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Developing a Sustainable Spectrum Strategy for America’s Future
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The National Telecommunications and Information Administration (NTIA) is requesting comments “with regard to development of a comprehensive, long-term national spectrum strategy.” These comments address what we believe should be a critical component of such a strategy: creating incentives for efficient use of government-controlled spectrum.

Over the last half century, the Federal Communications Commission (FCC) has made significant progress in adopting a market-based system for spectrum allocation. A substantial amount of spectrum is flexibly licensed under a quasi-property rights regime. While the government retains formal ownership of the spectrum rights, licensees have latitude to transfer their “rights” to new uses and new users.

Much remains to be done, however, as we move into the next generation—5G—of wireless technology. Realizing the potential of 5G, with its higher broadband speeds and potential for new applications, will require that large amounts of additional spectrum be made available for wireless use.

Much of the spectrum needed for 5G is occupied by the federal government. Federal agencies are able to treat spectrum as a free good, and therefore have an incentive to retain too much. There is thus reason to believe that a significant amount of government-occupied spectrum could be reallocated to more efficient private uses. Providing government agencies with appropriate

incentives to relinquish that spectrum would represent an important step in furthering the transition to a market-based spectrum allocation regime.

Everyone agrees that reforming government use of spectrum by providing those incentives is not easy, but we urge taking the long view. After all, the substantial progress in spectrum allocation that has been achieved thus far has taken the better part of the past 90 years: The regulatory regime in which the FCC allocated blocks of spectrum for specific uses (e.g., radio and television broadcasting) and assigned licenses to specific users was adopted in 1927. Nobel laureate Ronald Coase published his famous article explaining how flexible licenses (quasi-property rights) would allocate spectrum to higher-valued uses in 1959. And it wasn't until 1993 that Congress gave the FCC authority to auction flexible licenses.

We describe below our proposal for improving the incentives for efficient government use of the spectrum. But first it is worth mentioning some current initiatives.

Current Spectrum Sharing Initiatives

The FCC and the NTIA are studying a number of government-occupied spectrum bands to determine the feasibility of “repurposing” them for commercial use or sharing them with commercial users. The FCC is completing a proceeding to determine auction and sharing rules for the 3.5GHz (3550-3700 MHz) band, which has military occupants.

More recently, the NTIA announced it was studying the repurposing of an additional 100 MHz (the 3450-3550 MHz band) also being used by the government, including the Department of Defense (DoD), as mandated by the recently passed MOBILE NOW Act. This is a slow process, typically taking years, at the end of which only a fraction of the 100 MHz may be freed up for commercial use or for sharing. Indeed, this is typical of spectrum reallocations: they take longer and reallocate less than projected. For example, the Obama Administration's National Broadband plan envisioned a significant reallocation of TV spectrum for mobile applications by 2014-2015. The mechanism the FCC adopted to do this—voluntary incentive auctions—targeted 120 MHz, of which only 70 MHz was successfully auctioned. This spectrum is now scheduled to become available in 2020.

The challenge of freeing up government spectrum has frustrated policy makers for a long time—despite (or perhaps because of) an Interdepartment Radio Advisory Committee (IRAC) that

advises the NTIA on spectrum allocation and management issues. The most recent examination of the issue, a 2012 report by the President’s Council of Advisors on Science and Technology (PCAST), reached the following conclusion:

Clearing and reallocation of Federal spectrum for exclusive use is not a sustainable basis for spectrum policy due to the high cost, lengthy time to implement, and disruption to the Federal mission. Sharing of Federal spectrum, however, would provide the basis for economic and social benefits for the Nation.

However, this sharing solution is likely to be suboptimal: Even if government agencies can somehow be induced to share, government activities will reduce the usefulness of the spectrum to private users and the investments they will be willing to undertake. (Sales of encumbered spectrum generally involve lower prices at auction, which indicates its lower value to private-sector users.) The 3.5GHz plan, which entails significant sharing, will provide new evidence on how well such arrangements work.

Indeed, the PCAST report did *not* conclude that sharing is generally the most efficient way to organize spectrum usage. Rather, the report reflected the view that government agencies’ resistance to relinquishing spectrum made that route a losing proposition—and consequently, *as a comparative matter*, sharing was worth pursuing. Indeed, why should government users give up their spectrum rights? From the agency’s perspective, the spectrum is a free resource. Even if the agency has no current use for the spectrum, the option of using it in the future has value.

