

“LOOKING BACK TO LOOK FORWARD: THE NEXT TEN YEARS OF SPECTRUM POLICY”

The Pew Charitable Trust Conference Center, Washington DC

November 14, 2012

Conference Report

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February 26, 2013

## Executive Summary

On November 14, the Silicon Flatirons Center, CTIA - The Wireless Association and Public Knowledge co-sponsored the conference “Looking Back to Look Forward: The Next Ten Years of Spectrum Policy.” This event was held in cooperation with the Federal Communications Bar Association and IEEE-USA.

This conference was held at a pivotal moment for spectrum policy, as the year 2012 marks some important anniversaries: a century since the sinking of the Titanic and the resulting 1912 Radio Act; a decade since the FCC’s Spectrum Policy Task Force Report (SPTFR);<sup>2</sup> and the midpoint of an Administration that has welcomed the FCC’s National Broadband Plan,<sup>3</sup> published a Presidential Memorandum calling for 500 MHz of spectrum to be allocated for wireless broadband use,<sup>4</sup> and commissioned a President’s Council of Advisor’s Science and Technology (PCAST) report on ways to realize the full potential of government-held spectrum.<sup>5</sup>

The conference focused on learning lessons from the past 100 years of spectrum policy, and canvassing forward-looking policy advice. Particular attention was paid to the upcoming incentive auctions, and what impact they would have on future spectrum

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<sup>2</sup> The SPTFR is available at [http://transition.fcc.gov/sptf/files/SEWGFfinalReport\\_1.pdf](http://transition.fcc.gov/sptf/files/SEWGFfinalReport_1.pdf).

<sup>3</sup> More information on the National Broadband Plan is available at <http://www.broadband.gov/plan/>.

<sup>4</sup> Presidential Memorandum: Unleashing the Wireless Broadband Revolution, June 28, 2010, available at <http://www.whitehouse.gov/the-press-office/presidential-memorandum-unleashing-wireless-broadband-revolution>.

<sup>5</sup> The PCAST report is available at [http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast\\_spectrum\\_report\\_final\\_july\\_20\\_2012.pdf](http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast_spectrum_report_final_july_20_2012.pdf).

policy. Recurring themes included (i) calls for policy to be driven by technology and to create solutions rather than regulations; (ii) assertions that flexible rules and regulations should replace strict regimes in order to allow for more innovation within the marketplace; and (iii) a need to establish economic incentives for federal and commercial users in order to encourage a serious evaluation their spectrum use and needs.

The conference opened with a keynote by FCC Commissioner Jessica Rosenworcel, followed by three panels: “The Promise and Problems of Strategic Plans,” “Reforming US Spectrum Management,” and “The View Ahead: Technology Opportunities.” It closed with a discussion between FCC Commissioner Robert McDowell and Bryan Tramont.

Video of the conference is available at <http://publicknowledge.org/blog/spectrum-conference-recap-videos-and-audio>. Several panelists submitted position papers, and a compendium is available at <http://www.siliconflatirons.com/documents/conferences/2012.11.13%20Spectrum/Compendium.pdf>.

### **Opening Keynote: Commissioner Rosenworcel**

To begin the discussion, FCC Commissioner Jessica Rosenworcel highlighted four ideas that she argued would shape the next decade of spectrum policy: (i) the incentive auctions; (ii) the role of federal spectrum users; (iii) strengthening infrastructure; and (iv) public safety.

First, Rosenworcel noted that the United States would once again be pioneering spectrum policy with the implementation of the upcoming incentive auctions. She discussed four dimensions of the incentive auctions: (i) simplicity, (ii) fairness, (iii) balance, and (iv) public safety. She maintained that simplicity will yield more cooperation, and thus more spectrum and opportunity. Fairness, especially to the broadcasters, will allow parties to participate most effectively. In order to achieve success at every stage of the auctions, it is necessary for the FCC to balance the needs and concerns of the reverse auction, the repacking, and the forward auction. Lastly, the revenue of the auction will be shared with the nation’s public safety community since part of the proceeds is congressionally mandated to serve public safety needs.

Next, Rosenworcel addressed federal spectrum and potential incentives to increase spectrum efficiency. She argued that the hunt for an additional 500 MHz for commercial spectrum use requires cooperation by federal spectrum users, more flexible spectrum use, and secondary market transactions. Rosenworcel contended that growing spectrum demands would require new and old solutions for gaining additional spectrum.

