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Public Interest Comment on *Fostering Innovation and Investment in the Wireless Communications Market*¹

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The Regulatory Studies Program (RSP) of the Mercatus Center at George Mason University is dedicated to advancing knowledge of the impact of regulation on society. As part of its mission, RSP conducts careful and independent analyses employing contemporary economic scholarship to assess rulemaking proposals from the perspective of the public interest. Thus, this comment on the Federal Communications Commission's (FCC's) Wireless Innovation Notice of Inquiry² does not represent the views of any particular affected party or special interest group, but is designed to assist the commission as it develops a framework for assessing wireless innovation.

I. Introduction

In the Notice, the commission seeks specific data on technology, investment, and innovation in the wireless market. Market participants and other parties are better suited to provide this information. However, the commission also “seek[s] to understand better the factors that encourage innovation and investment in wireless[.]”³ In this we would like to offer the commission some broad concepts about what drives innovation and how it could help facilitate that innovation. We offer the following suggestions:

- **To the greatest extent possible, license spectrum for flexible use.** To increase access to spectrum, the commission should consider reallocating as much spectrum as possible to flexible use. In this way, licensees will be given an incentive to make more efficient and better use of their spectrum.

¹ Prepared by Jerry Brito and Jerry Ellig, senior research fellows, Mercatus Center at George Mason University. This comment is one in a series of Public Interest Comments from Mercatus Center's Regulatory Studies Program and does not represent an official position of George Mason University.

² Federal Communications Commission, *Fostering Innovation and Investment in the Wireless Communications Market*, GN Docket No. 09-157 (released August 27, 2009) [hereinafter “Innovation NOI”].

³ Innovation NOI at ¶ 1.

- **To the greatest extent possible, make spectrum licenses tradable.** Just as important as the initial assignment of spectrum, creating the conditions that allow secondary markets in spectrum to emerge are vital to fostering innovation. Given that so much of the most desirable spectrum is already licensed, the best way to ensure that innovators have access to spectrum is to make all licenses easily tradable.
- **Closed proprietary mobile platforms do not pose a threat to innovation.** Closed and open platforms will innovate in different ways and will make offerings that appeal to different parts of the market. Competition might not guarantee that all platforms are open if a sufficiently large segment of consumers is satisfied with a closed (but perhaps lower-cost or higher-quality) platform. But competition will ensure that an open platform is available as long as a sufficient number of consumers want and are willing to pay for it.

II. Access to Spectrum

One of the major issues the commission raises in the Notice is making spectrum available for new uses.⁴ The commission notes that “provision of wireless services is critically dependent on having access to spectrum,” and asks “what are the most innovative ideas relating to spectrum that the Commission should consider?”⁵

As Chairman Genachowski noted in his recent speech at the Brookings Institution, the Internet is such an incredible engine of innovation because its architecture allows “anyone to contribute and to innovate without permission.”⁶ He said:

Historian John Naughton describes the Internet as an attempt to answer the following question: How do you design a network that is “future proof”—that can support the applications that today’s inventors have not yet dreamed of? The solution was to devise a network of networks that would not be biased in favor of any particular application. The Internet’s creators didn’t want the network architecture—or any single entity—to pick winners and losers. Because it might pick the wrong ones.⁷

Yet permission from the commission is exactly what entrepreneurs must acquire before they are allowed to innovate in the wireless sector. Although the commission has taken some laudable steps to allocate some spectrum for flexible use, most spectrum is limited by its license to a particular application. If an entrepreneurial licensee wanted to deploy a

⁴ *Id.* at ¶¶ 20 – 47.

⁵ *Id.* at ¶ 20.

⁶ Prepared Remarks of FCC Chairman Julius Genachowski, The Brookings Institution, Washington, DC, September 21, 2009, *available at* <http://www.openinternet.gov/read-speech.html#book6>.

⁷ *Id.*

new and innovative service on its licensed spectrum, it would most likely first have to get the commission's permission by seeking to change the spectrum's allocation. This is no small feat, and requires a large investment in lawyers and lobbyists to navigate a protracted bureaucratic process.

The flip side of this state of affairs is that licensees have little incentive to consider different and innovative uses for their spectrum. For example, a broadcaster who is not allowed to consider other uses for its spectrum has no incentive to invest in innovations that make its spectrum use more efficient. If the same broadcaster had more flexibility about how it could use its spectrum, it would have an incentive to make the best use of it and would invest in developing and acquiring new technologies.