In this same vein, the “SPECTRUM NOW Act”, recently introduced in both the House and the Senate, provides more funds for government agencies to study the feasibility of relocating or sharing spectrum with private users. But it’s unclear why agencies would be interested in these studies in the first place.

The basic problem is that it is difficult to provide government agencies with appropriate market incentives. Even if a government agency had the option of “selling” spectrum for which it had little or no use, it might be unwilling to do so because budget reallocations might make the net gain to the agency far lower than the selling price, or even zero. It may be difficult to provide an agency with a credible commitment that it will be able to keep its gains. The United Kingdom

has instituted a system of “administered incentive pricing” (AIP) to provide direct price incentives for government agencies to use spectrum more efficiently—with ambiguous results.

The GSA Model—A Government Spectrum Ownership Corporation

There is, however, another route toward incentive-pricing for government-held spectrum that we believe holds more promise: This route is similar to the way that the federal government manages its real estate. The Government Services Administration (GSA) owns or leases much of the office space that is used by federal agencies (with the DoD as a major exception); in turn, the GSA leases that space to government agencies at market-based rental rates. These rental payments provide an incentive for government agencies to economize on space. Agencies take those rental payments into account in determining their real estate usage. GSA can use the rental payments to acquire additional property if necessary. GSA also disposes—i.e., sells or leases to the private sector—surplus property it owns.

The GSA model offers a rough template for how government-held spectrum could be handled. In that spirit, then—as a departure from the incrementalism that the current efforts to reallocate government-held spectrum represent—we propose a radical reform in the way that government spectrum is allocated:

Suppose that *all* government-used spectrum was “owned” by a central government agency—the “Government Spectrum Ownership Corporation” or GSOC—and leased to government agency users. The idea that spectrum-using agencies should pay rental fees to GSOC—and that those rental fees should represent something approximating the opportunity costs of the GSOC’s spectrum holdings—would be similar to government agencies’ paying rent for their use of the GSA’s buildings.

A separate facility to record, manage, and track spectrum uses by 15 separate agencies would create institutional separation from policy decisions made by the IRAC and NTIA. The benefits of a GSOC emanate not only from the incentive-pricing mechanisms, but also from the development of a focused staff to handle multi-billion dollar allocation decisions. Rather than falling deep within the organizational chart beneath NTIA and the Secretary of Commerce, a GSOC could apply best practices from other government property management entities.

Under our proposal, the GSOC would take possession of all government-held spectrum, with the existing user agencies granted annual leases (that are perpetually renewable at the option of the agency) at annual rental rates that are determined by the GSOC, based on its estimates of the relevant opportunity costs. The GSOC would forward its net proceeds to the Treasury. In the first year, OMB would add to each using agency's budget a sum that is just equal to the rental payment, so the first year's financial transactions would be a "wash" for all agencies and would be budget neutral.

In subsequent years, agency budgets would start from the base that included the initial allocations and rental charges; but the GSOC would change the rental rates in light of updated information about opportunity costs. The agencies and OMB would then negotiate (as they do now) over resource usage and budget allocations; but, although the agency's budget would take into account its spectrum rental costs, there need not (and should not) be a one-to-one adjustment in an agency's budget allocation in relation to any changes in its spectrum rental costs. However, to the extent the agency economized on spectrum usage (because it now faces the opportunity cost) one might expect there would be additional funding for other uses, including purchasing more spectrum-efficient transmitters and receivers.

Such a system would provide sensible incentives for agencies to economize on spectrum use. The GSOC would then have a surplus of spectrum to sell or lease to the private sector. The GSOC might set up an auction platform (perhaps together with the FCC) so that surplus spectrum could be routinely auctioned to the private sector (or to other agencies). This would be an efficient way to gather updated information on spectrum opportunity costs. Such a platform might also be used by the private sector as part of the secondary market.

GSOC could also help implement a version of "overlay" licenses for government-occupied bands. Under this arrangement, the government incumbent would retain primary rights to the spectrum it uses, taking into account the required rental payments reflecting opportunity costs. Secondary rights to unused spectrum in the band could be auctioned to commercial users through overlay licenses issued by the federal government. This would open the opportunity for bargaining between those users and the incumbent. For example, the overlay licensee could pay for equipment upgrades for the government user in return for freeing up some of the incumbent's spectrum. In this sense, although overlay licenses have somewhat of the flavor of spectrum "sharing", they would bring

interested parties directly into the picture, who may well be able to find creative ways to induce more efficient use of government-held spectrum.