She argued that both reallocation of services and large scale sharing would be necessary. She also suggested there are many strategies to release additional spectrum, such as monetary incentives for federal bodies to encourage efficient spectrum use. She argued that economic incentives should financially reward agencies that use spectrum efficiently, such as by allowing agencies to reclaim a portion of the revenue from the subsequent re-auctions of their unused airwaves. Rosenworcel maintained that these market-based incentives would alleviate financial constraints within federal organizations and open up additional spectrum.

Third, Rosenworcel addressed the importance of tower and facility siting to wireless services. Both the President and Congress have spoken to the need for simple and expedited deployment and investment. A recent Executive Order tasked a working group with reviewing federal lands and roads in order to speed the deployment process.<sup>6</sup> Congress has also addressed the acceleration of deployment and access.<sup>7</sup> She argued that the Commission should tie the disparate efforts together and draft model rules for facilitating siting that could be used by state and local governments. She contended that a more predictable regulatory environment would encourage investment in communities, a range of new deployments, and a surge in the economy.

Finally, Rosenworcel turned her attention to public safety. Today, one third of households rely on wireless phones that lack the reliability of wireline telephone and cable networks during emergencies. She suggested that in order to avoid future network outages during emergencies, there must be collaboration between federal and local governments to establish reliable networks and to continue efficient deployments. She also contended that consumers themselves must prepare for emergencies with longer back up batteries, solar chargers, and other measures.

Rosenworcel concluded by observing that spectrum policy must be flexible and dynamic in order for the United States to maintain its role as a leader in the wireless sector.

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<sup>6</sup> Exec. Order No. 13,604, 77 Fed. Reg. 18887 (March 22, 2012) (titled Improving Performance of Federal Permitting and Review of Infrastructure Projects), available at <http://www.gpo.gov/fdsys/pkg/FR-2012-03-28/pdf/2012-7636.pdf>.

<sup>7</sup> See generally, U.S. Congressional Research Service. Broadband Internet Access and the Digital Divide: Federal Assistance Programs (RL30719; Sept. 7, 2012), by Lennard G. Kruger & Angele A. Gilroy; available at <http://www.fas.org/sgp/crs/misc/RL30719.pdf>.

## **Panel 1. The Promise and Problems of Strategic Plans: From the Spectrum Policy Task Force to the PCAST Report**

The first panel, “The Promise and Problems of Strategic Plans: From the Spectrum Policy Task Force to the PCAST Report” discussed the successes of spectrum planning and how to improve the process. This panel was moderated by Michele Farquhar,<sup>8</sup> Partner at Hogan and Lovells, and specifically addressed (i) lessons learned about strategic planning from the Spectrum Policy Task Force; (ii) the role of the federal government in future spectrum policy discussions; and (iii) future predictions or big debates to come.

Panelist Charles Jackson,<sup>9</sup> Consultant and Adjunct Professor of Computer Science at George Washington University, began the discussion with the famous aphorism “Plans are worthless, but planning is everything.” Thus, staying “steeped in the character of the problem” is the greatest benefit of strategic planning at the FCC. He acknowledged that Commission staff has historically been participants in major policy considerations; their brainstorming and discussion of new solutions has inspired many current policies. Jackson’s predictions, made with the disclaimer that “they are little more than empty speculation,” include: (i) opportunistic spectrum use is overhyped and overpromised, (ii) the 100 MHz of unlicensed spectrum at 5 GHz made available by legislation earlier this year will generate between ten and one hundred times more consumer benefits than will unlicensed use of the TV white spaces, (iii) spectrum efficiency will continue to increase, (iv) new frequencies will be exploited, (v) the problem of the rising noise floor will continue to grow, and (vi) there will be significant negative impacts on consumers, but few will complain.

The next three panelists (Peter Tenhula, Michael Marcus and Kathleen Ham) were all members of the 2002 Spectrum Policy Task Force.

Tenhula, Senior Advisor in the Office of the Assistant Secretary of the U.S. Department of Commerce (NTIA), summarized the origins of the Task Force. Chairman Powell wanted a specific plan to guide his tenure at the Commission, which included focuses on (i) broadband deployment, (ii) media regulation, (iii) homeland security, (iv)

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<sup>8</sup> Farquhar submitted a position paper titled “Beyond Kolkata: Delivering on the Fundamental Goals of the Communications Act.” It is available at [http://www.siliconflatirons.com/documents/conferences/2012.11.13%20Spectrum/PositionPapers/Farquhar\\_BeyondKolkata.html](http://www.siliconflatirons.com/documents/conferences/2012.11.13%20Spectrum/PositionPapers/Farquhar_BeyondKolkata.html).

