

Congress of the United States
U.S. House of Representatives
Committee on Small Business
2361 Rayburn House Office Building
Washington, DC 20515-6515

To: Members, Committee on Small Business
From: Committee Staff
Date: February 10, 2014
Re: Full Committee Hearing: “*Building on the Wireless Revolution: Opportunities and Barriers for Small Firms*”

On Tuesday, February 11, 2014, at 1:00 p.m. in Room 2360 of the Rayburn House Office Building, the Committee on Small Business will meet for a hearing to examine applications¹ for mobile communication devices that can be used to remotely control other devices, such as home appliances, automobiles, and farm equipment. By investigating these applications, the hearing also will review new devices created by small businesses that can be controlled by mobile device apps. The hearing will provide members with the opportunity to hear from small businesses that are at the forefront of these technological advances, the potential economic benefits that may arise from widespread adoption of mobile device applications to remotely control other machines, and the potential barriers to growth and development of this innovative technology.

I. Economic Growth and the Wireless Device and App Industry

As a number of industries in the broader economy contend with limited economic growth, the wireless technology industry has been an exception. According to the technology firm Cisco, the demand for mobile data grew by 62 percent in 2012 compared to the previous year, and is forecast to increase ninefold by 2017, an annual compound rate of 56 percent.² This rapid growth in the utilization of wireless devices and associated apps has led to the creation of over 500,000 new jobs in the United States,³ many of them with small businesses.⁴ Overall the

¹ An “application” or “app” (the terms are used interchangeably) is a piece of software program intended to be used on a mobile device. See *In Re: Matter of Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of the Competitive Market Conditions with Respect to Mobile Wireless, Including Commercial Mobile Services*, WT Docket No. 09-66, 25 Fcc Rcd 11,407, 11,502 n. 454 (2010) (internal citations omitted).

² http://www.cisco.com/web/solutions/sp/vni/vni_mobile_forecast_highlight/index.html#~Country.

³ MICHAEL MANDEL & JUDITH SCHERER, *THE GEOGRAPHY OF THE APP ECONOMY* 5 (2012) (research sponsored by CTIA and the Applications Developers Alliance), available at http://files.ctia.org/pdf/The_Geography_of_the_App_Economy.pdf.

⁴ See AMY CRAVEN, *A DEMOGRAPHIC AND BUSINESS MODEL ANALYSIS OF TODAY’S APP DEVELOPER* 13 (2012) (research sponsored by Applications Developers Alliance), available at <http://appdevelopersalliance.org/files/pages/GigaOMApplicationDevelopers.pdf> (noting that more than two-thirds of app developers either work as sole proprietors or in firms with up to 3 employees).

wireless industry is valued at \$146.2 billion and accounts for the employment (directly and indirectly) of about 3.8 million people.⁵

Even these statistics do not represent the entire impact of the wireless industry on economic development. Wireless technology also represents an important avenue for the creation of new businesses by entrepreneurs.⁶ These entrepreneurs will lead in the development of innovative apps that may revolutionize the utilization of technology by businesses and consumers.

II. Innovations in Wireless Technology and the Internet

A recent report estimates that one trillion devices and machines may be connected to the Internet across the globe by 2025.⁷ This is estimated to have a global economic impact of approximately \$36 trillion.⁸ Some of the applications for connecting devices and the new devices were displayed at the most recent Consumer Electronics Show (CES). There one could see home appliances controlled remotely by mobile phones, t-shirts that track the wearer's heart rate,⁹ and automobiles that are less about a driving experience and more about keeping people connected as they sit in traffic during their daily commute.¹⁰

One prominent example of the innovations in wireless technology involves the products of Nest. Started in a garage, Nest developed smoke detectors and thermostats that can be controlled by any Wi-Fi enabled device, including smartphones.¹¹ From those humble beginnings, Nest grew into a firm of more than 300 employees and was recently purchased by Google for the "modest" sum of \$3.2 billion. Obviously, given the penetration of mobile devices and their potential as evidenced by the companies exhibiting at the CES, Nest may represent the tip of a very large iceberg.

