

GETTING AWAY FROM GOSPLAN

A BRAC-like effort is needed to repurpose federal spectrum.

◆ BY BRENT SKORUP

Describing the U.S. system of spectrum allocation, former Federal Communications Commission officials Gerald Faulhaber and David Farber have written, “[The] current system is similar to that of the former Soviet Union’s GOSPLAN agency, which allocated scarce resources by administrative fiat among factories and other producers in the Soviet economy.” The U.S. spectrum regulatory framework, still largely intact since 1927, severely distorts the 21st century technology industry and harms consumers with higher prices and lack of choice. As in many countries, the U.S. government possesses a majority of the most valuable radio spectrum and pays virtually nothing for this natural resource. Audits by the Government Accountability Office and independent groups have made clear that federal spectrum is used ineffectively and that reforms are long overdue. President Obama and his Federal Communications Commission appointees have, at some political risk, prioritized making substantial amounts of spectrum available for wireless broadband use, including spectrum currently used by federal agencies and the military.

The consumer demand in recent years for mobile broadband services—such as streaming Netflix, Voice-over-Internet Protocol, and Facebook use via smartphones and tablets—is unprecedented and strains the current capacity of wireless carriers. Building more cell towers and laying more cables will increase capacity, but increasing the supply of radio spectrum is also needed. For this reason, Congress and the Obama administration examined spectrum management at the National Telecommunications and Information Administration (NTIA), which oversees federal agencies’ spectrum, and the FCC, which regulates non-federal spectrum. A growing consensus among experts is that federally

held spectrum is lightly used and much of it would be better redeployed for commercial uses that accommodate consumer demands and expand the U.S. economy.

Before repurposing federal spectrum can take place, however, Congress must address two major spectrum management problems. The first is that there exists no reliable process for repurposing federal spectrum and selling it for more productive commercial uses in the relatively short term (that is, the next five to 10 years). The second problem is that federal agencies receive almost no price signals that would encourage efficient use of this valuable input. The FCC and NTIA gave federal users spectrum for free, often decades ago, and from the agencies’ perspective it is a free resource. Predictably, overuse abounds and billions of dollars of social welfare are squandered annually as a result. In the short term, Congress should create a temporary independent spectrum commission that has the authority to relocate federal systems to other spectrum bands and transfer federal spectrum to the FCC for auction. In the long term, Congress should establish a permanent agency that possesses the remaining federal spectrum and leases it out at approximately market rates, imitating the GSA’s practice of leasing out real estate and buildings to federal agencies.

BACKGROUND: RADIO SPECTRUM ALLOCATION

Today, the FCC and the president share spectrum management authority. The 1934 Communications Act gives the FCC authority to assign spectrum for commercial users and gives the president authority to regulate government-held spectrum. Presidents delegate this authority to the Department of Commerce, and specifically to the NTIA. Whether a band becomes “federal” or “nonfederal” spectrum is settled by informal agreement between the FCC and NTIA.

For well over a century, individuals and governments have used radio spectrum for communications. As the early technol-

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ogy advanced, it became possible to segment and apportion spectrum to different users. When national governments at the beginning of the 20th century first realized that spectrum was valuable and scarce (in the economic sense), many seized spectrum as the exclusive property of the state. The U.S. government, however, in the years following World War I, segregated government-controlled and privately controlled spectrum. The government treated privately controlled spectrum as the collective property of all Americans, with the federal government merely assuring its orderly use on a first-come, first-served basis so as to prevent interference. Before the 1927 Radio Act, typical radio licensing was amateur radio enthusiasts registering their use with the Department of Commerce. Commerce had no authority to reject applications to broadcast on the airwaves if a band was unoccupied.

This laissez-faire approach ended in the 1920s. By 1923, a technological marvel—broadcast radio—was sweeping the country. Scarcity became an issue and consumers and the broadcasting industry demanded more spectrum. In turn, Congress reassigned a large portion of then-usable spectrum for commercial broadcast use. Previously fallow spectrum became intensively used as technology improved and a new legal framework was needed to accommodate the onslaught of commercial broadcast use of radio frequencies.

As economist Thomas Hazlett explains in a seminal article on the subject, courts began giving broadcasters property-like rights

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to use the frequencies in the 1920s, provoking Congress, at the direction of Secretary of Commerce Herbert Hoover, to pass a major new law making spectrum public property and subject to substantial regulation. The ensuing 1927 Radio Act was not only a framework for commercial broadcast, but an extensive regulatory regime for the management of all radio spectrum. The Radio Act excessively zoned the frequencies according to administrative determinations of social “necessity” and nebulous conceptions of the “public interest.”

