build-Out

The roll-out of mobile broadband services by wireless providers in response to growing consumer demand has been extensive. Some carriers are deploying 4G networks and services across the U.S. while other providers upgrade their already deployed 3G networks to handle increased traffic and speeds and a larger coverage area. Regional and rural carriers such as Cellcom (operating in “Northeast and Central Wisconsin and select areas of Michigan’s Upper Peninsula”) and Bluegrass Cellular (located in Central Kentucky) are participating in Verizon’s LTE in Rural America program, along with Oklahoma-based Pioneer Cellular, Kentucky-based

Appalachian Wireless, North Carolina-based Carolina West Wireless, and other rural carriers.¹⁸ Mohave Wireless (operating in Arizona) expanded its 3G high speed data network with a \$2.25 million investment in Mohave County.¹⁹ U.S. Cellular announced plans to launch 4G LTE service across 24 markets serving more than 25 percent of subscribers by November 2011, with expansions in 2012.²⁰ The initial roll-out will serve markets in Iowa, Wisconsin, Maine, North Carolina, Texas, and Oklahoma.²¹ SouthernLINC Wireless (operating regionally in Alabama, Georgia, northwest Florida and southeast Mississippi) launched nationwide Push To Talk two-way radio and data services through an agreement with a major U.S. carrier.²² Verizon Wireless, AT&T, and MetroPCS all have begun deploying LTE networks and expanding

¹⁸ D. Meyer, *Cellcom to partner with Verizon Wireless for LTE*, RCRWireless (Jan. 6, 2011), available at <http://www.rcrwireless.com/ARTICLE/20110106/CARRIERS/110109960/cellcom-to-partner-with-verizon-wireless-for-lte>; Press Release, Bluegrass Cellular, *Bluegrass Cellular to Participate in Verizon's Wireless' LTE in Rural America Program* (Nov. 8, 2010), available at http://bluegrasscellular.com/about/news/bluegrass_cellular_to_participate_in_verizon_wireless_lte_in_rural_america. See also L. Luna, *Verizon's rural LTE partners to begin commercial launches in early 2012*, FierceBroadbandWireless (Nov. 9, 2011), available at <http://www.fiercebroadbandwireless.com/story/verizons-rural-lte-partners-begin-commercial-launches-early-2012/2011-11-09>.

¹⁹ Press Release, Mohave Wireless, *Mohave Wireless Expands 3G High Speed Data Network with \$2.25 Million Investment* (July 2011), available at http://www.mohavewireless.com/images/press_releases/moh_pr-3g-071411-final.pdf.

²⁰ Press Release, U.S. Cellular, *U.S. Cellular to Launch 4G LTE Services and Devices in Time for the Holidays* (May 6, 2011), available at <http://www.uscellular.com/about/press-room/2011/USCELLULAR-TO-LAUNCH-4G-LTE-SERVICE-AND-DEVICES-IN-TIME-FOR-THE-HOLIDAYS.html> (last accessed Sept. 6, 2011).

²¹ *Id.*

²² Press Release, SouthernLINC Wireless, *SouthernLINC Wireless Launches Nationwide Push To Talk and Data Services* (Apr. 4, 2011), available at <http://www.southernlinc.com/pressroom/69-southernlinc-wireless-launches-nationwide-push-to-talk-and-data-services-.aspx>.

coverage across the U.S.²³ Leap, Sprint and C Spire all have announced intentions to deploy LTE networks.²⁴ T-Mobile and AT&T have increased the coverage of their HSPA+ networks, and Cellular Properties, doing business as Cellular One of East Central Illinois, is expanding its mobile broadband coverage.²⁵ Commnet Wireless is partnering with the Navajo Tribal Utility Authority (NTUA) to develop and operate an LTE network covering the Navajo Nation.²⁶

²³ See Press Release, Verizon Wireless, *America's Fastest And Most Reliable 4G Network Expands To More Than 175 Markets On Nov. 17* (Oct. 10, 2011), available at <http://news.verizonwireless.com/news/2011/10/pr2011-10-07d.html>; *Kentucky fried LTE? Appalachian Wireless confirmed as Verizon's twelfth rural LTE partner*, TeleGeography (Oct. 12, 2011), <http://www.telegeography.com/products/commsupdate/articles/2011/10/12/kentucky-fried-lte-appalachian-wireless-confirmed-as-verizons-twelfth-rural-lte-partner>; Press Release, AT&T, *AT&T Evolves to 4G*, (Sept. 19, 2011), available at <http://www.att.com/gen/press-room?pid=2943>; Press Release, MetroPCS, *MetroPCS Launches Commercial 4G LTE Services in the Dallas/Fort Worth Metroplex* (Sept. 29, 2010), available at <http://www.metropcs.com/presscenter/articles/mpcs-news-20100929.aspx>.

²⁴ See Press Release, Press Release, Leap Wireless Int'l, Inc., *Cricket Enters into 4G Roaming Agreement with LightSquared* (Mar. 22, 2011), available at <http://leapwireless.mediaroom.com/index.php?s=13383&item=30563>; Press Release, Sprint, *Sprint Accelerates Deployment of Network Vision and Announces National Rollout of 4G LTE* (Oct. 7, 2011), available at http://newsroom.sprint.com/article_display.cfm?article_id=2064; C Spire Wireless, *C Spire Wireless Expands Advanced Mobile Broadband Coverage* (Oct. 24, 2011), available at https://netforum.avectra.com/eweb/Shopping/Event/Registration.aspx?Site=FCBA&WebCode=Registration&prd_key=e7f8de3b-1f66-46fc-a36b-48b1941c3803.

²⁵ See Press Release, T-Mobile, *T-Mobile to Rollout the Nation's Fastest 3G Wireless Network with HSPA+ to More than 100 Metropolitan Areas in 2010* (Mar. 24, 2010), available at <http://newsroom.t-mobile.com/articles/t-mobile-HSPA-3G-network>; Press Release, AT&T, *AT&T Upgrades 3G Technology at Cell Sites Across Nation* (Jan. 5, 2010), available at <http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=30358&mapcode=corporate|wireless-networks-general>. See Press Release, Cellular Properties, *Cellular One Awarded over \$13 Million For Rural Broadband Development* (Aug. 20, 2010), available at <http://www.cellular1.net/downloads/broadband%20funds.pdf>.

²⁶ L. Luna, *Navajo Tribal Utility Authority, Commnet Wireless formalizes partnership to bring LTE to Navajo Nation*, FierceWireless (Apr. 7, 2011), available at <http://www.fiercebroadbandwireless.com/story/navajo-tribal-tribal-authority-commnet-wireless-formalize-partnership-bring/2011-04-07>

DISH also has made efforts to roll-out national broadband networks.²⁷ Further, the Educational Broadband Service licensees and Broadband Radio Service spectrum holders recently completed the bulk of their network build out obligations to conclude the transition of these bands to mobile broadband services. Completion of this network build has enabled Clearwire and Sprint to offer enhanced WiMax coverage.²⁸

Outside of the traditional retail business model, wireless operators using a wholesale business model allow companies to offer 4G service to their customers who would otherwise be precluded from doing so. For example, Clearwire has launched a 4G wholesale business combining an all-IP network, substantial spectrum resources, and a technology roadmap to serve the growing demand for mobile broadband.²⁹ In addition to Clearwire's retail customer base, through its CLEAR brand, it has over 8 million subscribers through wholesale partners.³⁰ Similarly, LightSquared has announced that it will be pursuing a wholesale business model on its

²⁷ See Cecilia Kang, *Dish Network moves into wireless, taking on AT&T, Verizon, LightSquared*, Washington Post, Post Tech Blog (Aug. 24, 2011), available at http://www.washingtonpost.com/blogs/post-tech/post/dish-network-moves-into-wireless-taking-on-atandt-verizon-lightsquared/2011/08/24/gIQAmy5Ubj_blog.html.