<sup>9</sup> Jackson submitted a position paper titled “The Promise and Problems of Strategic Plans.” It is available at [http://www.siliconflatirons.com/documents/conferences/2012.11.13%20Spectrum/PositionPapers/Jackson\\_ThePromiseandProblemsofStrategicPlans.html](http://www.siliconflatirons.com/documents/conferences/2012.11.13%20Spectrum/PositionPapers/Jackson_ThePromiseandProblemsofStrategicPlans.html).

spectrum policy, and (v) competition policy. At the time, spectrum policy was criticized for not being efficient, and Powell identified the command-and-control regime as being the culprit. Therefore, in 2002 Powell partnered with the Defense Advanced Research Projects Agency (DARPA) to establish the SPTF. Tenhula observed that many of the policy concerns addressed by the SPTF a decade ago are still crucial issues today.

Michael Marcus,<sup>10</sup> Consultant, discussed the origins of the FCC and the influence of the Administrative Procedure Act (APA) on FCC policy over time. In 1935, at the time the FCC was established, there was no APA. Further, at the FCC's establishment there were seven commissioners, rather than today's five. The Commission was established with a focus on three main topics: radio, telephone, and telegraph. Marcus argued that the decision-making process utilized today within the FCC still resembles the original models used for broadcast ownership, and are not appropriate for spectrum policy. Other countries have standing spectrum policy strategies that are revised and updated as technology and leadership changes. The FCC, on the other hand, does not have a process of revising its spectrum policy even in light of the changing technology and leadership. Marcus contended that telecommunications and spectrum policies should evolve and be maintained in order to create more predictability for investors.

Fourth, panelist Kathleen Ham,<sup>11</sup> Vice President of Federal Regulatory Affairs at T-Mobile, addressed policy planning from the perspective of a carrier. Because spectrum is the lifeblood for carriers, there is a need to bring extra spectrum to market. She argued that competition and consumers benefit from additional spectrum. One of the goals of the upcoming incentive auctions is to free up additional spectrum.<sup>12</sup> Ham believes the incentive auctions may be overly complex. Furthermore, she held that the participation of the broadcasters is vital to the success of the auctions. She concluded with a call for spectrum policy to consider the role of spectrum in the future of competition and services.

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<sup>10</sup> Marcus submitted a panelist position paper titled "The Promise and Problems of Strategic Plans: From the Spectrum Policy Task Force to the PCAST Report." It is available at [http://www.siliconflatirons.com/documents/conferences/2012.11.13%20Spectrum/PositionPapers/Marcus\\_ThePromiseandProblemsofStrategicPlans.html](http://www.siliconflatirons.com/documents/conferences/2012.11.13%20Spectrum/PositionPapers/Marcus_ThePromiseandProblemsofStrategicPlans.html).

<sup>11</sup> Ham submitted a panelist position paper, co-written with Sara Leibman, titled "U.S. Spectrum Policy – When the Rubber Meets the Road." It is available at [http://www.siliconflatirons.com/documents/conferences/2012.11.13%20Spectrum/PositionPapers/Ham\\_US\\_SpectrumPolicy.html](http://www.siliconflatirons.com/documents/conferences/2012.11.13%20Spectrum/PositionPapers/Ham_US_SpectrumPolicy.html).

<sup>12</sup> See, In the Matter of Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, FCC 12-118 (Adopted Sept. 28, 2012) ("Building off of the National Broadband Plan, the FCC has worked to free up spectrum for wireless broadband use through traditional approaches such as auctions.").

Ellen P. Goodman,<sup>13</sup> the last panelist and Professor of Law at Rutgers University, spoke to the ability of strategic planning to socialize new concepts not ready for implementation. First, she discussed how strategic planning incorporates (or fails to incorporate) public interest values such as market efficiency, competition, universal access, affordable or free access, privacy, and public safety. She highlighted the new opportunities for allowing more unlicensed spectrum offered by the upcoming incentive auctions. Next, she considered the role of public interest within spectrum policy. She observed that the public is not engaged in spectrum issues, considering, for example, how active the public was in the SOPA copyright debate.<sup>14</sup> Unlicensed spectrum has not fired the passions of the public in the same way that broadcasting and copyright issues have, despite its contribution to consumer welfare. She ended with a call for the conversations concerning unlicensed spectrum to be framed in humanistic terms: allocating spectrum for unlicensed access is not just about innovation and economic growth, but also about providing control over communications capacity to more than a few wireless carriers. She asserted that the public is neither aware of nor understands the role of spectrum within the national economy and daily life. It is time for the public to join this dialogue.

