

April 25, 2014

Honorable Fred Upton, Chair
Honorable Greg Walden
Committee on Energy and Commerce
U.S. House of Representatives
Washington, DC 20515

The Information Technology and Innovation Foundation (ITIF)¹ welcomes the Committee's interest in modernizing U.S. spectrum policy as a part of an update to the Communications Act and appreciates this opportunity to comment. Although it may seem obvious, it is worth reiterating how important radio spectrum is to our economy. Proliferation of wireless technologies, especially the recent growth of wireless broadband, has been an incredible boon to our economy, increasing American prosperity and innovation. A recent White House report shows annual investment in U.S. wireless networks rising more than 40% – from \$21 billion to \$30 billion – between 2009 and 2012.² With this transformation happening around us, the time is ripe to re-evaluate and improve spectrum policy to further facilitate such investment and growth.

A holistic re-working of spectrum licensing would be difficult – many existing allocations and rights are intricately defined, and starting over from scratch is unworkable. However, spectrum allocation and management is an ongoing process that will benefit from guidance by a set of fundamental principles. Rather than simply re-assigning spectrum from legacy systems to mobile networks, policymakers need to reform the system that has created a critical shortage of spectrum in the most dynamic sector of the economy while over-allocating spectrum to wasteful and obsolete systems. The spectrum crisis is an opportunity for fundamental reform in the logic of spectrum assignment.

¹ The Information Technology and Innovation Foundation (ITIF) is a non-partisan research and educational institute – a think tank – whose mission is to formulate and promote public policies to advance technological innovation and productivity internationally, in Washington, and in the states. Recognizing the vital role of technology in ensuring prosperity, ITIF focuses on innovation, productivity, and digital economy issues.

² Office of Science and Technology Policy & The National Economic Council, "Four Years of Broadband Growth," June, 2013, http://www.whitehouse.gov/sites/default/files/broadband_report_final.pdf.

An improved system of spectrum assignment would respect the principles that are evident in the operation of actual high-demand, high-performance, and high-efficiency wireless networks. ITIF has written extensively on guiding principles to fuel the expansion of innovative wireless services. In brief, these principles are:

1. Sharing: Prefer assignments that serve multiple users, as commercial networks do, over those for single uses.
2. Application Flexibility: Prefer assignments that support a variety of applications over those that support a single application.
3. Dynamic Capacity Assignment: Prefer networks that allow capacity to be adjusted on demand to those that allocate capacity statically.
4. Technology Upgrade Flexibility: Permit technology upgrade without permission.
5. Aggregation Efficiency: Prefer large allocations over small ones to minimize guardband losses.
6. Appropriate Facilities-Based Competition: Seek an ideal number of networks, a number that is likely to be larger than two and smaller than six in most instances.
7. High-Performance Receivers: Favor systems of high-performance receivers over those that can't tolerate common sources of RF noise.
8. All Relevant Dimensions: Allocate "patches" of spectrum by frequency, power level, place, transmission direction, beam spread, modulation, coding, and time.
9. Promotion of New Technologies: Use rules modification rather than exclusive allocation as a means of enabling the next generation of spectrum technologies.
10. Maximize Redeployment Opportunities: When upgrades to existing systems free up spectrum for new ones, as was the case in the DTV transition, require the upgrade.

These allocation principles can help guide spectrum policy reform under the Update, and we encourage the Committee to examine ITIF's research in detail.³ However, there are a number of the Committee's prompts we would like to address specifically.

Auctions, flexible use licenses, and secondary markets are all successful tools to allocate spectrum rights to socially optimal uses, and should be encouraged. The next steps in liberalizing spectrum management, however, are in transitioning away from technical micromanagement. To the extent possible, we should attempt to shift responsibilities of interference mitigation and

³ See Richard Bennett, "Powering the Mobile Revolution: Principles of Spectrum Allocation," July, 2012 <http://www.itif.org/publications/powering-mobile-revolution-principles-spectrum-allocation>.

coordination to the parties themselves instead of consolidating these functions within the Commission. As long as the details of spectrum management are centralized in one location, inefficient rent-seeking through protracted rulemakings will restrict the flow of spectrum to the highest valued use. To achieve this, we should generally favor policies granting clearly defined spectrum rights with flexible uses over specific, narrow uses that require protection with detailed technical rules.

The FCC's Technological Advisory Council (TAC) has been investigating interference limits policies that can potentially clarify the rights and responsibilities of operators in a way that would help facilitate a move towards more decentralized spectrum management.⁴ These policies, which would specify the amount of interference a licensee would expect to tolerate before having a legitimate claim of harmful interference, would also be an appropriate, light-touch mechanism to incorporate receivers into the regulatory picture without specifying receiver standards or a particular architecture for a band.