²⁸ See *Sprint Partners with Clearwire to Offer 4G WiMax*, Sprint, http://developer.sprint.com/site/global/home/4g/sprint_clearwire/sprint_clearwire.jsp (last viewed Nov. 30, 2011).

²⁹ See, e.g., Press Release, Clearwire, *Clearwire and Locus Telecommunications Announce New 4G Wholesale Agreement* (Apr. 7, 2011), available at <http://corporate.clearwire.com/releasedetail.cfm?ReleaseID=563465>; see also, Press Release, Clearwire, *UPDATE -- United Online and Clearwire Announce Agreement to Power NetZero 4G High-Speed Mobile Broadband Service Via Clearwire 4G Network* (Nov. 2, 2011), available at <http://corporate.clearwire.com/releasedetail.cfm?ReleaseID=620289>.

³⁰ Press Release, Clearwire, *Clearwire Reports Record Third Quarter 2011 Results* (Nov. 2, 2011), available at <http://corporate.clearwire.com/releasedetail.cfm?ReleaseID=620322>.

network.³¹ Efforts made by wireless carriers to deploy broadband networks demonstrate a swift response to competitive pressures in the wireless ecosystem as well as growing consumer demand for broadband services. Importantly, this investment in mobile broadband technology and networks enables the United States to continue to lead the world in advanced wireless networks, as discussed in more detail herein.

VIRTUOUS CYCLE - DEVICES

MANUFACTURERS

3. Competition in the Wireless Ecosystem Fuels the Development of New and Innovative Devices by Numerous Manufacturers.
 - a. Growth in Devices and Device Capabilities

The U.S. wireless market is characterized by ongoing development of innovative devices and device capabilities. The number of device manufacturers and devices has flourished in response to competitive pressures in the wireless ecosystem. Currently, there are at least 32 device manufacturers and over 630 devices manufactured for the U.S. market.³²

³¹ *About Us*, Light Squared, <http://www.lightsquared.com/about-us>.

³² CTIA—The Wireless Association®, *Wireless Industry Overview* (“*CTIA Wireless Industry Overview*”) (June 13, 2011) at 13, available at http://files.ctia.org/pdf/061311_-_Wireless_Industry_Overview.pdf.

MANUFACTURERS PRODUCING WIRELESS DEVICES FOR THE U.S. MARKET		
Alcatel	Firefly	Palm
Acer America	HP	Pantech & Curitel
AirTouch® Communications (formerly Waxess USA)	HTC	PCD
Apple	Huawei	Research in Motion
ASUS	Jitterbug	Samsung
Axxesstel	Kyocera	Sanyo
BandRich	LG	Sharp
Cal-Comp	Motorola	Sierra Wireless
Casio	Nokia	Sony Ericsson
Dell	Novatel Wireless	Verykool USA
	Option	ZTE

SMARTPHONES

Incredible progress in the capabilities in devices has occurred in the past few years, as demonstrated by a comparison of the Motorola DROID RAZR and Motorola v3 RAZR. While the Motorola v3 RAZR was one of the top 5 devices in the third quarter of 2008, the new RAZR, an Android smartphone, is dramatically faster and more powerful and outfitted with more advanced capabilities than its predecessor model.³³

³³ CTIA Wireless Industry Overview at 14; see Press Release, Motorola, *Motorola Mobility Unveils the New Motorola RAZR™: Impossibly Thin Meets Head-turning Innovation* (Oct. 18, 2011), available at <http://mediacenter.motorola.com/Press-Releases/Motorola-Mobility-Unveils-the-New-Motorola-RAZR-Impossibly-Thin-Meets-Head-turning-Innovation-3867.aspx>.

Motorola DROID RAZR Compared to Motorola v3 RAZR



	Motorola DROID RAZR	Motorola v3 RAZR
General	4G LTE Android Platform	GSM phone Proprietary Motorola OS
Dimensions	Width: 2.71" Depth: 0.28" Height: 5.15"	Width: 2.1" Depth: 0.6" Height: 3.9"
Weight	4.48 ounces	3.4 ounces
Material	KEVLAR fiber and scratch-resistant Corning Gorilla glass	Aluminum Alloy
Primary Display	4.3" Super AMOLED Advanced qHD (540x960 pixels)	2.2" LCD display (176x220 pixels)
Camera(s)	8 Megapixel rear facing camera with 1080p HD video capture 1.3 Megapixel front facing camera with 720p HD video capture 8x digital zoom	VGA Camera 4x digital zoom
Processor	Dual-core 1.2GHz processor	40 MHz
Memory	16GB internal with a 16GB microSD card pre-installed (supports up to 32 GB microSD for a potential total of 48 GB)	5 MB
Battery life	Talk time: up to 750 min. Standby time: up to 205 hrs.	Talk time: up to 210 min Standby time: up to 250 hrs.
Multimedia Capability	Streaming audio, video and internet radio with media players for internal media.	Can only play MPEG-4 Video
Internet Capability	Fully capable mobile web browser	Limited mobile web browser
Messaging Capability	Email MMS SMS Instant Messaging	Limited email MMS SMS AOL Instant Messenger
Connectivity	4G Mobile Hotspot WiFi 802.11 b/g/n Bluetooth version 4.0	GSM Bluetooth version 1.2
Interface	Touch screen	Numeric keypad
Sensors	Proximity, ambient light, eCompass, battery temperature, and accelerometer	N/A
Life Span	Released Nov. 2011	Originally released in 2004 the first line was discontinued in 2007, but it wasn't until 2008 that the RAZR was surpassed by the iPhone 3G as the top selling handset for the quarter.

Certainly, such innovation has not been limited to just a single device either. The proliferation of high-speed, data-capable smartphones from all handset manufacturers has accelerated each quarter of 2011. Consumers now no longer need access to a computer to utilize the Internet nor do they need access to a television to stream video. Smartphones can handle the full panoply of services demanded by consumers and are doing so at an astonishing rate.

Wireless Devices have Evolved to be Multifunction and Multiform

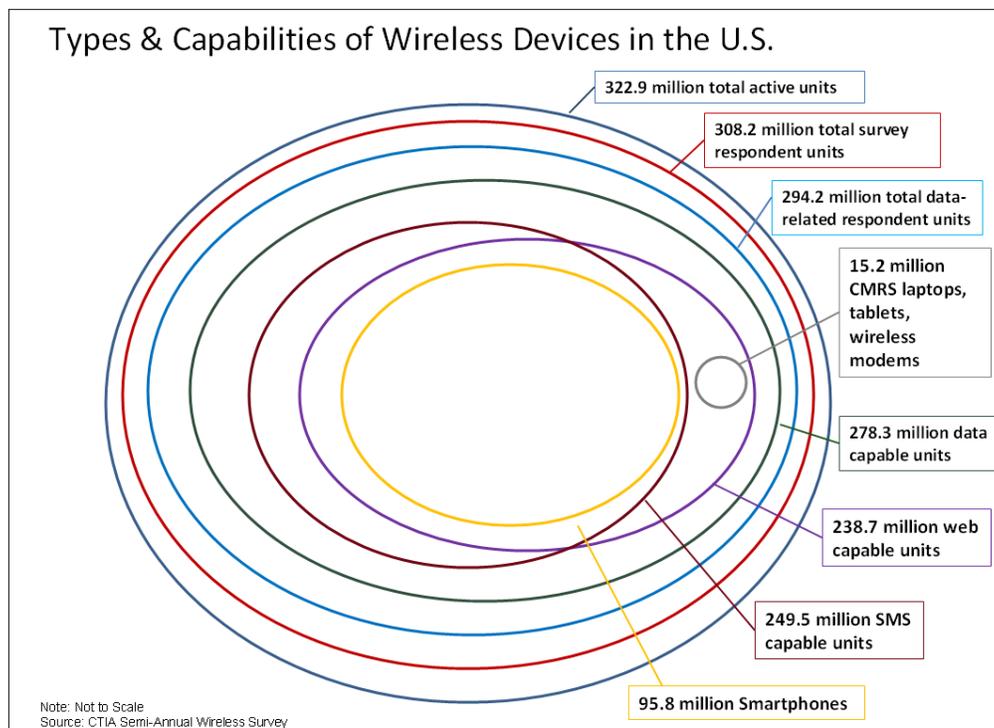


CTIA
The Wireless Association®

In 2009, there were 257 million data-capable devices in the hands of consumers. In 2010, this number grew to 270 million.³⁴ It is important to note, however, the substantial evolution of these devices, as consumers migrate from data-capable feature phones to the latest sophisticated smartphones. For example, smartphones accounted for only 49.8 million of the total in 2009,