Today, the commission is the entity charged with determining the best use of spectrum.⁸ This arrangement precludes entrepreneurs from engaging in the evolutionary trial-and-error process that is the engine of innovation in the Internet space and in markets everywhere. This kind of competition among many entrepreneurs is important because one mind can't find all the best innovations. Just the same, one mind cannot figure out all the best allocations of spectrum, and neither can a commission. Regulators cannot have all the economic information contained in all the possible permutations of entrepreneurial behavior attempted to satisfy market demand. They also cannot internalize the gains from successful innovation, so their incentive to discover the best use of some spectrum can never be as great as an entrepreneur's.

To increase access to spectrum, the commission should consider reallocating as much spectrum as possible to flexible use. In this way, licensees will be given an incentive to make more efficient and better use of their spectrum. Spectrum that was previously limited to an inefficient high-power application for example, would become available to a more efficient use that can squeeze more communications capacity out of the same spectrum. Similarly, entrepreneurs would have an incentive to invest in developing ways to exploit bands, especially at higher frequencies, now considered of little use. By allocating more spectrum for flexible use, the commission would by definition be generating the increased "access to spectrum" it seeks. For example, the FM radio band is ripe for a process similar to the DTV transition.

⁸ As 37 prominent economists noted several years ago, "[A]uctions for licenses have not changed the underlying system of spectrum allocation. Radio frequencies are allocated to services by an FCC rule making. The opportunity cost of spectrum is evaluated not by market participants but by regulators. With few exceptions, spectrum continues to be offered to the market only as allocated and no price can be offered to reallocate it from the officially designated use." "Comments of 37 Concerned Economists," *In the Matter of Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, WT Docket No. 00-230 (Feb. 7, 2001), at 3. "Indeed, to be issued an FCC license, an applicant must first certify that it will not assert any property interests in radio spectrum. This is so fundamental to U.S. communications law that it predates the 1927 Radio Act, being enacted in Senate Joint Resolution 125, signed into law by President Calvin Coolidge on Dec. 8, 1926." Thomas W. Hazlett, *The Wireless Craze, The Unlimited Bandwidth Myth, The Spectrum Auction Faux Pas, and the Punchline to Ronald Coase's 'Big Joke': An Essay on Airwave Allocation Policy*, 14 Harvard J.L. & Tech. 335, 438 (2001).

Such a shift to liberal licensing is not unheard of. Several countries, including New Zealand, Australia, Guatemala, and El Salvador, have effectively liberalized spectrum.⁹ The United Kingdom has also recently begun a process to reallocate to allocate about 70 percent of the bandwidth below 3 GHz to flexible use by 2010.¹⁰

Empirical research using data from more than 1,400 license auctions in 27 countries finds that liberal policies allowing license holders to determine services, technologies, and business models reduce the price paid for licenses by 38 percent, thus making it easier for entrepreneurial firms to begin offering new wireless services. A more liberal spectrum regime is also associated with lower retail prices for wireless service.¹¹ Looking at El Salvador and Guatemala specifically, Hazlett, Iburguen, and Leighton find that liberalization has led to relatively intense competition, high output, and low prices.¹²

The FCC should begin to reallocate currently licensed spectrum for flexible use and allow licensees to decide if they would like to continue their incumbent uses, deploy a new use, or trade the spectrum. Additionally, if it is serious about seeking more spectrum for commercial use in order to spur innovation, the commission should take a leading role in advocating for the reallocation of federal spectrum. Over 20 percent of the prime spectrum in the United States is state controlled.¹³ The Department of Defense alone controls over 500 MHz.¹⁴ Government actors do not internalize the benefits of innovation as well as a private actor might. As a result, federal agencies that control spectrum have little incentive to make manage it well or deploy more efficient technologies that better exploit bandwidth.

III. Markets for Spectrum

Reallocating spectrum for flexible use is only one part of the equation. It must also be easy for entrepreneurs and innovators to gain licenses to the flexible spectrum. The commission asks whether innovators would be well served if they were allowed “to initiate the auction and licensing process on their own timetable.” The answer is yes.

