

**PREPARED REMARKS OF FCC CHAIRMAN TOM WHEELER
“WIRELESS SPECTRUM AND THE FUTURE OF TECHNOLOGY INNOVATION” FORUM
THE BROOKINGS INSTITUTION
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Thank you, Roger Altman, for that introduction.

Thank you to Brookings for hosting this forum and inviting me to participate. Thanks in particular for limiting your forum to two hours. Giving an afternoon keynote to close a conference is much less daunting when the audience has only been here since lunch.

Thank you, Secretary Rubin, for your leadership of the Hamilton Project and identifying spectrum as an area of the Project’s focus.

More important, I want to commend Secretary Rubin and Brookings for having the good sense to commission Phil Weiser and Pierre de Vries to craft your new policy proposal to improve the allocation and adjudication of spectrum.

You’ve just heard a spirited discussion of Phil and Pierre’s paper, and some of the things we *should* be doing to update spectrum policy to meet today’s realities and seize tomorrow’s opportunities.

Now, it’s my job to close this forum by previewing some of the things we *will* be doing to update spectrum policy. In particular, I want share some thoughts about two next-generation spectrum policies – incentive auctions and sharing – that together hold the promise to completely revolutionize the way we manage our airwaves – and in so doing to provide the underpinning for economic growth.

From my first day at the Commission, I have been arguing that the best way to look forward is to begin by looking backward to the lessons of history.

We are now in the midst of the fourth great network revolution – the wireless connectivity of miniature computing devices. In the preceding three revolutions – the printing press, steam railroad, and magnetic telegraph – we can view circumstances similar to the challenges we face today. But we should not delude ourselves that the impact of our network revolution is yet as definingly revolutionary as the other three.

The key word in the preceding statement is “yet.” And getting to “yet” is not just a matter of technology; it is also a matter of intellectual and psychological changes.

It is at the FCC that all of these technological, intellectual and psychological matters collide. Our role is to harness the power of modern communications to produce social and economic benefits. This we can accomplish in two ways. First, by removing obstacles to progress, whether the obstacles are unnecessary or counterproductive regulations or private arrangements that restrict economic, intellectual, and cultural advancement. And second by assuring the availability of the economic inputs we manage which are essential to modern networks. By far the most important of these inputs is spectrum.

We are evolving spectrum policy from the age of Marconi's analog waveform to the era of digital on/off pulses that obviate the previous underpinnings of policy: the nature of the waveform, and the need for a large spectrum buffer to protect it from other signals. This new technical reality has placed us on the threshold of two fundamentally transformative spectrum policies—incentive auctions and spectrum sharing. We will make unprecedented use of market mechanisms, and of the flexibility of digital technology to derive greater value from the finite spectrum resource.

Let's start with the concept of an incentive auction. While it has never been tried before, its power lies in how it addresses the root of all issues: economics. If it is possible to marry the economics of demand with the economics of current spectrum holders, it should be possible to allow market forces to determine the highest and best use of spectrum.

In mid-2015 we will run the first ever incentive auction. Television broadcasters will have the opportunity to bid in a reverse auction to relinquish some or all of their spectrum rights, and wireless providers will bid in a forward auction on nationwide, "repacked" spectrum suitable for two-way wireless broadband services.

The auction presents a once-in-a-lifetime opportunity for broadcasters, and we are committed to providing them with information about both our process and the financial opportunity the auction represents to enable them to make informed business decisions about whether and how to participate. I came to this position after almost a decade as a venture capitalist and even longer as an entrepreneur myself. Seldom have I seen such a risk-free opportunity as that represented to broadcasters by the incentive auction, including the opportunity to continue their existing business on shared spectrum and take home a check for the spectrum they vacate.

Shortly, the FCC staff will begin briefing the Commissioners and Congress on the proposed policy decisions necessary for the incentive auction to succeed. These are a tough set of interrelated issues made even more difficult by the detailed instructions the Congress provided in the Spectrum Act of 2012.

Let me give you a quick glimpse into some of the issues associated with moving from incentive auction concept to reality.

Since we have no idea how many broadcast license holders intend to show up for the auction, we should probably scale expectations by looking at the patterns of previous auctions. There have been six FCC auctions involving spectrum below 3GHz. All have been regarded as successful. The largest amount of spectrum sold in any auction was 90MHz. The average amount of spectrum was 45MHz. These auctions enabled the development of a robust and competitive wireless industry. Their lesson helps us define success insofar as the amount of spectrum repurposed for wireless use.

The incentive auction will also increase the amount of spectrum for unlicensed use, but the exact amount will depend on the amount of spectrum available for sale to wireless carriers. We are huge proponents of unlicensed spectrum. Our instruction from Congress, however, is that the spectrum reallocated from broadcast licensees must be made available for auction. Thus, the spectrum available for unlicensed applications is limited to the frequencies that are designated as guard bands (and channel 37, as well as remaining TV White Spaces). The amount of unlicensed spectrum at 600MHz, therefore, is driven by

engineering and mathematics: the number and extent of the guard bands is a reflection of what is (in the words of the statute) “technically reasonable to prevent harmful interference between licensed services” that will operate on the auctioned spectrum.

Here’s the bottom line on incentive auctions: If we get this right – and I’m confident we will – incentive auctions could revolutionize spectrum policy by applying economic forces to the *allocation* of spectrum and not simply the assignment of individual licenses.

The discussion of unlicensed spectrum offers a natural transition to talk about the other big breakthrough policy – spectrum sharing.