³⁴ CTIA – The Wireless Association®, *Wireless Metrics* (Mar. 21, 2011), p. 18.

compared to 78.2 million devices in 2010.³⁵ Growth in smartphone adoption is an important metric because data consumption associated with smartphones vastly exceeds the usage by prior feature phones. Fast forward to today, in total, there are more than 322 million active wireless devices on wireless networks in the U.S. as of June 2011. Of these, 278.3 million are data capable units, 238.7 million are web capable units, 249.5 million are SMS capable units, and 15.2 million are CMRS laptops, tablets, and wireless modems, as indicated in the chart below.



The proliferation of smartphones now available from a growing number of manufacturers in the U.S. market is one of the many benefits of robust competition in the virtuous cycle. Despite its relatively recent entrance into the wireless market, Apple has become the largest U.S.

³⁵ CTIA Semi-Annual Report 2010 at 11.

cell phone maker, selling more than 4 million units of the iPhone 4S in the first three days of release³⁶ and more than 20 million iPhones in the third quarter of 2011 alone.³⁷ Additionally, there are now more than a dozen Android phones available from manufacturers including HTC, Motorola and Samsung.³⁸ Microsoft has initiated its new mobile phone operating system and announced an agreement with Nokia to incorporate this new software in its device portfolio.³⁹ Research in Motion has continued to garner a large share of the smartphone market with its Blackberry devices.⁴⁰

These device manufacturers have developed a multitude of innovative devices including numerous smartphones and wireless-enabled tablets. As a result, consumer demand for smartphones and tablets has grown significantly. With respect to smartphones, in the third quarter of 2011, 59 percent of mobile phone purchases were smartphones, up from only 46

³⁶ Press Release, Apple, *iPhone 4S First Weekend Sales Top Four Million* (Oct. 17, 2011), available at <http://www.apple.com/pr/library/2011/10/17iPhone-4S-First-Weekend-Sales-Top-Four-Million.html>.

³⁷ Press Release, Apple, *Apple Reports Third Quarter Results* (July 19, 2011), available at <http://www.apple.com/pr/library/2011/07/19Apple-Reports-Third-Quarter-Results.html>.

³⁸ See, e.g., *Products*, HTC, <http://www.htc.com/us/products#/?view=1-1&sort=0>; *Mobile Phones*, Motorola, <http://www.motorola.com/Consumers/US-EN/Consumer-Product-and-Services/Mobile-Phones>; Samsung, *Cell Phones*, <http://www.samsung.com/us/mobile/cell-phones>.

³⁹ Press Release, Microsoft, *Nokia and Microsoft Announce Plans for a Broad Strategic Partnership to Build a New Global Mobile Ecosystem* (Feb. 11, 2011), available at <http://www.microsoft.com/presspass/press/2011/feb11/02-11partnership.mspx>.

⁴⁰ See, e.g., Press Release, Research In Motion, *Research In Motion Reports Year-End and Fourth Quarter Results for Fiscal 2011* (Mar. 24, 2011), available at <http://press.rim.com/release.jsp?id=4934>.

percent during the same quarter in 2010.⁴¹ Combined, the number of active smartphones and wireless-enabled PDAs has skyrocketed from 61.2 million as of mid-year 2010 to 95.8 million only a year later, an increase of 57 percent.⁴² Indeed, demand for smartphones continues to grow as manufacturers introduce innovative devices into the wireless marketplace.

In 2010, the first 4G handset – the HTC Evo – was introduced at International CTIA WIRELESS®. As of June 2011, various providers were offering numerous 4G handsets, including the following:

- AT&T: Motorola Atrix 4G, HTC Inspire 4G, Samsung Infuse 4G, HP Veer 4G;
- CellularOne: Motorola Atrix 4G, HTC Inspire 4G;
- MetroPCS: Samsung Craft, Samsung Galaxy Indulge;
- Sprint Nextel: Motorola Photon 4G, HTC Evo 4G, HTC Evo View 4G (tablet), HTC Evo Shift 4G, Samsung Epic 4G, Nexus S 4G, RIM 4G PlayBook (tablet);
- T-Mobile: myTouch 4G, Google G2 and G2x, Samsung Galaxy S 4G, Streak 7 (tablet);
- Verizon Wireless: HTC Thunderbolt, Samsung Droid Charge, LG Revolution, Motorola Droid Bionic, Motorola Xoom (tablet).

Importantly, smartphone pricing has declined dramatically with increased consumer adoption. The average price of smartphones has dropped for four consecutive quarters, down to

⁴¹ Press Release, NPD Group, *As Smartphone Prices Fall, Retailers Are Leaving Money on the Table, According to The NPD Group* (Nov. 11, 2011), available at http://www.npdgroup.com/wps/portal/npd/us/news/pressreleases/pr_111114a.

⁴² CTIA-The Wireless Association®, *Mid-Year 2011 Survey Results* (“CTIA Mid-Year Survey 2011”) (Oct. 11, 2011).

its current average price level of \$135.⁴³ Moreover, despite already declining prices, wireless device retailers continue to offer competitive pricing deals. From November 23 to November 28, 2011, Amazon sold smartphones such as Motorola Droid Razr 4G, Samsung Galaxy S II and the Blackberry Torch 4G for a penny.⁴⁴ Competition in the wireless ecosystem continues to drive prices down for innovative devices with retailers providing short term competitive pricing deals.

Consumer adoption of smartphone technology has changed the way consumers shop and make purchases resulting in a boost for e-commerce stores. So far during the 2011 Holiday Season, retailers have seen four times as much traffic on their mobile websites as compared to last year.⁴⁵ Indeed, over 17 percent of consumers are using a mobile device to visit a retailer's website and over 9 percent of consumers are using a mobile device to make a purchase.⁴⁶ Consumers are now using mobile devices such as the iPhone, which leads all mobile device traffic with 6.77 percent, Android phones, with 5.37 percent, and the iPad with 4.67 percent, to browse retailer inventory and make purchases, reflecting a major shift in the way consumers shop as a result of consumer adoption and use of mobile wireless services.⁴⁷

⁴³ Tom Krazit, *How Low Will They Go? Average Smartphone Price Falls Again In U.S.*, mocoNews, (Nov. 14, 2011), available at <http://moconews.net/article/419-how-low-will-they-go-average-smartphone-price-falls-again-in-u.s>.

⁴⁴ *Amazon Sells Smartphones for a Penny*, The Wall Street Journal, Digits (Nov. 23, 2011), available at http://blogs.wsj.com/digits/2011/11/22/amazon-sells-smartphones-for-a-penny/?blog_id=100&post_id=23575.

⁴⁵ Om Malik, *This holiday season shopping has gone mobile in a big way*, GigaOm (Nov. 25, 2011), http://gigaom.com/2011/11/25/this-holiday-season-shopping-has-gone-mobile-in-a-big-way/?utm_source=General+Users&utm_campaign=e1b9db0d42-c%3Acln%2Ctec+d%3A11-26&utm_medium=email.