⁵ RECON ANALYTICS, LLC, THE WIRELESS INDUSTRY: THE ESSENTIAL ENGINE OF THE US ECONOMIC GROWTH 8, 14 (2012), available at <http://reconanalytics.com/wp-content/uploads/2012/04/Wireless-The-Ubiquitous-Engine-by-Recon-Analytics-1.pdf>. The global value of the wireless industry is estimated to be \$195 billion of which all but about \$50 billion is retained in the United States. *Id.* at 8.

⁶ IAN HATHAWAY, KAUFFMAN FOUNDATION, TECH STARTS: HIGH-TECHNOLOGY BUSINESS FORMATION AND JOB CREATION IN THE UNITED STATES 8 (2013), available at http://www.kauffman.org/~media/kauffman_org/research%20reports%20and%20covers/2013/08/bdstechstartsreport.pdf.

⁷ MCKINSEY GLOBAL INSTITUTE, DISRUPTIVE TECHNOLOGIES: ADVANCES THAT WILL TRANSFORM LIFE, BUSINESS AND THE GLOBAL ECONOMY 5 (2013), available at http://www.mckinsey.com/insights/business_technology/disruptive_technologies [hereinafter McKinsey Report].

⁸ *Id.* It is important to note that the economic impact estimated by McKinsey involves industrial, public sector, and health care providers' use of devices interconnected through Internet and controlled by mobile device applications. *Id.* at 6. Since the McKinsey Report does not include consumer utilization of this interconnectedness, the overall global impact may be significantly larger. There also are some significant caveats to the McKinsey report including that the dollar value does not have a time frame estimate. Furthermore, by way of comparison, the total gross world product (aggregation of individual country gross domestic product) for 2012 was about \$71.62 trillion. <https://www.cia.gov/library/publications/the-world-factbook/geos/xx.html>.

⁹ <http://www.technewsworld.com/story/79771.html>.

¹⁰ *Id.* Advances in wireless devices and the automobile include vehicle-to-vehicle communication, in-dash access to various mobile applications (substituting the car's systems for the handheld mobile communication device owned by the driver), and self-driving vehicles. *Id.* McKinsey estimates that one billion vehicles may be equipped with various types of wireless devices and apps resulting in an economic impact of \$4 trillion. McKinsey Report, *supra* note 7, at 5.

¹¹ <http://www.pcworld.com/article/2087520/why-google-paid-32-billion-for-thermostat-startup-nest.html>.

III. Small Business Utilization of Wireless Apps and Technologies

Small businesses are not just at the forefront of developing wireless apps and technologies but also are rapidly adopting these innovations to improve their operations and productivity¹² – be they in rural areas or dense urban environments or somewhere in between. Farmers are using wireless technology to monitor soil conditions to pinpoint the most productive areas of their farms¹³ thereby increasing their returns by up to \$100 per acre.¹⁴ Managers in the transportation and logistics industries utilize tracking sensors accessed by both mobile and non-mobile devices to provide real-time status on shipments and improve delivery efficiency (which reduces, among other things, fuel consumption).¹⁵ In dense urban areas, coffee shops provide free Wi-Fi to their customers while using wireless transaction payment systems, like those developed by Square, Inc.¹⁶

In addition to playing an important role in the development of wireless innovation, small businesses are benefitting by utilizing these new products.¹⁷ A recent study states that the emergence of apps and mobile devices helps firms directly engage with their customers to improve productivity and services.¹⁸ The study also estimates that users will interact with more than 100 apps per day, generating more than \$77 billion in revenue for that industry. It goes without saying that mobile apps will play an ever-increasing role in overall economic growth.¹⁹

IV. Hurdles to Further Development

Given the promise of wireless technology and the economic benefits it imbues, it is important to understand and reduce obstacles to growth in the industry. One of the top concerns expressed by the wireless technology sector²⁰ is ensuring adequate access to electromagnetic spectrum.²¹ In addition, many of these devices could face regulatory barriers from various federal, state, and local governments, depending on the size, scope, and use of the product.