The panelists then had an opportunity to respond to each other. They focused first on the challenges facing the government in spectrum management. Marcus contended that the FCC is uninterested in long-term issues, but instead focuses on adjudicating near-term issues. Ham felt that U.S. spectrum policy is lagging behind and restricting market place innovation; thus, the Commission should develop a more flexible regulatory model for licensed and unlicensed use to allow the market to innovate and evolve more quickly. Jackson submitted that the FCC must move forward by focusing on goals such as timeliness, predictability, and transparency. Tenhula argued that strategic planning must also incorporate short-term goals and objectives, because of the FCC's frequently transitioning leadership. There was a consensus that interdisciplinary teamwork solves spectrum policy problems most efficiently.

Next, the panel considered the lessons that could be learned from past strategic planning. Panelists felt that follow-up plans, implementation strategies, and transparency were necessary for a successful policy or long-term planning.

Lastly, the panel discussed predictions and big debates for spectrum policy. The panelists agreed that the next big debate would be focused on the incentive auctions and

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<sup>13</sup> Goodman submitted a panelist position paper titled "The Stunted Public Interest Vocabulary in the Broadcast Spectrum Auction." It is available at [http://www.siliconflatirons.com/documents/conferences/2012.11.13%20Spectrum/PositionPapers/Goodman\\_PublicInterestinSpectrum.html](http://www.siliconflatirons.com/documents/conferences/2012.11.13%20Spectrum/PositionPapers/Goodman_PublicInterestinSpectrum.html).

<sup>14</sup> H.R. 3261 - Stop Online Piracy Act, House Judiciary Committee, Oct. 26, 2011, available at <http://judiciary.house.gov/hearings/pdf/112%20HR%203261.pdf>.

the ‘spectrum crunch.’ Jackson argued there is a disconnect between policy makers and rural America, and that it is necessary for policy makers to understand rural America in order to establish appropriate spectrum policy. Future predictions included: the development of new technologies, the possible collaboration between NTIA and the FCC, and a possible repeal of Section 7 of the Communications Act.<sup>15</sup>

## **Panel 2. Reforming US Spectrum Management: Sharing, Reallocation, and Other Options**

The second panel, “Reforming US Spectrum Management: Sharing, Reallocation, and Other Options,” was moderated by Chris Guttman-McCabe, Vice President of Regulatory Affairs for CTIA. This panel focused on: (i) the strengths and weaknesses of reform proposals, (ii) issues needing to be added or removed; and (iii) the prospects for facilitating the transition from old to new ways of using spectrum for federal and non-federal users.

First, the panel discussed what makes a policy successful and concluded that policies seeking pragmatic solutions, balance, and market driven incentives are often the strongest. Panelist Harold Feld,<sup>16</sup> Senior Vice President of Public Knowledge, proposed that instead of deriving spectrum policy from economics or viewing spectrum access as a zero-sum game, it should instead be developed around pragmatic solutions to the problem of enhancing wireless capacity to meet ever-expanding needs.

Next, the panel discussed how the upcoming incentive auctions and the debate about federal spectrum would force policy reform. There was a general consensus that the auctions will require significant broadcaster participation and that federal spectrum was a place where re-allocation and sharing should be explored. Panelist Thomas Power,

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<sup>15</sup> 47 USC §157 – New technologies and services. (a) It shall be the policy of the United States to encourage the provision of new technologies and services to the public. Any person or party (other than the Commission) who opposes a new technology or service proposed to be permitted under this chapter shall have the burden to demonstrate that such proposal is inconsistent with the public interest. (b) The Commission shall determine whether any new technology or service proposed in a petition or application is in the public interest within one year after such petition or application is filed. If the Commission initiates its own proceeding for a new technology or service, such proceeding shall be completed within 12 months after it is initiated. For a critique of this legislation, see Michael Marcus, “Section 7 is Also Part of the Communications Act,” Public Knowledge, April 20, 2011, available at <http://www.publicknowledge.org/blog/section-7-also-part-communications-act>.