⁴⁶ *Id.*

⁴⁷ *Id.*

WIRELESS TABLETS

Competition has led to enormous growth in the availability and adoption of wireless-enabled tablets. Tablets are produced by a growing number of manufacturers: Acer, Algiz, Amazon, Apple, Cisco, Dell, DRS Technologies, Inc., HTC, LG, Motorola, Nook, OpenPeak, Inc., Samsung, and Sony.⁴⁸

Wireless Enabled Tablet Manufacturers		
Acer	Dell	Nook
Algiz	DRS Technologies, Inc.	OpenPeak, Inc.
Amazon	HTC	Samsung
Apple	LG	Sony
Cisco	Motorola	

Consumer demand for these tablets continues to grow. For example, the Apple iPad sold more than 9.25 million units in the third quarter of 2011 compared to only 3.27 million units during the same quarter in 2010.⁴⁹

⁴⁸ See, e.g., Hayley Tsukayama, *The Year the Tablet Market Grew Up*, The Washington Post (Nov. 23, 2011), available at http://www.washingtonpost.com/business/the-year-the-tablet-market-grew-up/2011/11/21/gIQA0xV0vN_story.html; Hayley Tsukayama, *Hot Tablets For Just About Everyone*, The Washington Post (Nov. 16, 2011), available at http://www.washingtonpost.com/wp-srv/special/business/tech_guide_tablets_index.html.

⁴⁹ Press Release, Apple, *Apple Reports Third Quarter Results* (July 19, 2011), available at <http://www.apple.com/pr/library/2011/07/19Apple-Reports-Third-Quarter-Results.html>; Press Release, Apple, *Apple Reports Third Quarter Results* (July 20, 2010), available at <http://www.apple.com/pr/library/2010/07/20Apple-Reports-Third-Quarter-Results.html>.

OTHER DEVICES

b. “No-Frills” Devices and Non-Contract, Pre-Paid Services

Wireless providers, driven by competitive forces in the wireless marketplace, have responded to consumer demands for alternative devices and plans. Providers continue to offer innovative “no-frills” devices like the Jitterbug.⁵⁰ Additionally, there is an increasing availability of non-contract and pre-paid services in the marketplace. The non-contract, pre-paid marketplace is defined by strong competition for customers. By mid-year 2011, there were more than 68.3 million wireless pre-paid and pay-as-you go subscriptions, equal to 21.2 percent of all estimated wireless connections and 21.7 percent of the U.S. population.⁵¹ Indeed, the demand for these devices and services has grown considerably and wireless providers are competing to serve these consumers.

As a result of competition in the wireless ecosystem, consumers have a choice of where and how to purchase handsets: from wireless providers, online stores such as Google for the Nexus One,⁵² and retailers such as Best Buy, offering mobile phones with plans, no-contract and

⁵⁰ *Jitterbug – Simple Cell Phones with No Contracts*, Greatcall, <http://www.greatcall.com/jitterbug>.

⁵¹ CTIA—The Wireless Association®, *Prepaid Wireless Service in the United States, A Snapshot from CTIA based on CTIA’s Semi-Annual Wireless Industry Survey Results, Mid-Year 2011 Results* (released November 2011).

⁵² *Phone Gallery*, Google, <http://www.google.com/phone/detail/nexus-one>.

pre-paid phones, and unlocked phones that can be used on any carrier's network.⁵³ Today, more carriers are offering unlocked handsets or offering the ability to use unlocked phones on their network giving consumers the ability to purchase handsets from other retailers.⁵⁴ Indeed, as a result of strong competition in the wireless ecosystem, consumers are benefitting from expanding choices among innovative devices, device manufacturers and device retailers.

VIRTUOUS CYCLE – OPERATING SYSTEMS

4. Consumer Demand for Innovative System Capabilities Fuels Competition Among Operating System Providers.

Increasingly, consumers and enterprise users expect mobile devices to fill the role of a growing number of devices – from traditional home computers to high definition video recorders to scanners to GPS devices to mobile wallets. Mobile operating system providers have

⁵³ See *No-Contract Phones*, Best Buy, <http://www.bestbuy.com/site/Mobile-Cell-Phones/No-Contract-Phones/abcat0801002.c?id=abcat0801002>; *Unlocked Mobile Phones*, Best Buy, <http://www.bestbuy.com/site/Mobile-Cell-Phones/Unlocked-Mobile-Phones/pcmcat156400050037.c?id=pcmcat156400050037>.

⁵⁴ See, e.g., Hayley Tsukayama, *Apple begins selling unlocked iPhone 4S*, The Washington Post (Nov. 11, 2011), available at http://www.washingtonpost.com/business/technology/apple-begins-selling-unlocked-iphone-4s/2011/11/11/gIQASVnICN_story.html (Apple has begun selling unlocked versions of its latest smartphone on its store..."); See *Unlocked Mobile Phones*, Best Buy, <http://www.bestbuy.com/site/Mobile-Cell-Phones/Unlocked-Mobile-Phones/pcmcat156400050037.c?id=pcmcat156400050037> (Best Buy offers numerous unlocked phones for sale.)

responded by developing innovative new platforms which accommodate these functions – from email and word processing to web browsing, digital photography / videography, scanning, GPS functionality and near field communications. These seemingly limitless capabilities rely on advanced software platforms which are necessary to run the sophisticated applications and devices.

Mobile operating systems are essential to advancement in mobile device technology because they manage both the hardware features of the device as well as the software applications. These platforms are the necessary interface between the hardware – antennas, camera, touch screen, thumbwheel and keyboards – and the software applications – email, text-messaging, web browsing, and GPS functionality. Through the virtuous cycle, as smartphones offer increasingly sophisticated features and functions, operating system providers must develop increasingly advanced operating systems.

The market for mobile operating systems remains robustly competitive. Competition between providers delivers choice and value to consumers, carriers, application developers, and other participants in the mobile wireless ecosystem. Currently, at least 11 companies in the U.S. wireless market compete to be the system provider of choice. These operating system providers and systems include – Research in Motion BlackBerry OS, QUALCOMM Binary Runtime Environment for Wireless (“BREW”), Open Handset Alliance (with Google) Android, Apple iPhone OS, Samsung bada, Sun Microsystems Java, Linux LiMo, Palm PalmOS and WebOS, Symbian and Microsoft Windows Mobile, as reflected in the chart below.

WIRELESS OPERATING SYSTEMS⁵⁵
Android (Open Handset Alliance)
Blackberry OS (Research in Motion)
BREW (Qualcomm)
Java (Sun Microsystems)
LiMo (Open Source Linux for Mobile)
OS iPhone (Apple)
Palm OS (Palm)
Samsung (bada)
Symbian OS (Nokia)
WebOS (Palm)
Windows Phone (Microsoft)

The fluid market share of each mobile operating system highlights the robust competitive pressures of the mobile wireless ecosystem. Indeed in the past year and a half Google/Android's market share has risen dramatically, illustrating the constantly changing nature of the mobile operating system ecosystem:

Top Smartphone Platforms			
Share of Smartphone Subscribers – Jan. 2010		Share of Smartphone Subscribers – Oct 2011	
RIM	43.0%	Google	46.3%
Apple	25.1%	Apple	28.1%
Microsoft	15.7%	RIM	17.2%
Google	7.1%	Microsoft	5.4%
Palm	5.7%	Symbian	1.6%

Source: comScore MobiLens⁵⁶

⁵⁵ CTIA *Wireless Industry Overview* at 13.

⁵⁶ Press Release, comScore, *comScore Reports January 2010 U.S. Mobile Subscriber Market Share* (Mar. 10, 2010), available at http://www.comscore.com/Press_Events/Press_Releases/2010/3/comScore_Reports_January_2010_U.S._Mobile_Subscriber_Market_Share; see also, *comScore Reports October 2011 U.S. Mobile Subscriber Market Share*, Newswire (Dec. 2, 2011), available at <http://www.prnewswire.com/news-releases/comscore-reports-october-2011-us-mobile-subscriber-market-share-134909833.html>.