In the decades that followed, the FCC held hearings and determined what wireless services were needed and how much spectrum those services required (called “allocation”). The distribution of zoned spectrum (called “assignment”) was granted at no cost to FCC- and NTIA-approved licensees. The Supreme

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Court later justified the severe regulation of spectrum because the frequencies are a “scarce resource whose use could be regulated and rationalized only by the Government.” Economist Ronald Coase explained in his seminal 1959 paper “The Federal Communications Commission” why this reasoning is faulty: virtually all resources are scarce and scarcity of spectrum is not a justification for government allocation of spectrum over market allocation any more than the scarcity of beef, grain, and fruit justifies government allocation of groceries:

It is true that some mechanism has to be employed to decide who, out of many claimants, should be allowed to use the scarce resource. But the way this is usually done in the American economic system is to employ the price mechanism.

Spectrum is most efficiently used when in the hands of private users who internalize the benefits and costs of deploying the input, and can later sell it to parties who value it more.

These theories slowly gained support in the ensuing decades, first among academics and then from policymakers. The FCC has adopted market-based prescriptions to some extent. Congress limited the time-consuming allocation and assignment proceedings by amending the 1934 Communications Act in 1993 and authorizing the FCC to conduct spectrum auctions over some slivers of spectrum. The NTIA and Congress, however, have not embraced the view that the federal government should pay market rates for spectrum just as it pays market rates for other indispensable inputs.

THE RISE OF MOBILE BROADBAND AND THE SPECTRUM CRUNCH

Electromagnetic spectrum usage resembles the progress of the evolution of radio technology. The low end (around 3 kHz) is allocated for long-distance maritime signals. At the high end (300 GHz), transmissions are used for radio astronomy applications. Most mass-market technologies—AM radio, broadcast television, FM radio, mobile phones, satellite television, and many other services—are in between. Each generation of technology stimulated more demand for spectrum and brought higher, previously worthless frequencies into commercial and federal use.

The band between approximately 300 MHz and 3 GHz is frequently called “beachfront” spectrum by wireless experts because transmissions in this bandwidth can travel long distances and through walls. That makes it highly desirable for wireless services like cellphone calls, satellite communications, television broadcasts, and mobile broadband. Because of its favorable characteristics, this beachfront band is the focus of most proposals to repurpose federal spectrum.

The FCC has raised tens of billions of dollars through spectrum auctions in the beachfront bands, which began in the mid-1990s. These are substantial sums, but the consumer and

social value of today’s wireless ecosystem dwarfs the auction values. Tremendous economic losses occur, however, when spectrum is withheld from sale because consumers derive substantial value from spectrum availability not captured in auction receipts. Hazlett and fellow economist Robert Muñoz estimate the economic losses from misallocation of existing spectrum are hundreds of billions of dollars annually. The lost innovation value is not amenable to economic calculation, but the Hudson Institute’s Harold Furchtgott-Roth, a former FCC commissioner, estimates this cost may be even greater than the substantial losses arising from zoning spectrum and not auctioning it. He notes that many American firms—such as Cisco, Qualcomm, Apple, Google, and Amazon—have a disproportionate role in driving economic value and innovation in one of the few bright spots in the U.S. economy: the wireless sector.

Scholars and government experts have noted the perpetual demand for more wireless communications services since the creation of mass-market cellphones in the 1990s. Those demands have increased dramatically since the mid-2000s with the creation of mobile broadband and the ensuing ubiquity of smartphones and tablets. Cisco estimates that a single smartphone generates about as much mobile traffic as 50 traditional cellphones, and a tablet as much as 120 cellphones. In 2008, only 11 percent of U.S. wireless subscribers had smartphones. Midway through 2013, smartphone ownership surged past 60 percent of subscribers. Bandwidth demands will intensify as more consumers upgrade to 4G-capable devices, which consume even more data than non-4G devices because 4G makes more Internet applications usable. Data-heavy applications like video streaming—using applications like YouTube, Netflix, and Hulu—have overwhelmed some networks and compelled carriers to look for technological improvements and additional spectrum to cater to consumer needs.

FCC Chairman Julius Genachowski has remarked: “Demand for spectrum is rapidly outstripping supply. The networks we have today won’t be able to handle consumer and business needs.” In 2013 there were 608 MHz being used for mobile broadband, and the International Telecommunication Agency (ITU), a specialized agency of the United Nations, estimates that industrialized countries like the United States will need around 1300–1700 MHz for mobile broadband by 2020. While experts optimistically estimate that incentive auctions—authorized by Congress in 2012—will retrieve 120 MHz from television broadcasters, that amount is well short of the ITU’s goals. This government-created shortage of spectrum increases prices, reduces broadband access, slows speeds, and reduces economic growth. While technology is improving and carriers are building more base stations and towers, which permit more broadband traffic, these are expensive ways to improve spectrum use. The FCC estimated in 2010 that freeing 275 MHz of spectrum for commercial use by 2014 would save carriers more than \$120 billion in capital investments. The new mobile demands simply

require more radio spectrum. Many scholars now look to the broad swaths of government spectrum to replenish much of the projected commercial spectrum shortfall.