Innovators should be able to identify unused spectrum that should be licensed by the commission and apply for it. In the unlikely event that no other entrepreneur seeks the

⁹ Thomas W. Hazlett, *Optimal Abolition of FCC Spectrum Allocation*, 22 J. ECON. PERSPECTIVES 103, 116 (2008).

¹⁰ See OFFICE OF COMMUNICATIONS (U.K.), SPECTRUM FRAMEWORK REV. 4-5 (Nov. 23, 2004) 32, available at <http://www.ofcom.org.uk/consult/condocs/sfr/sfr2/sfr.pdf>.

¹¹ Four countries—Australia, New Zealand, Guatemala, and El Salvador—leave these decisions to the license holder rather than the regulator. See Thomas W. Hazlett, Property Rights and Wireless License Values 4 (AEI-Brookings Joint Center for Regulatory Studies, Working Paper No. 04-08, 2004).

¹² See Thomas W. Hazlett et al, *Property Rights to Radio Spectrum in Guatemala and El Salvador: An Experiment in Liberalization*, 3 REV. OF LAW & ECON. 437 (2007).

¹³ John R. Williams, FCC Office of Plans and Policy, *U.S. Spectrum Allocations 300-3000 MHz: A Vertical Bar Chart with Frequency Bands Shown Approximately to Scale*, Nov. 2002, 15, available at http://www.fcc.gov/Bureaus/OPP/working_papers/oppwp38chart.pdf.

¹⁴ *Id.*

same spectrum, a flexible license should be granted to the applicant. More likely there will be competing applications, in which case the commission should hold an auction for the license. This ongoing process can ensure that unassigned spectrum is always made available to new innovative uses. Guatemala, El Salvador, and Norway have adopted this type of spectrum-release process with favorable results.¹⁵ Spectrum is released more quickly than in a regulator-driven system, and innovators have better incentives to innovate ways to exploit unused spectrum for which they could then apply.¹⁶

Just as important as the initial assignment of spectrum, creating the conditions that allow secondary markets in spectrum to emerge are vital to fostering innovation. Given that so much of the most desirable spectrum is already licensed, the best way to ensure that innovators have access to spectrum is to make all licenses easily tradable.

The commission has already taken laudable steps to create secondary markets in some flexible use spectrum. However, because most spectrum is not allocated for flexible use, in practice licenses are often not easily leased or transferred. If the commission liberalizes spectrum use as suggested in the first part of this comment and allows easy trading of those flexible licenses, then we should see the emergence of a vibrant secondary market where innovators can gain access to spectrum. Current holders of non-flexible-use spectrum who employ it in low-valued uses or who use their spectrum inefficiently would finally have an incentive to make some of their spectrum available to entrepreneurs who have better ideas about how to use it.

The commission also asks whether there are “circumstances under which licensees should be required to make spectrum rights available on the secondary market,” and suggests such possible mechanisms as a “use-or lose” requirement.¹⁷ If all spectrum can be flexibly used and easily traded, then licensees will fully internalize the opportunity costs of holding spectrum without using it. Therefore, no “use-or-lose” rule would be necessary. The only instance when a regulatory intervention may be required is if an actor with substantial market power is hoarding spectrum in order to diminish competition. However, such a circumstance is best addressed case-by-case after a competition analysis has demonstrated that spectrum hoarding has caused prices to be higher than they would otherwise be, rather than by imposing a restriction on all market actors.

A market process can similarly address interference. The C\commission asks how it can “balance the interference protection rights of incumbents against the opportunities for access to spectrum[.]”¹⁸ Luckily, the commission need not engage in any such balancing as long as it allows parties to come to mutually advantageous agreements by trading interference rights. Fifty years ago this month, Ronald Coase showed us that as long as

¹⁵ Pietro Crocioni, Is allowing trading enough? Making secondary markets in spectrum work, 33 TELECOM. POL'Y 451, 458 (2009).

¹⁶ *Id.* at 459.

¹⁷ Innovation NOI at ¶ 33.

¹⁸ *Id.* At ¶ 34

spectrum rights are well defined and transferable, rights holders will bargain amongst themselves to correct any interference externalities.¹⁹ The commission could therefore auction to entrants “overlay rights” that allow them to operate in unoccupied bands, but respect incumbent uses.²⁰ In order to expand, entrants could negotiate with incumbents to buy them out, to pay to move them to another band, or to upgrade their technology so that they could accept more interference.