<sup>16</sup> Feld submitted a position paper titled “Not a Zero Sum Game – Why Objections to the PCAST Report Make No Sense.” It is available at [http://www.siliconflatirons.com/documents/conferences/2012.11.13%20Spectrum/PositionPapers/Feld\\_NotAZeroSumGame.html](http://www.siliconflatirons.com/documents/conferences/2012.11.13%20Spectrum/PositionPapers/Feld_NotAZeroSumGame.html).

Deputy Chief Technology Officer for Telecommunications in the White House Office of Science and Technology Policy, argued that in comparison to previous decades there has been more cooperation between the FCC and NTIA in addressing new spectrum usage. This collaboration is necessary to achieve spectrum policy goals in the future.

The panel then discussed the possibility of spectrum regulators establishing “future-proof” policies. Susan Fox, Vice President for Government Relations at the Walt Disney Company, argued that because future-proofing policy is extremely difficult, there should instead be a focus on getting as much content, devices, and data to consumers as possible. Further, she argued that when policy focuses on consumers, innovation and market incentives are the result.

The conversation then moved to the role of secondary markets in spectrum. Kathryn Brown,<sup>17</sup> Senior Vice President of Public Policy and Corporate Responsibility for Verizon, argued that there is a robust secondary market, and that better spectrum use can be achieved the more trades that can be done in the absence of regulations. Julius Knapp, Chief of the FCC’s Office of Engineering and Technology, concluded that there is not a “one-size fits all” solution to maximizing spectrum efficiency. Thus, it takes time to resolve the big issues and controversies, such as repurposing spectrum and introducing new technologies; however, the investment in discovering the solutions has continued to pay off.

### **Panel 3. The View Ahead: Technology Opportunities**

The last panel, moderated by Pierre de Vries, Senior Fellow at the Silicon Flatirons Center, was titled “The View Ahead: Technology Opportunities,” and sought to provide some insights into where technology will take spectrum policy.

First to speak was panelist Doug Sicker, DBC Endowed Professor of Computer Science and Director of the Interdisciplinary in the Department of Computer Science at the University of Colorado, Boulder. He recommended that spectrum management and policy should focus on clearing spectrum, looking for opportunities for new unlicensed allocations (for example, in the white spaces), and building and establishing more cooperation and understanding between NTIA and the FCC. Sicker believes it is the White House’s responsibility to establish that understanding.

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<sup>17</sup> Brown submitted a panelist position paper, co-written with Charla Rath, titled “U.S. Spectrum Policy: The Way Forward.” It is available at [http://www.siliconflatirons.com/documents/conferences/2012.11.13%20Spectrum/PositionPapers/Brown\\_USSpectrumPolicy.html](http://www.siliconflatirons.com/documents/conferences/2012.11.13%20Spectrum/PositionPapers/Brown_USSpectrumPolicy.html).

Next, panelist Dale Hatfield, Senior Fellow at the Silicon Flatirons Center and Adjunct Professor in the Interdisciplinary Telecommunications Program at the University of Colorado at Boulder, began with recommendations for establishing efficient spectrum use and management, including: (i) denser packing of services within the bands, (ii) moving to higher frequencies to relieve pressure on lower frequencies, and (iii) more dynamic sharing. Hatfield reflected on how the role of interference has evolved as technology has changed. Therefore, he argued, policy must accommodate the new technologies because these technologies may be able to overcome many new challenges. For example, technology, rather than rules and regulations, will one day be able to overcome receiver inadequacies, the increasing numbers of transmitters, and reducing harmful interference. Further, policy must produce incentives for players to react in meaningful ways.

Third, panelist Ed Tiedemann,<sup>18</sup> Senior Vice President of Engineering at Qualcomm, focused on the role of U.S. data consumption in guiding future policy considerations. He argued that the huge data-load growth will drive new technologies. Thus, he held that if spectrum is to be utilized efficiently, infrastructure considerations must be addressed (e.g., building small cell sites).

Next, panelist Preston Marshall,<sup>19</sup> Research Professor at Viterbi School of Engineering at the University of Southern California, focused on the three drivers for future technology. First, he argued that spectrum sharing is the only untapped resource capable of providing hundreds of megahertz of spectrum for new innovation. Second, dense, heterogeneous spectrum usage will drive the need for and development of new technology. And lastly, Marshall argued that there is not a “spectrum crunch” but an “infrastructure crunch.” Ultimately, policy should address technology needs (i.e., flexible mixing of licensed and unlicensed sharing, automated co-existence management, tunable filters, and managing interference rather than predicting interference).