¹² <http://www.connectedworldmag.com/latestNews.aspx?id=NEWS130130144313980>.

¹³ <http://www.washingtonpost.com/sf/brand-connect/wp/2013/03/11/u-s-farmers-grow-wireless/>.

¹⁴ http://www.agweb.com/farmjournal/article/the_bottom_line_the_value_of_precision_NAA_Moe_Russell/.

¹⁵ <http://www.zdnet.com/the-business-benefits-of-machine-to-machine-7000008924/>.

¹⁶ <http://www.connectedworldmag.com/latestNews.aspx?id=NEWS130130144313980>.

¹⁷ *M2M Empowers the Small Business*, CONNECTED WORLD MAG., January 30, 2013, available at

<http://www.connectedworldmag.com/latestNews.aspx?id=NEWS130130144313980>.

¹⁸ <http://www.gartner.com/newsroom/id/2654115>.

¹⁹ *Id.*

²⁰ *Avoiding the Spectrum Crunch: Growing the Wireless Economy Through Innovation: Hearing Before the Subcomm. On Technology and Innovation of the House Comm. On Science, Space and Technology*, 112th Cong., 2d Sess. (statement of Christopher Guttman-McCabe 2 (2012), available at

<https://science.house.gov/sites/republicans.science.house.gov/files/documents/hearings/HHRG-112-SY19-WState-CGMcCabe-20120418.pdf>.

²¹ Electromagnetic spectrum is commonly referred to as “radio frequency spectrum,” “wireless spectrum,” and also “spectrum.” Spectrum is the range of electromagnetic radio that transmits data, sound, and video across the United States. The total amount of spectrum is limited by the laws of physics. Further limitations are imposed by the federal government. As a result, spectrum is a finite resource.

Overall, wireless devices depend on utilization of both licensed²² and unlicensed²³ spectrum to communicate and operate their devices efficiently. The Federal Communications Commission (FCC) assigns spectrum by frequency bands for certain services, such as public safety, broadcasting, radio, and unlicensed services.²⁴ As demand for wireless devices and services increase, those unique frequency bands used by wireless devices may become crowded, which causes either interference among devices or slow transmission of data, or a combination of both.

In an effort to meet the increasing demand for spectrum, Congress and the Administration have developed policies aimed at reallocating usage of spectrum to make it more available for use by wireless broadband and devices. In June 2010, President Obama issued a memorandum directing the NTIA to work in coordination with the FCC to make 500 megahertz of federal and nonfederal spectrum available.²⁵ In February 2012, Congress passed the Middle Class Tax Relief and Job Creation Act of 2012,²⁶ which provided the FCC with the authority to auction unused spectrum to wireless providers.²⁷ The law also granted the FCC authority to conduct a one-time incentive auction in which broadcast stations can relinquish their previously allocated spectrum for the FCC to then auction.²⁸ The Congressional Budget Office estimates the new incentive auctions could result in \$27 billion in federal receipts.²⁹ The FCC Chairman has set the goal of completing the incentive auction³⁰ in the middle of 2015.³¹ Furthermore, in June 2013, President Obama issued a follow-up memorandum that directed the federal agencies to identify new ways to share unused spectrum.³² The wireless industry welcomed the federal government's efforts to expedite the process to bring more unused spectrum to the commercial market.³³

Along with limited access to spectrum, small innovators could experience a number of regulatory barriers at the federal, state and local level. The type of industry and specific use of the

²² Licensed spectrum is defined as the portion of spectrum that is specifically licensed and regulated by the FCC to a specific entity or carrier. Some licensed frequencies can be shared, leased, or transferred. <http://www.fcc.gov/encyclopedia/accessing-spectrum>.

²³ Unlicensed spectrum is defined as the part of the spectrum that does not require a license to operate and allows sharing with licensed services. <http://www.fcc.gov/encyclopedia/accessing-spectrum>.

²⁴ The FCC is the federal agency responsible for managing non-federal spectrum to ensure that all wireless communications can co-exist. The National Telecommunications and Information Administration (NTIA), within the Department of Commerce, is responsible for managing spectrum owned by the federal government.