Finally, the commission asks about the role of unlicensed spectrum in innovation and astutely points out that “licensed and unlicensed technologies are being combined in synergistic ways, such as the inclusion of Wi-Fi, Bluetooth, and near-field devices in commercial wireless products.” It is important to note that unlicensed spectrum devices have been most successful when their use maps to physical property rights.²¹ These tend to be short-distance communications where using exclusively licensed spectrum might present high transaction costs. Therefore, as the commission notes, unlicensed spectrum devices are often used to interconnect or extend communications from wired or licensed spectrum networks. One new and innovative example is the MiFi, a business-card-sized device that connects to a 3G network and then radiates a Wi-Fi signal to which users can attach any of the many consumer electronic devices that incorporate the standard.²²

Unlicensed spectrum is likely not suitable for wide-area networks. As Thomas Hazlett has shown, this fact is underscored by the relative investment patterns in licensed and unlicensed equipment and spectrum. “Sales of cellular network equipment sales—base stations and handsets—amounted to \$202 billion internationally in 2005, as against \$3.1 billion for local area wireless networks.”²³ Hazlett further explains,

Over the past decade, U.S. regulators have allocated hundreds of MHz for additional unlicensed use, yet it has generated relatively little economic activity. Very substantial investments, in contrast, continue to be made by wireless operators gaining new exclusive rights, often bidding billions of dollars for the privilege. In 2006, for instance, T-Mobile spent \$4.2 billion for AWS licenses, and then embarked on a \$2.7 billion construction project to build a nationwide wireless broadband network. This strategy was to compete with similar systems already launched by its three major rivals. No investment

¹⁹ See Ronald Coase, *The Federal Communications Commission*, 2 J.L. & ECON. 1 (1959).

²⁰ Hazlett, *supra* note 9, at 111.

²¹ Jerry Brito, *The Spectrum Commons in Theory and Practice*, 2007 STAN. TECH. L. REV. 1, ¶ 83 (2007).

²² See Mi-Fi product page at Verizon.com, http://www.verizonwireless.com/b2c/mobilebroadband/?page=products_mifi

²³ Hazlett, *supra* note 9, at 123

approaching this scale has been observed using unlicensed airwaves.²⁴

Again, the lesson here is that while unlicensed spectrum certainly has its innovative uses, those tend to be short-range uses that map to physical property rights and which extend existing networks. As a result, if the commission is seeking to get the greatest bang for its innovation buck, it would do well to prioritize making more exclusive flexible-use spectrum available. Unlicensed spectrum is a complement, not a substitute, for it.

IV. Device and Application Openness

Other important components of wireless innovation are mobile devices and applications, and the commission seeks comments on their relative openness.²⁵ Some are concerned that the closed proprietary nature of many devices and platforms can hinder innovation. However, as long as competition among platforms exists, there is little to fear. Closed and open platforms will innovate in different ways and will make offerings that appeal to different parts of the market. Competition might not guarantee that all platforms are open, if a sufficiently large segment of consumers is satisfied with a closed (but perhaps lower-cost or higher-quality) platform. But competition will ensure that an open platform is available as long as a sufficient number of consumers want and are willing to pay for it.

Two of the major national networks—AT&T and T-Mobile—operate on the GSM standard. As a result, these carriers will allow any device that conforms to the GSM standard to operate on their networks. The carriers, of course, will not subsidize or provide technical support for all devices, but consumers nevertheless have the option to purchase unlocked devices and attach them to at least two competing networks.

There is also an abundance of mobile device platforms from which consumers can choose. Some are closed platforms that allow users to run only applications approved by the carrier or device manufacturer. These include Apple's iPhone, Microsoft's Danger, and many embedded operating systems. Other platforms are open and allow users to run any third party application. These include Microsoft's Windows Mobile, RIM's BlackBerry, Palm's WebOS, Google's Android, and Nokia's Symbian. It should also be noted that the Android and Symbian platforms themselves are open-source initiatives. This means that users can not only run their choice of third-party apps, but they can also modify and run different versions of the operating system.²⁶

Finally, while carriers often cripple their subsidized devices so that they may only run carrier-approved applications—and becoming a carrier-approved developer has

²⁴ *Id.*

²⁵ Innovation NOI at ¶ 59.