Panelist Milind Buddhikot, Distinguished Member of Technical Staff at Lucent Bell Labs, focused on the architecture of current spectrum usage. He argued there is a need to find ways to re-allocate spectrum and to implement controlled/coordinated sharing in small scales. He contended that there is a need to

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<sup>18</sup> Tiedemann submitted a panelist position paper titled “The Wireless Data Demand: Technology and Spectrum Implications.” It is available at [http://www.siliconflatirons.com/documents/conferences/2012.11.13%20Spectrum/PositionPapers/Tiedemann\\_TheWirelessDataDemand.html](http://www.siliconflatirons.com/documents/conferences/2012.11.13%20Spectrum/PositionPapers/Tiedemann_TheWirelessDataDemand.html).

<sup>19</sup> Marshall submitted a panelist position paper titled “The View Ahead: Technology Opportunities.” It is available at [http://www.siliconflatirons.com/documents/conferences/2012.11.13%20Spectrum/PositionPapers/Marshall\\_TheViewAhead.html](http://www.siliconflatirons.com/documents/conferences/2012.11.13%20Spectrum/PositionPapers/Marshall_TheViewAhead.html).

reconsider the current, strict models dominating spectrum management and allow technology to drive policy and create new solutions.

There was consensus at the end of the panel that policy should encourage innovation by adopting flexible rules and regulations. Even simple incentives to encourage higher standards of device performance would change the conversation about spectrum efficiency. Further, regulators should allow market players and new technology to shape policy considerations rather than leading with policy initiatives. Ultimately, the panel agreed there is a need to reconsider the policies, models, incentives, and leadership that have been driving spectrum management in order to achieve maximum efficiency within the spectrum space. The panel predicted the future of spectrum management would be shaped by new, innovative technology.

### **Closing Discussion with Commissioner McDowell**

The conference concluded with a conversation between Bryan Tramont, Managing Partner at Wilkinson, Barker, Knauer, and Commissioner Robert McDowell. First, McDowell outlined his vision of spectrum policy for the next four years. McDowell encouraged the FCC to follow Congress' intent and instructions, especially concerning the upcoming incentive auctions. Further, he emphasized the importance of bringing more spectrum to the marketplace for auctions. Lastly, he argued in order to yield more spectrum, there should exist financial incentives for federal agencies and commercial users to re-evaluate their spectrum use. He contended that this will encourage users to consider relocating or sharing spectrum and thus move the nation towards more efficient spectrum use.

Next, the two discussed how the incentive auctions, the President's call for 500 MHz to be opened to the market, and the FCC will influence spectrum policy over the next four years. McDowell was cautious about the amount of spectrum and revenue the incentive auctions would yield. He maintained that the auctions must be held in a timely manner and the FCC must prepare itself for the unexpected. The discussion then turned to the Presidential memorandum.<sup>20</sup> McDowell argued that it is necessary to remove regulatory roadblocks to help make the search for 500 MHz successful. Under the new policies, McDowell predicted that technology and competition should play a much

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<sup>20</sup> Presidential Memorandum: Unleashing the Wireless Broadband and Revolution. June 28, 2010 (calling for the "Federal Communications Commission to make available a total of 500 MHz of Federal and nonfederal spectrum over the next 10 years (in collaboration with NTIA), available at <http://www.whitehouse.gov/the-press-office/presidential-memorandum-unleashing-wireless-broadband-revolution>).

stronger role in spectrum policy than the government. Further, it is important for the U.S. government to be extremely considerate of how it acts in regard to spectrum, because the United States is an international leader and other countries replicate our decisions.

The conversation then turned to Hurricane Sandy and the role of the telecommunications industry and first responders in public safety. McDowell observed that these situations offer insight into the nation's preparation and communications ability. For example, network resilience, hardening and backup power are all key ingredients in future emergency preparedness. He also noted that the FCC will be exploring the lessons learned from Sandy in the coming months.

Lastly, McDowell reflected on his experiences with spectrum policy. First, he found that light touch regulations and flexible use policies have been the most successful. In regard to unlicensed spectrum, he believes it has been extremely valuable to innovation; however, he believes a mix of unlicensed spectrum and exclusive use licenses is necessary to provide the most competitive and innovative marketplace. He concluded his remarks by encouraging public comment on current spectrum policy questions, such as perspectives on the upcoming incentive auctions.