As noted in the Committee's White Paper, although cheap receivers have allowed for widespread availability of low-cost consumer devices, their sensitivity to adjacent channel interference can prevent the entry of innovative services and reduce flexibility in service allocation. Considering the tremendous growth in demand for wireless service, and the resulting need to pack diverse systems increasingly close together in frequency and space, new mechanisms to resolve interference disputes will be needed. The mechanisms described in the TAC's White Paper are still experimental and should be introduced incrementally;⁵ however, the Committee is right to be concerned with receiver overload and should consider the proposals.

Continuing to liberalize spectrum management does not necessarily mean a world of only exclusive licenses. Undoubtedly, the right to exclude, *i.e.* the right to protection against interference, is needed to assure uninterrupted mission-critical services and certainly makes a key difference in

⁴ See FCC Technological Advisory Council, Receivers and Spectrum Working Group, "Interference Limits Policy," Feb. 2013, <http://transition.fcc.gov/bureaus/oet/tac/tacdocs/WhitePaperTACInterferenceLimitsv1.0.pdf>.

⁵ The Commission has sought comment on the TAC's recommendation for introduction into the proposed 3.5 GHz Citizens Broadband Radio Service. See *In the Matter of Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Notice of Proposed Rulemaking, FCC 12-148, Dec. 12, 2012, ¶ 141.

incentivizing the heavy investment needed for most wireless architectures. However, unlicensed applications like WiFi have been a tremendous success, add considerable value to the economy, and should be encouraged.⁶ Unlicensed spectrum makes more sense in higher frequency bands, where natural attenuation and absorption help reduce the likelihood of interference. Ideally, unlicensed spectrum will have minimal rules to ensure against interference, allowing for lower cost devices and easier entry. This means that although unlicensed can opportunistically fill gaps in some under-used spectrum like as guard bands, unlicensed spectrum works best in its own bands.

Another key opportunity lies in unlocking access to government spectrum. An Update to the Communications Act should work to include a comprehensive regime to incentivize efficient use of government spectrum, especially that used by the federal government. This is, of course, no small task. Federal spectrum allocations are incredibly complex, and it is unlikely that the NTIA currently has sufficient resources to accurately know how each part of the government is using its spectrum. Clearing and relocating spectrum users is an expensive and difficult process, but a well-designed incentive mechanism can potentially spur more efficient use.

It is important that such mechanisms be designed to avoid simply pushing the problem into the budgetary process. Real incentives, both carrots and sticks, will be needed for legacy systems to realize the true value of this resource. The Obama Administration is in the process of investigating reforms,⁷ and a long-term Communications Act Update should take their findings into account. It is likely that a combination of top-down administrative relocations and a more bottom-up incentive mechanism will be necessary to unlock sufficient government spectrum. In the short term, Congress can take an important step by expanding the scope of the spectrum relocation fund.⁸

⁶ See, e.g., Raul Katz, *Assessment of the Economic Value of Unlicensed Spectrum in the United States*, Feb. 2014.

⁷ See Tom Power, *Request for Information: Agency Incentives to Share or Relinquish Spectrum*, Feb. 2014, <http://www.whitehouse.gov/blog/2014/02/14/request-information-agency-incentives-share-or-relinquish-spectrum>.

⁸ While the Federal Spectrum Incentive Act introduced by Representatives Guthrie and Matsui, proposing a small incentive on top of relocation funds, is a great step in the right direction, but the relocation fund should also be expanded to fund relocation studies, general planning of relocation or sharing, and research into new, more efficient equipment.

It is important that we not let the difficult challenge of relocating federal users prevent full clearing to make way for full access for more socially beneficial uses. Where alternative economically viable technologies or spectrum exists that would allow federal users to continue achieving their mission, full relinquishment of federal spectrum should be preferred. The expenses of coordination and sharing will slow the growth of wireless broadband and increase costs throughout the ecosystem.

Where full relinquishment is not feasible, spectrum sharing holds great promise. Of course, most spectrum is already extensively shared, but recent advances in technology indicate the possibility to automate such sharing at a much more granular level, increasing total spectrum use and improving efficiency. The Commission's proposals for the 3.5 GHz Citizens Broadband Radio Service, which aims to implement many of the PCAST report's spectrum sharing recommendations, will be a key experiment and testing ground for these technologies. Experimentation and further research into the use of sharing technologies should certainly be encouraged, but where the incentive to share is lacking, it is unlikely these innovations will be a panacea.

Spectrum management is a complex and constantly evolving area of policy. A Communications Act Update is an opportunity to take stock of and expand those policies that have led the U.S. to be a global leader in wireless innovation.

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