If we use the 3450-3550 MHz band the NTIA is now studying as an example, this process would work as follows: Rather than engaging in a lengthy review process within NTIA, DoD would be presented with a rental price reflecting the market price of their spectrum as estimated by GSOC. Assume that, to start with, DoD decides to continue with the amount of spectrum from this band it has been occupying, either using the spectrum or holding it in reserve. An amount equal to the rental payment would be added to DoD's appropriation. In subsequent years, DoD might adjust its spectrum use in response to the positive price it has to pay. GSOC could then auction any freed-up spectrum, as well as issuing overlay licenses for commercial use for the spectrum that the DoD retains. GSOC would institutionally be responsible for brokering a resource decision from DoD for how much and how long such spectrum could be leased out. In addition, the overlay licensees may negotiate with DoD to reduce its spectrum use—for example, by paying for more spectrum-efficient equipment or spectrum relocation costs.

A GSOC would manage contracting functions, while NTIA can focus on policy. Professional staff will gain institutional knowledge in measuring spectrum valuations, issuing overlay licenses, and adjusting lease renewals over time. For fairly standardized lease agreements between the public and private sector, a GSOC would better serve the thousands of decisions needed between the public and private sectors as 5G buildout changes over time. The analogy to real estate helps here as well: everyday decisions for leases of federal property do not move through the Department of Interior, but rather through real estate professionals at the GSA.

Several objections have been raised to this GSOC proposal: First, estimating spectrum rents would be difficult—more difficult than for building rents, which is difficult enough—and open to challenge by federal spectrum “tenants”. Estimating market rental rates for spectrum is difficult, it is argued, because of the many different frequency assignments with different characteristics and different geographic areas. While admittedly difficult, obtaining reasonably accurate estimates of spectrum opportunity costs based on auction and secondary market data reflecting spectrum characteristics, geographic area, and other relevant factors, would not seem to be an insurmountable problem. The FCC currently pays economists and other experts tens of millions of dollars to design

and implement auctions. Developing and updating a reliable model to estimate spectrum rental rates would seem, if anything, to be a less difficult task.

Second, it is argued that GSA administers only about 12 percent of the federal building inventory, and major agencies—most notably DoD—administer their own building needs. This has a direct implication for our GSOC proposal: Since the DoD is the largest federal user of spectrum, the greatest gain in spectrum re-allocation would occur if DoD is included in the GSOC domain. However, as the GSA example also reveals, there can be significant improvements in allocative efficiency even if (against our urging) the DoD evades the GSOC.

The fact that DoD had (and no doubt continues to have) a surplus of military bases may be partially attributable to the agency's ability to avoid GSA control of its real estate. Here again there are implications for the DoD's likely surplus of spectrum—but this time the real estate analogy needs a finer distinction:

In the case of surplus military bases, the response was the Building Realignment and Closure (BRAC) process, which has been used four times. Under the BRAC process, an independent commission proposes a set of base closure recommendations, which the Congress must accept or reject in its entirety. The objective is to give individual members of Congress political cover for base closures that would inflict economic pain on their constituents.

A BRAC approach has been proposed for spectrum; but such an approach misses the point, because local politics (as represented in the Congress) is not the impediment to spectrum reform. Rather, as discussed above, the problem is a lack of appropriate incentives facing the agencies themselves.

Of course, no government agency will be happy to give up its current de facto ownership of “free” spectrum; but agencies also aren't happy about having to pay rent to the GSA for office space or to pay for office supplies, either. The change would have to be put in the context of better overall management of a multi-billion dollar resource. Modern best practices can be applied to federal spectrum, and a GSOC would be a vast advance from the interagency structure of the 1930s currently used by committees within NTIA/IRAC. Again, including all agencies, with no exemption for the DoD, would yield the largest economic benefits. And the first-year budget neutrality would be necessary for a smooth transition.

Real estate is often used as a metaphor for spectrum and its use. “Beachfront property” is a common descriptor for spectrum that has especially good attributes. This real estate analogy should be carried over to federal spectrum management. The GSA, established in 1949, is a good place to start. The GSOC, perhaps established in the 2020s, would be a good place to continue, especially in a new century of wireless innovation.