Notably, none of the leading systems is owned by a wireless carrier. Moreover, the two newest operating systems – iPhone OS and Android – now hold more than 74 percent market share in the U.S. The original iPhone OS debuted in June 2007 and the initial Android system was released in October 2008, demonstrating the dynamic nature of the mobile wireless industry.

Competition in the mobile wireless ecosystem pushes operating system providers to regularly offer users new innovative features and applications. This year, Apple introduced iOS 5, providing users with at least 200 new features.⁵⁷ Google introduced Android 4.0 ("Ice Cream Sandwich") offering users a variety of innovative new features such as "Face Unlock."⁵⁸ With Face Unlock users can unlock their phone through face recognition technology.⁵⁹ It has also been a year of extensive changes and innovation for the Windows Phone operating system. In September 2011, Windows began its roll-out of Windows Phone 7.5 ("Mango") offering hundreds of new features to users.⁶⁰ Notably, Nokia, the world's largest maker of phones, entered into an agreement with Microsoft to use the Windows Phone software as its smartphone

⁵⁷ Press Release, *Apple Launches iPhone 4S, iOS 5, & iCloud* (Oct. 4, 2011), available <http://www.apple.com/pr/library/2011/10/04Apple-Launches-iPhone-4S-iOS-5-iCloud.html>.

⁵⁸ *Introducing Ice Cream Sandwich*, Android, <http://www.android.com/about/ice-cream-sandwich>.

⁵⁹ *Id.*

⁶⁰ Press Release, Windows, *'People-Centric' Windows Phone 7.5 Update Released* (Sept. 27, 2011), available at <http://www.microsoft.com/Presspass/Features/2011/sep11/09-27WindowsPhone75.msp>.

platform.⁶¹ This collaboration is expected to compete directly with Google Android and Apple iOS.⁶² With operating systems providers frequently offering new platform versions, software updates, and increased “application” functionality, this sector of the mobile ecosystem continues to flourish and be subject to vibrant competition driven by the diverse providers in the field.

VIRTUOUS CYCLE - CONTENT

APPLICATIONS

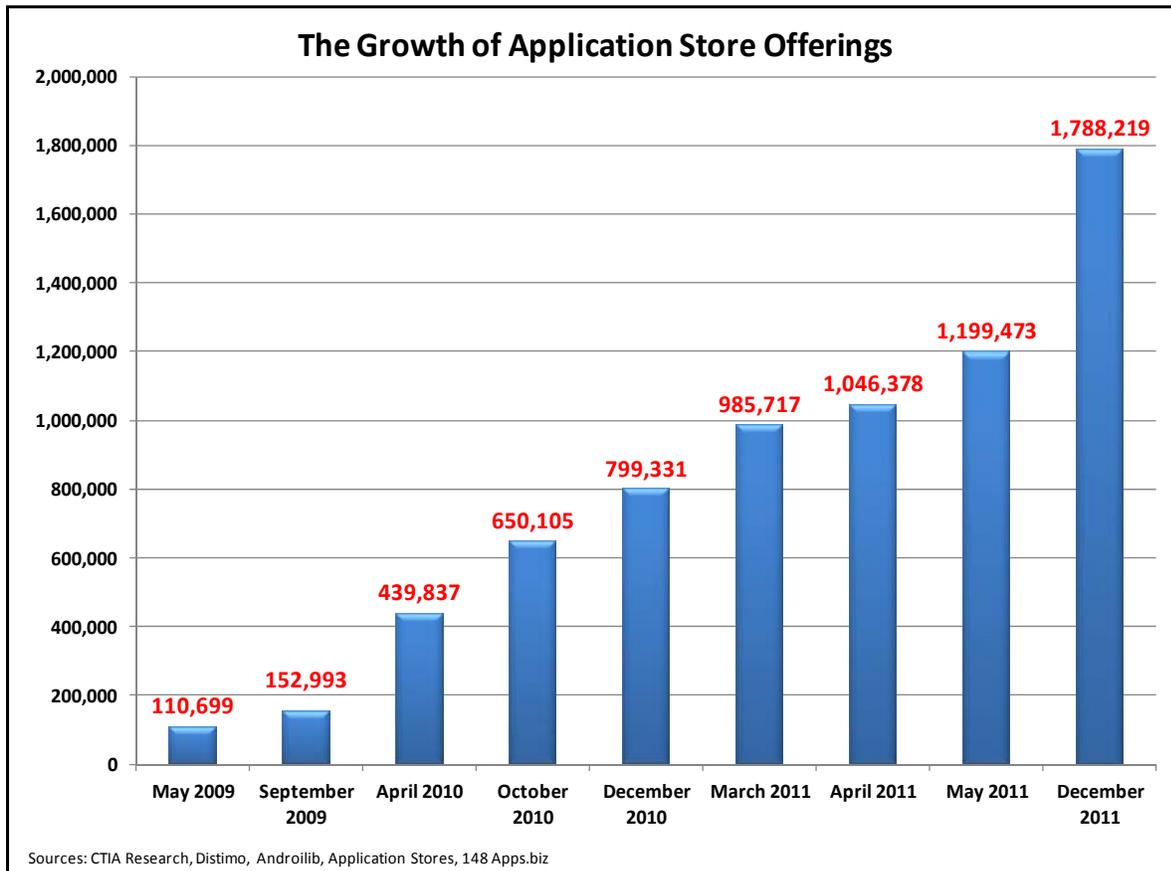
5. Competition In The Wireless Marketplace Fuels The Development Of Open Network Initiatives, Applications And Application Stores.
 - a. Growth In Applications And Application Stores

As competition increases in the application segment of the wireless ecosystem, so does the number of apps and application stores available to consumers. In May 2010, there were more than 240,000 app offerings available on 7 operating systems from 7 different stores. By May 2011, there were over 1.19 million applications on 11 operating systems offered by more than 27 different non-carrier stores.⁶³ As the following chart indicates, by December 1, 2011, there were nearly 1.79 million applications offerings available from these stores.

⁶¹ *Nokia, Microsoft in pact to rival Apple, Google*, CBC News, <http://www.cbc.ca/news/technology/story/2011/02/11/nokia-microsoft-smart-phone-apple-google.html>.

⁶² *Id.*

⁶³ *CTIA Wireless Industry Overview* at 9.



Individual application stores have seen tremendous growth as well. As of mid-year 2011, as shown in the chart below, the Apple iTunes App Store offered over 390,000 apps; the Android Market over 200,000 apps; and the Windows Mobile Marketplace over 11,000 apps for download. Now, nearing the end of 2011, there are over 40,000 apps available in the Windows Phone Marketplace with approximately 165 apps and games being added each day.⁶⁴ The

⁶⁴ Maisie Ramsay, *Report: 40,000 Apps for Windows Phone*, Wireless Week™ (Nov. 21, 2011), available at http://www.wirelessweek.com/News/2011/11/Mobile-Content-40000-Apps-Windows-Phone-Mobile-Applications/?et_cid=2333175&et rid=54167066&linkid=http%3a%2f%2fwww.wirelessweek.c

Marketplace launched in November 2010 and now has the highest download volume in the U.S.⁶⁵ Additionally, Apple's iTunes App Store now offers over 500,000 apps for iPhone and iPad users to purchase or download.⁶⁶ There are now six application stores that have more than 100,000 apps available each.