²⁶ Gina Trapani, *Why (and How) to Root Your Android Phone*, SMARTERWARE, Sep. 15, 2009, at <http://smarterware.org/3189/why-and-how-to-root-your-android-phone>.

historically been too expensive and onerous a feat for small entrepreneurs²⁷—the tide has begun to turn. Apple’s introduction of the iPhone was a game-changer because it put application approval and distribution in the hands of the device maker, who has a special incentive to enhance the value of its platform. The company released a simple software development kit at no charge and encouraged thousands of developers to create applications for the iPhone. Perhaps more importantly, Apple created the App Store, a unified catalog of applications, and made it easy for consumers to find, purchase, and install applications on their devices. In just over a year since its launch, the App Store has amassed over 75,000 applications.²⁸

Given the success of the App Store’s development and distribution strategy, competitors have begun to follow Apple’s lead. In the last year, Microsoft, Google, RIM, and Palm have all announced or launched their own app store initiatives. What’s key to note about this is that while consumers could always download and install third-party applications on open platforms such as Windows Mobile, BlackBerry, and Symbian, the process was difficult. The unified app store innovation has created an explosion in mobile application development and consumer use.

As carriers have done historically, Apple controls which applications are allowed to run on its proprietary iPhone platform. They have, however, made it very easy for developers to create submit applications to the App Store, and the astounding number of applications available for the platform underscores that fact. This has been a boon for both developers and consumers. Apple, however, does reject applications that are not up to its standards of quality or which they otherwise feel would detract from the user experience.²⁹ What must be understood is that it is precisely this ability to jealously guard its platform and to present to consumers only applications that conform to Apple’s vision of a quality user experience that motivates Apple to make the investment it has in developing the iPhone. And it probably also accounts in large part for its success.

Proprietary control over a platform does not pose a threat to competition or innovation. The good news is that for those consumers and developers who prefer to be free of any restrictions and like to tinker, there are several other platforms available to them. Google’s Android is a good example. Not only can any application be freely installed on

²⁷ See Tim Wu, *Wireless Net Neutrality: Cellular Carterfone and Consumer Choice in Mobile Broadband*, New America Foundation Wireless Future Program Working Paper No. 17 (Feb. 2007), *available at* http://www.newamerica.net/publications/policy/wireless_net_neutrality.

²⁸ Apple, Inc., Press Release, *Apple Introduces New iPod touch Lineup*, Sep. 9, 2009, *available at*, <http://www.apple.com/pr/library/2009/09/09touch.html>.

²⁹ One of the authors developed an iPhone application that was recently rejected from App Store inclusion because an icon it used violated Apple’s Human Interface Guidelines. As a developer, he was a little frustrated that he now has to find a new icon, resubmit the app, and likely wait two more weeks for such a small thing. As an iPhone user, though, he’s glad Apple is manning the quality control station. It is precisely Apple’s seeming capriciousness that has made the iPhone such a success. Consumers know that the iPhone and its apps “just work.” No other platform has ever “just worked” as well, and third-party apps for open platforms like Windows Mobile tend to be typified by poor user interfaces. *See Jerry Brito, Apple rejected my iPhone App, and I’m glad*, *Surprisingly Free*, Sep. 28, 2009, *available at* <http://surprisinglyfree.com/2009/09/28/apple-rejected-my-iphone-app-and-im-glad>.

the platform, but the operating system itself can be modified. Other platforms such as Palm WebOS include an app store to which entry is regulated, but users are also free to download and install “homebrew” apps not available in the official catalog. Finally, as long as a device has a standards-compliant web browser, such as the iPhone’s WebKit-based Safari, users can still access a wide variety of application.

Innovation is best served when there is a creative diversity of entrepreneurial approaches to platforms. As long as there is choice for consumers, there is no reason why the regulator should prefer an open platform to a proprietary one. Each has its comparative advantages and satisfies different segments of the market.

V. Conclusion

The greatest contribution the commission could make to spur innovation is to align policy with the incentives of entrepreneurs. Reallocating spectrum to flexible use allows incumbents to internalize the cost of their use. Allowing spectrum licenses to be freely traded allows entrepreneurs to put spectrum to its highest valued use. And allowing innovators to choose open or closed development paths ensures a beneficial diversity of creativity.