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To: Committee on Energy and Commerce,
United States House of Representatives

From: Richard Bennett, Visiting Fellow, American Enterprise Institute,
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Subject: Modernizing U.S. Spectrum Policy

This is in response to your ten questions on spectrum policy in the White Paper dated April 1, 2014.

1. *What structural changes, if any, should be made to the FCC to promote efficiency and predictability in spectrum licensing?*

   The FCC's mandate is both too broad and too narrow with respect to licensing. It's too broad because it fails to encompass federal spectrum assignments. An alternate way of addressing federal spectrum use is described in the attached draft, "Blueprint for a Federal Spectrum Service."

2. *What role should unlicensed spectrum play in the wireless ecosystem? How should unlicensed spectrum be allocated and managed for long-term sustainability and flexibility?*

   Unlicensed is currently a one-way gate; once a swath of spectrum is declared unlicensed, its terms of use are impossible to alter and it can't be re-purposed for a higher use. This is already causing problems in the 2.4 GHz band, as both analog and digital systems coexist and interfere with each other (analog baby monitors vs. digital Wi-Fi and Bluetooth systems) and more recent versions of Wi-Fi must coexist with legacy versions that degrade the performance of the more advanced protocols. Unlicensed should best be reconsidered as no-fee license that carries a greater set of terms and conditions than it carries today. One option is to grant a Wi-Fi license for a nominal fee to an organization such as the Wi-Fi Alliance that would enable it to make rules that would require the phase-out of obsolete systems and other adjustments and adaptations.

   Low-cost licenses are important in many settings, but they need not be completely free. There is nothing wrong, in principle, with taxing each Wi-Fi device at point of sale.

3. *What should be done to encourage efficient use of spectrum by government users?*

   This question is addressed by the attached paper, "Blueprint for a Federal

Spectrum Service." In brief, federal spectrum should be transferred to a federally charted corporation mandated to reduce the federal spectrum footprint by 75% over a ten year period.

4. *What other steps can be taken to increase the amount of commercially available spectrum?*

   In addition to the over-allocation of spectrum to federal systems, spectrum is over-allocated to satellite-based systems and to TV broadcasting. The Spectrum Incentive Auction system, if it proves effective, can be applied to the satellite assignments as well. Generally speaking, satellite systems must be segregated from licensed, terrestrial systems except those used for low power unlicensed applications. At present, it appears that the Spectrum rights map must be rationalized to place similarly powerful allocations closer together, but advanced filters may alter the status quo.

5. *Should the Act permit the FCC to use expected auction revenue as the basis for a public interest finding? What criteria should the FCC consider as part of its analysis?*

   Yes, auction revenues are in the public interest and should be considered. The FCC should also consider the ability of licensed systems to serve a broader range of applications, to serve applications more efficiently, and to advance along the technology curve more quickly than non-licensed and un-licensed systems. See the attached paper "Technical Principles of Spectrum Allocation", 2013. *TPRC 41: The 41st Research Conference on Communication, Information and Internet Policy*. Available at SSRN: http://ssrn.com/abstract=2240625

6. *Should all FCC licenses be flexible use? In what instances should the Commission exercise control over the service offered? How can the Act enable better use of spectrum, either flexible or specified?*

   When spectrum is licensed and auction, the terms and conditions of its use need only be specified in technical terms as the auction and subsequent market transfers ensure appropriate use. The Commission, or its successor agency, need only concern itself with interference dynamics, which are partly a function of receiver design. In general, the flexible use model is the most beneficial because it allows continual re-assignment as technologies, markets, and needs change.

7. *What principles should Congress and the FCC consider when addressing spectrum aggregation limits? How has the converging marketplace and growing demand for services changed the discussion of spectrum aggregation?*

   In general, problems of market concentration are antitrust matters best

policed by the Federal Trade Commission and Justice Department after the fact. The FCC has not demonstrated the advanced powers of extra-sensory perception necessary to predict market dynamics many years in the future.

8. [*Should the Act impose build-out requirements?*]

   The larger question is what the Act can do to promote competition and the effective use of spectrum. Many license holders have not deployed spectrum until they've been able to acquire a considerable portfolio covering a large geographic footprint. When a license holder is actively acquiring spectrum, there is no reason for the Act to require immediate deployment. Spectrum is a valuable asset, so there's no reason in principle for speculation in spectrum to be constrained any more severely than speculation in foodstuffs, oil, or water is constrained. Short of severe harm to the public, investors should be allowed to explore a range of strategies.

9. *What is the best balance between mitigating interference concerns and avoiding limiting flexibility in the future? Can engineering and forward-looking spectrum strategies account for the possibility of unanticipated technologies and uses in adjacent spectrum bands? How do we promote flexibility without unreasonably increasing the cost of services and devices? Does the Act provide the FCC tools to address this problem?*

   The current discussion about receiver standards is at a very high level; indeed, some would describe it as little more than hand waving. The issue is that receiver standards depend in the precise definition of a "harm claim threshold" which is no different, in practice, from a transmit power profile. Receivers are only affected by transmissions, so to characterize the noise environment in which receiver must or may operate is also to characterize a transmitter. The only exception would be in terms of peculiar inter-modulation noise, second and third harmonics, and combinations of the effects of multiple transmitters that would be extremely difficult to adjudicate. The Act should be sensitive to advanced research on receiver standards, but as of this moment there is very little substance in the "harm claim threshold" arena.

   It is perfectly sensible, however, for license holders in adjacent frequencies or geographies to mutually agree upon modification to their license terms. These negotiations should generally be encouraged by the Act. It should also empower the Commission or its successor to deal with the holdout problem where modifications to licenses are concerned. Without the ability to modify license terms, it will be impractical to gather licenses in appropriate frequencies by power level.

10. *What role should NTIA play in the licensing and management of spectrum? Is their current role appropriate and necessary, given the potentially duplicative*

functions of the FCC and NTIA in spectrum allocation and assignment?

The fragmentation of spectrum allocation responsibilities between the FCC and NTIA is harmful and counter-productive. In addition, NTIA lacks the power to effectively police spectrum use by federal agencies as the inefficient use of spectrum by agencies proves. NTIA and the FCC's spectrum authority should be consolidated in a single agency that also has the power to improve government spectrum use, conduct auctions, and sponsor research and development.