Application Store	Date Launched	Number of Applications Available
Handmark	Dec-00	5,177
Mobihand	2004	50,000
Getjar	Dec-04	384,253
Handster (acquired by Opera)	May-05	30,000
Appia (formerly PocketGear)	Jun-08	140,000
Apple iTunes App Store	Jul-08	450,000
Android Market	Oct-08	352,800
BlackBerry App World	Apr-09	42,893
Nokia Ovi Store	May-09	104,576
Palm App Catalog	Jun-09	7,062
Archos AppsLib	Sep-09	38,771
Windows Mobile Marketplace	Oct-09	1,579
Apple Store for iPad	Apr-10	117,495
Amazon Appstore for Android	Nov-10	15,487
Windows Phone Marketplace	Holiday Season 2010	35,000

Sources: Distimo, application store websites, trade reports

In conjunction with the growing number of apps and application stores, wireless carriers and other developers have experienced a rising demand for apps by consumers. In 2011,

om%2fNews%2f2011%2f11%2fMobile-Content-40000-Apps-Windows-Phone-Mobile-Applications%2f.

⁶⁵ Tiuri van Agten, *Windows Phone 7 Marketplace: One Year Later*, Distimo (November 2011), available at http://www.distimo.com/blog/2011_11_windows-phone-7-marketplace-one-year-later/.

⁶⁶ *Id.*

worldwide mobile application store revenue is projected to surpass \$15.1 billion, nearly triple the \$5.2 billion in revenue during 2010.⁶⁷ Many new applications utilize device data and video capabilities. It is expected that more than 60 percent of data volume in the network in 2011 will be some form of video communications, exemplifying tremendous growth and demand for innovative applications and content.⁶⁸ Video content continues to expand and evolve, moving far away from the broadcast model of delivering products on the broadcasters' schedule and, instead, delivering video when the consumer wants access, where they want access. In sum, competition in the virtuous cycle is demonstrated by the increased availability of application stores and apps as well as the growing demand and consumption of these apps by consumers.

b. Open Network Initiatives

Due to robust competition in the virtuous cycle, the U.S. wireless market has experienced tremendous growth in the number of application stores and the number of apps available for purchase and download by consumers. This growth has occurred in tandem with carrier "open development" initiatives and development resources. Carriers and device developers have continued their open development initiatives in 2010 and 2011. For example, AT&T announced the "Power Your Future" contest, a mobile application contest open to software developers and

⁶⁷ U.S. Department of Commerce, Bureau of Economic Analysis, *Industry Economic Accounts*, <http://www.bea.gov/industry> (last visited Nov. 30, 2011); Harold Furchtgott-Roth, *The Wireless Services Sector: A Key to Economic Growth in America 2008 Report* (Jan. 2009).

⁶⁸ News Release, Bytemobile, *Bytemobile Forecasts Video to Account for More than 60% of Total Mobile Network Traffic in 2011 – Strain on Capacity to Continue with LTE Roll-Outs* (Jan. 17, 2011), available at http://www.bytemobile.com/news-events/2011/archive_170111.html.

designed to promote applications that “deliver an environmental or energy efficient benefit”⁶⁹ and initiated a series of one-day “Hackathons” in cities across the country to bring together coders to learn about new technologies and create new mobile applications.⁷⁰ LG Mobile Phones announced a new LG Enterprise Application Partner Program which will help to develop enhanced smartphone applications and business solutions as well as give LG application developer partners better access to LG smartphones.⁷¹ Competition in the application market segment as well as consumer demand for applications will continue to drive carriers to promote open networks and application development.

WIRELESS “VERTICALS”

6. The Virtuous Cycle Has Produced Far Reaching Economic and Societal Benefits.

The virtuous cycle associated with the wireless industry is triggering innovation throughout the economy, in addition to the mobile ecosystem. Innovations associated with this

⁶⁹ Press Release, AT&T, *Customers, App Developers Invited To Power Your Future* (Aug. 2, 2011), available at <http://www.att.com/gen/press-room?pid=20543&cdvn=news&newsarticleid=32325&mapcode=innovation-releases|mk-att-sustainability>.

⁷⁰ Press Release, AT&T, *Developer "Hackathons" Set to Create Unique Apps for AT&T Mobile Customers* (Jul. 15, 2011), available at <http://www.att.com/gen/press-room?pid=20320&cdvn=news&newsarticleid=32158&mapcode=innovation-releases|mk-att-wireless-choice/op>.

⁷¹ Press Release, LG, *New LG Enterprise Partner Program to Deliver Enhanced Smartphone Applications, Business Solutions* (Mar. 23, 2010), available at <http://www.lg.com/us/press-release/article/new-lg-enterprise-partner-program-to-deliver-enhanced-smartphone-applications-business-solutions.jsp>.

virtuous cycle have produced significant economic and societal benefits in areas such as energy efficiency, education, healthcare, manufacturing, environment, and entrepreneurship. Listed below are highlights from some of these innovations.

a. Education

- Qualcomm partnered with the North Carolina Department of Public Instruction to use mLearning to improve math skills. The program – Project K-Nect – gave smart phones and service to ninth grade math students with content aligned to their teachers’ lesson plan objectives. The phones were used to supplement in-class teaching and allow students to collaborate with each other and contact after-school tutors to assist them with mastering a targeted skill set.⁷² A recent study of the project indicated that it was having a profound impact.⁷³ The study also concluded that mLearning apps are changing the way teachers think about their teaching.⁷⁴
- In another project, Qualcomm partnered with AT&T to provide HP notebooks to students, with access over AT&T’s network. The project offered online tutoring sessions, homework assistance, career guidance, and resume writing assistance.⁷⁵
- The University of Texas at Austin supports its College of Education Mobile Learning Initiative. This includes several projects related to location-based learning activities, the “affordances of mobile communications in teacher education,” and the use of smartphones in augmented reality.⁷⁶

⁷² See *Global Citizenship – Education*, Qualcomm, available at http://www.qualcomm.com.au/citizenship/wireless_reach/projects/education.html (last visited Dec. 1, 2011).

⁷³ *Project K-Nect Evaluation Report, 1-2* (July 2010), available at http://www.tomorrow.org/docs/Project_K-Nect_EvaluationReport_Final_Jul7.pdf.

⁷⁴ *Id.*

⁷⁵ See Press Release, Qualcomm, *Alliance for Digital Equality, AT&T, and Qualcomm Enable Learning Without Walls* (Oct. 1, 2009), available at <http://www.qualcomm.com/news/releases/2009/10/01/alliance-digital-equality-att-and-qualcomm-enable-learning-without-walls>.

⁷⁶ See, e.g., *Mobile Learning Initiative*, The University of Texas at Austin, available at <http://mobilelearningportal.org/node/2202>.

- Apple iPads are being used in school districts across the country. Zeeland Public Schools in Michigan is giving all of their high school students, or 1,800 total students, an iPad for school activity. The devices are used to aid in class teaching, at home studying, and even allow students to coach one another through collaborative iPad apps. Teachers believe that the new opportunities the iPad can offer will change the way teaching in the classroom is done and revolutionize current educational efforts.⁷⁷
- AT&T certified a mobile learning app in August 2008 that was designed to heighten the classroom experience and enhance learning at colleges and universities. The application, a Web-based solution that can be enabled using an AT&T smartphone, creates interactive student response systems that allow educators to go beyond traditional teaching methods. The application allows real-time student polling and offers in-depth analysis of responses. The solution can work within a traditional classroom environment or remotely for distance learning.⁷⁸ AT&T expanded this initiative in 2010 by awarding Abilene Christian University \$1.8 million to support mobile learning and in early 2011 opened a learning center designed to leverage traditional and mobile learning to improve the experience of students.⁷⁹

⁷⁷ Mark Smith, *iPads For Every High School Student in Michigan District*, Detroit Free Press (Sept. 20, 2011), <http://www.usatoday.com/tech/news/story/2011-09-20/schools-education-ipad-students/50480836/1>; *see also*, Winnie Hu, *Math that Moves: Schools Embrace the iPad*, NY Times (Jan. 4, 2011), <http://www.nytimes.com/2011/01/05/education/05tablets.html?pagewanted=all> (discussing different initiatives in numerous districts across the country, and showcasing some of the enhanced techniques an iPad can bring to the classroom); Megan O'Neil, *Catholic School uses iPad as Learning Device*, Glendale News-Press (Sept. 19, 2011), http://articles.glendalenewspress.com/2011-09-19/news/tn-gnp-0920-ipads_1_ipad-program-catholic-school-device.