The July 2012 PCAST report, which presented the definitive case for enhanced spectrum sharing, is rooted in the lessons of unlicensed policy. Unlicensed spectrum has always been based on sharing – Wi-Fi, Bluetooth, and all the other unlicensed applications must share spectrum with each other, while not causing harmful interference to licensed spectrum users.

Both the PCAST and the FCC’s Technological Advisory Council recommended that we target the 3.5 GHz as an “innovation band.” And, I know it’s shocking, considering I participated in the work of both of these groups, but that’s exactly what we’re doing.

Very soon I will circulate to my fellow Commissioners detailed proposed rules designed to make the PCAST vision a reality. Subject to ongoing discussion with other government parties in interest, this is what I hope to recommend.

First, the proposal would include three tiers of prioritization: federal and non-federal incumbents, priority access licensees, and general authorized access users. The three-tiered construct was a key aspect of the PCAST report, and is necessary to realizing the full potential of spectrum sharing.

Second, it would include a single, highly flexible band plan, avoiding the analog trap of Balkanizing spectrum into sub-bands, each with its own sets of rules.

Third, the proposal would anticipate a wide range of flexible uses. Small cells will undoubtedly be a core use case, but we would not limit the band to such use.

Finally, the proposal would reflect economic incentives. Even with the most efficient technology, there will always be places and times where there is rivalry for spectrum access. To that end, the proposal would set up a flexible auction and licensing scheme that leverages the technical capabilities of a Spectrum Access System database.

In addition, the 3.5 GHz band provides a real-life opportunity to apply some bold thinking about receiver performance. In parallel to our formal rulemaking, I expect that a multi-stakeholder group will be convened to explore ways to drive not only efficient transmission, but also efficient reception, in the band.

In less than two years since the PCAST report’s release, the concept of sharing has already come a long way.

A few moments ago I mentioned the role intellectual and psychological issues played in determining the outcome of technological innovation. The same holds true for spectrum policy, and especially for the incentive auction and spectrum sharing future.

There are two controlling forces in spectrum policy: the laws of physics, and the laws of human nature. Of the two, physics is the easy hurdle.

Human nature is something else again. There is something in our human nature that draws us to worst case assumptions. Both the incentive auction and the sharing proposal provide additional, if unneeded, evidence of this reality. They both involve significant changes in traditional ways of doing business. Predictably, the novelty has produced anxiety.

I hope I am clear on this point. I understand the legitimate equities of those we are asking to confront change, both broadcasters and other incumbent spectrum holders. And I understand that, inevitably, with change comes the perception of risk. But if we proceed responsibly, as I am confident we are, the rewards of vastly improved spectrum policy will make our collective endeavor entirely worthwhile for everyone involved.

Mind you, I'm not complaining—at least not much—about our human proclivities. The people in this room have dealt with this reality of change in multiple contexts; it has been around for as long our government has existed. People of good will can solve these kinds of issues – and in that regard, I want to especially call out the efforts of the Defense Department and NTIA, at the direction of the President, that have brought us this far. After all, NTIA put 3.5 GHz and other bands on the table with the publication of its Fast Track report in 2010. I'm simply pointing out that achieving the goals we all recognize – including the recommendation of Phil and Pierre – requires a psychological about-face to reorient from what was to what can be.

Together, the incentive auction and spectrum sharing mark watershed moments in the evolution of spectrum management. Today, however, they are but concepts. Within the next 18 months they will both be realities.

To be clear, while incentive auctions and spectrum sharing are really big deals and really big pieces of the FCC's mobile agenda going forward, they are not our entire agenda. We will still use traditional tools to unleash spectrum and spur innovation in the mobile sector, notably my favorite tool of all: competition, competition, competition. If you're in this room, chances are high that you've already heard me extol the virtues of competition as a driver of innovation and investment, so I'll spare you yet another exposition. It is worth repeating that as long as I am Chairman, competition will be at the center of our spectrum agenda.

I started my remarks with a look back at the past. I'll close with a look to the future.

While mobile connectivity has already revolutionized our world in multiple ways, the fact of the matter is we're just getting warmed up.

Think about the iPhone and Android phones, which have given more than 60% of Americans more computing power in their pocket than the module that put a man on the moon. They didn't even exist when Barack Obama began running for President.

In barely six years, those platforms have given rise to the apps economy, which has already created more than 750,000 new U.S. jobs and put a solution to countless problems just one finger-tap away. Think about what U.S. innovators and entrepreneurs will come up with for these platform over the next six years? The next 16? Or the next 60?

Think about our education system and what it would mean if every student had an interactive digital textbook that tailored lessons to her strengths and weaknesses.

Think about our health care system and how many lives could be saved by remote monitoring that can diagnose health risks before they become emergencies.

Think about people with disabilities. I saw a story last week about wireless technology that will put GPS navigation in shoes. A dance instructor who lost her leg during the Boston Marathon bombing was gliding across the stage at the TED conference in Vancouver with a bionic leg specifically engineered for dancing, and the MIT engineer who designed it said that wireless technology will enable more advanced neural-controlled limbs in the not-too-distant future.

To seize those new opportunities – for job creation, health care, education, energy – entrepreneurs will have to update the way they do business, and the FCC has to update the way we manage and allocate spectrum.

The challenges before us are great, but if we work together to tackle these challenges and seize the opportunities, we can achieve great things to advance the latest Network Revolution.