²⁵ <http://www.whitehouse.gov/the-press-office/presidential-memorandum-unleashing-wireless-broadband-revolution>.

²⁶ Pub. L. No. 112-96, 126 Stat. 156 (2012).

²⁷ *Id.* at Tit. VI, § 6402, 126 Stat. at 224.

²⁸ *Id.* at Tit. VI, § § 6402-03, 126 Stat. at 224-30.

²⁹ THE CONGRESSIONAL BUDGET OFFICE, COST ESTIMATE FOR AMERICAN JOBS ACT OF 2011, available at http://www.cbo.gov/sites/default/files/cbofiles/attachments/s1549_0.pdf.

³⁰ Incentive auctions are a voluntary, market-based means of repurposing spectrum by encouraging licensees to voluntarily relinquish spectrum usage rights in exchange for a share of the proceeds from an auction of new licenses to use the repurposed spectrum. <http://www.fcc.gov/topic/incentive-auctions>.

³¹ Posting of Tom Wheeler to Official FCC Blog, <http://www.fcc.gov/blog/path-successful-incentive-auction-0> (December 6, 2013).

³² <http://www.whitehouse.gov/the-press-office/2013/06/14/presidential-memorandum-expanding-americas-leadership-wireless-innovatio>.

³³ *Equipping Carriers and Agencies in the Wireless Era: Hearing Before the Subcomm. On Communications and Technology of the House Comm. Of Energy and Commerce*, 113th Cong., 1st Sess. (statement of Chris Guttman-McCabe 2 (2013), available at <http://docs.house.gov/meetings/IF/IF16/20130627/101059/HHRG-113-IF16-Wstate-Guttman-McCabeC-20130627.pdf>).

technology are factors in the size and scope of potential regulations. The FCC sets the standards and regulates communication devices, including part 15 devices,³⁴ while other federal agencies establish regulations specific to industries within their jurisdiction. For example, the Food and Drug Administration regulates wireless medical devices,³⁵ including medical apps,³⁶ to maintain the safety and protection of the individual users. The United States Highway and Transportation Safety Administration establishes the standards for vehicle-to-vehicle communications technology, including the development of autonomous vehicles.³⁷ In addition, the Federal Aviation Administration regulates the use of unmanned aerial vehicles (UAVs), which many farmers see as a revolutionary product.³⁸ As these new industries are complex and dynamic in nature, it is important for regulators to strike a balance that offers necessary consumer protections, but does not impede innovation and economic opportunity.

V. Conclusion

The innovation and growth in wireless technology continues to expand at rapid pace. These advancements have the potential to transform the fundamental way small businesses operate and compete in the economy. However, to continue this growth and its related economic benefits, the federal government must manage spectrum to meet the growing demands of the wireless industry and its consumers, including small businesses. In addition, when considering new rules and regulations for this industry, policymakers should ensure these changes do not unduly diminish the incentive for small businesses to innovate and develop new products.

³⁴ 47 C.F.R. Part 15. The FCC has rules, known as Part 15 rules, to limit the potential for harmful interference by low-power non-licensed transmitters. Part 15 rules cover both products that unintentionally and intentionally emit radio frequency, including on devices that may share licensed or unlicensed spectrum. Small technology manufacturers must ensure that their innovative products meet the FCC Part 15 compliance standards and do not cause interference. Examples of Part 15 devices include remote control cars, garage door openers, and wireless microphones.

³⁵ <http://www.fda.gov/MedicalDevices/ProductsandMedicalProcedures/ConnectedHealth/WirelessMedicalDevices/default.htm>.

³⁶ *Mobile Medical App Entrepreneurs: Changing the Face of Health Care: Hearing Before the Subcomm. On Health and Technology of the House Comm. On Small Business*, 113th Cong., 1st Sess. (2013), available at http://smallbusiness.house.gov/uploadedfiles/6-27-2013_memo.pdf.

³⁷ <http://www.nhtsa.gov/About>.

³⁸ <http://farministrynews.com/precision-farming/take-sky-high-tech-field-scouting?page=3>.