⁷⁸ *See* Press Release, AT&T, *AT&T to Deliver Mobile Student Response Solution, Enhancing Higher Education Classroom Experience Web-Based Application Certified by AT&T, Enabling Real-Time Polling and Distance-Learning Interaction Using Mobile Devices* (Aug. 26, 2008), available at <http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=26035>.

⁷⁹ *See* Press Release, Abilene Christian University, *AT&T awards \$1.8 million contribution to ACU to expand mobile learning initiative* (May 13, 2010), available at http://acuonline.acu.edu/media-center/2010/att_mobile_learning.asp; *see* Press Release, AT&T, *AT&T Learning Studio Opens at Abilene Christian University* (Feb. 28, 2011), available at <http://www.att.com/gen/press-room?pid=19195&cdvn=news&newsarticleid=31644&mapcode=wireless-networks-general|wireless>. Abilene Christian University has also published its *ACU 2009-10 Mobile-Learning Report* which reviews the success and perceptions of their mobile learning initiative. *See ACU 2009-10 Mobile-Learning Report* available at <http://www.acu.edu/technology/mobilelearning/documents/ACU2009-10MobileLearningReport.pdf>.

- The Joan Ganz Cooney Center at Sesame Workshop and Nokia Research Center formed a research collaboration to examine improving literacy through mobile media. The first project to come out of the collaboration was Story Visit, a distance learning tool that allows children to read stories with relatives who are far away. It combines video conferencing with connected storybooks, when the grownup turns the page the child's page turns also, allowing children and grownups to read together even when not in the same place.⁸⁰
- Sprint provided students at the Myron B. Thompson Academy with 3G/4G mobile hotspot devices to guarantee their access to the network. The plan will allow teachers to better track student work and increase accessibility to course content and materials.⁸¹
- This April, AT&T announced the release of Rave Campus Messenger, a web-based notification system designed to foster efficient communications within colleges and universities. The platform allows users to distribute time-sensitive information and also includes features beyond basic messaging such as polling, reporting, and response features.⁸²
- Blackboard Education has a mobile application for the iPad that allows users to collaborate and work on assignments with other members of their selected courses.⁸³
- The Homework Management System mobile application, developed through a partnership between Nokia and Stanford University, allows student-created multimedia inquiry items which can be tagged and rated by peers to indicate how relevant or useful the item is to their own learning.⁸⁴

⁸⁰ See *Story Visit*, The Joan Ganz Cooney Center at Sesame Workshop, available at <http://www.joanganzcooneycenter.org/Initiatives-34.html> (last visited Dec. 1, 2011).

⁸¹ Press Release, Sprint, *Sprint Brings Connected Internet Mobility to Myron B. Thompson Academy Students in Oahu* (Aug. 09, 2010), available at http://newsroom.sprint.com/article_display.cfm?article_id=1592.

⁸² Press Release, AT&T, *AT&T Enhances Campus Communications with New Messaging Platform* (Apr. 12, 2011), available at <http://www.att.com/gen/press-room?pid=19621&cdvn=news&newsarticleid=31795&mapcode=enterprise|mk-mobility-solutions>.

⁸³ *Blackboard Mobile Learn*, Apple Store, <http://itunes.apple.com/us/app/blackboard-mobile-learn/id364252826?mt=8> (last visited Dec. 1, 2011).

⁸⁴ *Homework Management System Mobile Application*, Nokia/Stanford University Mobile Learning Research (Feb. 20, 2011), <http://nokia.stanford.edu/?p=59>.

- Google partnered with MIT to create a center dedicated to the study of mobile learning. The center will focus on designing and studying new mobile technologies to enable people to learn anywhere. It will also focus on expanding “App Inventor for Android,” a programming system that makes it easy for learners and students to create educational mobile apps for Android phones.⁸⁵
- Partnering with universities around the world, Apple created “iTunes U,” a segment of iTunes that has over 350,000 free course lectures, videos, readings, and podcasts from numerous institutions.⁸⁶
- Mobile learning is not just used in the traditional classroom environment, but it is also used by businesses to teach their employees. A recent survey showed that mobile learning solutions were used by approximately 80% of the organizations surveyed.⁸⁷
- Museums are tapping into mobile solutions to enhance their learning experiences. For instance, the American Museum of Natural History in New York offers a mobile application which provides information and turn-by-turn directions to specific points of interests in the museum.⁸⁸
- Cisco offers a mobile learning app that allows users to download different modules related to different technical issues, like configuring routing interfaces or working with enterprise systems. The app is available on most major device platforms.⁸⁹

⁸⁵ Hal Abelson, *A New MIT Center for Mobile Learning, With Support from Google*, Google Research Blog (Aug. 16, 2011), <http://googleresearch.blogspot.com/2011/08/new-mit-center-for-mobile-learning-with.html#!/2011/08/new-mit-center-for-mobile-learning-with.html>.

⁸⁶ *Learning with iPod Touch and iPhone*, Apple, <http://www.apple.com/education/ipodtouch-iphone/> (last visited Dec. 1, 2011).

⁸⁷ Laura Chamberlain, *Virtual learning used by three-quarters of employers*, Personnel Today (Nov. 17, 2011), <http://www.personneltoday.com/articles/2011/11/17/58154/virtual-learning-used-by-three-quarters-of-employers.html>.

⁸⁸ Peter Panepento, *Using Mobile Phones to Guide Museum Visitors*, The Chronicle of Philanthropy (June 29, 2010), <http://philanthropy.com/blogs/social-philanthropy/using-mobile-phones-to-guide-museum-visitors/25880>.

⁸⁹ *M-Learning*, Cisco, https://learningnetwork.cisco.com/community/learning_center/m-learning.

b. Mobile Health

- The Text4Baby program provides free pre- and post-natal health tips for expectant mothers and through the first year of a baby's life. Through a partnership with CTIA members, the entire costs of the texts received are free. Subscribers without text messaging plans will not be charged for the texts associated with the Text4Baby initiative.⁹⁰
- WebMD Mobile, one of the most popular health applications, is a free application that contains first aid information and a symptom checker.⁹¹
- Sutter Health provides iTriage, a free mobile health app developed by physicians. iTriage combines health resources with GPS and mapping technology to point users toward the care needed.⁹²
- Wheelmap, an iPhone app for wheelchair users, finds routes for wheelchair users. The user can also see which public transportation hubs are wheelchair accessible and where elevators are located.⁹³
- GreatCall recently released an iPhone application called MedCoach. The app gives users the ability to monitor their prescriptions, a contact list for nearby doctors, and nearby pharmacy locations. The app also has a 24/7 email service that links to GreatCall's HIPPA compliant customer support team.⁹⁴
- The MedMinder Systems' wireless enabled pillbox has been deployed in a pilot program by Harvard Pilgrim Health Care for use by patients with chronic kidney disease.⁹⁵ The

⁹⁰ *About Text4Baby*, <http://www.text4baby.org/index.php/about> (last visited Dec. 1, 2011).

⁹¹ *See Top 10 Health Applications for iPhone Users*, Tech Episode (Oct. 19, 2010), available at <http://techepisode.com/top-10-health-applications-iphone-users>.

⁹² *Health App for Your Smartphone*, Sutter Health, available at <http://www.sutterhealth.org/itriage/index.html>.

⁹³ *Wheelmap*, Applications Store, <http://itunes.apple.com/us/app/wheelmap/id399239476?mt=8>.

⁹⁴ Press Release, GreatCall, GreatCall Announces MedCoach App, Available in Apples App Store (June 28, 2011), available at <http://www.businesswire.com/news/home/20110628005752/en/GreatCall%20AE-Announces-MedCoach%E2%84%A2-App-Apple%E2%80%99s-App-Store>.

⁹⁵ *See Brian Dolan, Harvard Pilgrim to pilot wireless pillbox for CKD patients*, MobiHealthNews (Aug. 31, 2009), available at <http://mobihealthnews.com/4153/harvard-pilgrim-to-pilot-wireless-pillbox-for-ckd-patients>. *See also*, Brian Dolan, *AT&T inks deal to*

wireless pillbox “lights up, sounds alarms, places phone calls and even emails users for alerts and notifications” regarding their medication regime.⁹⁶

- The National Institute on Aging and the National Cancer Institute funded the creation of eMedMobile, a smartphone application that works with “smart labels” on prescription medication bottles and sends alerts to caregivers when a medication is skipped.⁹⁷
- The Telcare Blood Glucose Monitoring System is a glucose meter that wirelessly transmits a patient’s glucose readings to their doctor’s electronic medical records.⁹⁸
- The Vena-enabled inhaler reminds patients to take their medication and sends compliance reports to the doctor. A wireless peak flow meter for asthma combines monitoring technology with wireless communication. Physicians can be alerted when a patient falls below respiratory safe levels or when a patient stops testing.⁹⁹
- Sutter Health provides a MyChart app for its My Health Online Users. The app allows patients to send secure emails to their doctor, view most lab results and upcoming appointments, receive preventive care reminders, and view medications, allergies, immunizations and more.¹⁰⁰
- Even major carriers are working to advance mobile healthcare; for instance, Verizon recently launched a pharmacy app that gives customers medication reminders, drug interaction warnings, and out-of-pocket costs for prescription drugs.¹⁰¹

provide connectivity for GlowCaps, MobiHealthNews (Oct. 9, 2009), available at <http://mobihealthnews.com/4839/att-inks-deal-to-provide-connectivity-for-glowcaps/>.

⁹⁶ *Id.*

⁹⁷ *CA Health Study* at 12.

⁹⁸ *Telcare, Inc. Exhibits First Cellular-Enabled Glucose Meter at Joint Meeting of FDA and FCC*, Earth Times (July 28, 2010), available at <http://www.telcare.com/wp-content/uploads/2011/03/press0728103.pdf>.

⁹⁹ Dong Ngo, *Wireless asthma inhaler links patient, doctor*, CNET (May 6, 2009), available at http://news.cnet.com/8301-17938_105-10234750-1.html.

¹⁰⁰ *New MyChart App for My Health Online Users*, Sutter Health, available at http://www.sutterhealth.org/myhealthonline_app/index.html (last visited Dec. 1, 2011).

¹⁰¹ Sara Jackson, *Verizon Wireless Debuts Cost-Conscious Pharmacy App*, Fierce Mobile Healthcare (May 18, 2011), <http://www.fiercemobilehealthcare.com/story/verizon-debuts-cost-conscious-pharmacy-app/2011-05-18>.

- The recently released Jawbone Up is a wrist band that syncs with an accompanying mobile application. The application can be used to track a user's movement, sleep patterns and eating habits.¹⁰²
- The Department of Veterans Affairs partnered with American Well to deploy a telehealth program to veterans across the country, particularly in rural areas. The initiative will allow users to have online consultations via video, text, and phone messaging.¹⁰³
- Announced at International CTIA WIRELESS 2011®, the Comfort Zone tracking service allows users to track and check in on Alzheimer's patient through their Sprint phone. The service can be programmed check in at certain times and send notifications via text or email.¹⁰⁴
- Walgreens started an initiative where pharmacy customers are reminded via text message when their prescription is due for a refill. Customers can also request a refill via text message.¹⁰⁵
- St. Jude recently upgraded their Merlin home patient monitoring system. The system monitors a patient's implantable medical devices and transmits the information back to physicians wirelessly and securely. The device also can be set to alert physicians if the device is triggered by a certain medical event.¹⁰⁶

¹⁰² Mark Smith, *Jawbone Up Nudges You to Think Healthy*, Detroit Free Press (Nov. 15, 2011) available at <http://yourlife.usatoday.com/health/story/2011-11-15/Jawbone-Up-nudges-you-to-think-healthy/51212640/1>.

¹⁰³ Chris Gullo, *VA Launches Online Consultations with American Well*, Mobihealthnews, (Nov. 8, 2011), <http://mobihealthnews.com/14531/va-launches-online-consultations-with-american-well/>.

¹⁰⁴ Press Release, Omnilink, *Omnalink Systems Extends the Alzheimer's Association Comfort Zone Location Monitoring Solution* (March 22, 2011), available at http://www.omnilink.com/Omnalink_News/PressReleases/PR032211.html.

¹⁰⁵ Press Release, Walgreens, *Prescription Refill Text Alerts Deliver Important Reminders for Mobile Users and Make Ordering as Simple as a Reply* (Oct. 06, 2011), available at http://news.walgreens.com/article_display.cfm?article_id=5475.

¹⁰⁶ *Merlin@home Transmitter*, St. Jude Medical, <http://www.sjmprofessional.com/Products/US/CRT-Systems/Merlin-at-home-Transmitter.aspx>.

- T-Mobile and Meridian Health offer a sleep monitoring system. The user wears an armband while sleeping and the information is synched to a smartphone via NFC.¹⁰⁷
- Aetna Florida launched a new application for doctor's in their network that will work on tablets or smartphones. The application gives physicians updates about new health information and also allows them to participate in e-prescribing services.¹⁰⁸
- Athens Regional health Services, an Athens Georgia Hospital, recently started using QR codes to allow patients to schedule appointments. The codes allow patients to schedule a visit without needing access to a computer or remembering a lengthy website name.¹⁰⁹
- The FDA recently cleared an iOS powered blood pressure monitor, which is already on the market. The device, produced by Withings, has a blood pressure cuff that attaches into the bottom of an iPhone which serves as the display readout.¹¹⁰

c. Smart Grid

- Sprint Nextel and Grid Sentry LLC recently announced the launch of the GS-200 Line Sentry to carry smart grid data regarding the electric transmission grid over the Sprint 3G network.¹¹¹ This device will provide detailed information about the transmission grid and enable utility operators to make decisions based on real-time data.¹¹²
- T-Mobile also developed a SIM card specifically designed for M2M applications, including smart grid applications. The M2M SIM is much smaller than traditional SIM

¹⁰⁷ Press Release, T-Mobile, *Meridian Health and iMPak Health Tap T-Mobile to Deploy Near Field Communication Technology for Mobile Health Application* (Oct. 3, 2011) available at <http://newsroom.t-mobile.com/articles/t-mobile-enables-NFC-for-mobile-health>.

¹⁰⁸ Press Release, Aetna, *Aetna Launches New Mobile Health Care Tools for Doctors* (Aug. 11, 2011) available at http://www.aetna.com/news/newsReleases/2011/0811_PrematicsPilot.html.

¹⁰⁹ Brian Dolan, *Hospital Uses QR Codes for Appointment Booking*, *Mobihealthnews* (Aug. 8, 2011) available at <http://mobihealthnews.com/12385/hospital-uses-qr-codes-for-appointment-booking/>.

¹¹⁰ Withings Blood Pressure Monitor, <http://www.withings.com/en/bloodpressuremonitor?gclid=CPKEv-XUwKwCFYtR7AodbwFjrw> (last visited Dec. 1, 2011).

¹¹¹ Press Release, Sprint, *Grid Sentry Line Sentry utilizes the Sprint 3G Network* (Jan. 31, 2011), available at http://newsroom.sprint.com/article_display.cfm?article_id=1784.

¹¹² *Id.*