GOVERNMENT USE OF SPECTRUM

No unallocated spectrum remains, and the consensus among telecom economists is that federal spectrum is used inefficiently relative to commercial frequencies. Yet, the federal government is the largest holder of spectrum in the United States. Today, counting exclusively held and shared spectrum, the U.S. government

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possesses over half—some 1500 MHz—of beachfront spectrum. Over 60 federal agencies use these valuable bands, typically for voice and data communications. However, because there are no market signals for federal users, it is impossible to determine the extent of “surplus” federal spectrum.

Government agencies buy most inputs—things like labor, real estate, aircraft, and tanks—at approximately the market price. Not so with spectrum, and it distorts federal usage of the resource. With millions of consumer devices and government systems using the resource, spectrum is therefore very expensive, but according to the NTIA, federal agencies pay merely \$122 annually per assignment of spectrum—a tiny fraction of the market value. In 2012 the President’s Council of Advisers on Science and Technology concluded in an influential report that “federal users currently have no incentives to improve the efficiency with which they use their own spectrum allocation, nor does the Federal system as a whole have incentives to improve its overall efficiency.”

Because they face no opportunity costs, efficient federal spectrum management is, based on the findings of government audits, essentially a non-priority for the agencies. The cost of additional spectrum will always be below the cost of efficiency-improving technology, so agencies are predisposed to acquire more spectrum than they would acquire if they faced the higher costs. Since acquisition is less costly than investing in and upgrading equipment, many agencies are not careful monitors of their airwave usage. For example, the GAO released a report to congressional committees in April 2011 about the NTIA’s spectrum management and called for dramatic improvement. The

report’s findings were troubling. The GAO could not even begin to assess the NTIA’s spectrum management capabilities because of “an antiquated data collection system” and “significant inaccuracies.” One agency revealed that half its assignment records in the Detroit metropolitan area were inaccurate. Another agency found that 25 percent of one department’s assignments were unused. There was no evidence that most agencies completed any site surveys or records reviews at all.

The information we do have about government use of spectrum is inadequate if it exists, often incomplete because of classified information, and likely only hints at the magnitude of inefficient use. The lack of basic information about utilization by agencies is one of the reasons it is so difficult to quantify the waste from inefficient assignments. When the GAO questioned government users about their management of spectrum, it became clear that even the NTIA has relatively little knowledge about whether spectrum at the agency level is used efficiently, and federal spectrum managers have no way of knowing whether the information provided to them is accurate. Indicative of

the chaos, the GAO reported that in one case, a completely unrecorded system emitted transmissions for an unknown number of years before a commercial user who had purchased the federal spectrum at auction complained of the interfering signal.

RECOMMENDATIONS

Policymakers need to address two related issues to rationalize federal spectrum use. The relatively short-term need is for an effective reform in repurposing lightly used federal spectrum in the next few years. In the longer term, the law should be amended to recognize that spectrum is an input and should not be free to federal users. The NTIA and the FCC cannot gauge the amount of (nearly) free spectrum federal agencies need any more than they can gauge how much free steel, labor, or real property agencies need to operate. Like other operations inputs, federal users should budget for and purchase spectrum. Prices signal the opportunity costs of inputs and ensure more efficient use of scarce resources.

Reform the repurposing process / Getting as much spectrum as possible to licensees with liberal and exclusive rights is the best way to avoid the delay and waste of allocations. Progress has been slow, but unprecedented consumer demands mean that old allocations are increasingly wasteful. Policymakers should thus move quickly to extend a liberalized regime over federal spectrum through a modified version of the system used for the Base Realignment and Closure (BRAC) process. Overlay auctions, particularly, have proven successful at incentivizing agencies to

voluntarily vacate their spectrum holdings.

A BRAC for spectrum / Opponents to spectrum reform often cite national security concerns to impede further legislative action. It is difficult for even veteran telecom experts to discern legitimate concerns from what is simply agency self-interest and status quo bias. A proposed way to eliminate some of the substantial political obstacles to freeing federal—particularly military—spectrum is to use the strategy crafted for closing military bases. BRAC arose because there was a congressional consensus in the 1980s that bases needed to be closed with the winding down of the Cold War, but it was impossible to close bases one-by-one. Congress members could not stomach the ensuing backlash once bases in their districts were publicly considered for closure.

Seeing the necessity of closing bases but also the political impediments, Rep. Dick Armey (R-Texas) proposed the BRAC bill. The BRAC Commission was created to recommend the closure of bases. BRAC took the decision out of Congress's direct control—thus mitigating the political liability associated with base closures—and managed to close hundreds of military installations. Once BRAC made a closure decision, Congress could not undo the move absent a joint resolution—a fairly difficult task, and intentionally so. Political entrepreneurs in Congress see similar dynamics at play in repurposing federal spectrum—including the political liability that comes with selling national defense resources like spectrum—and crafted proposals tying congressional hands from interfering with relocating federal spectrum users.

Sen. Larry Pressler (R-S.D.) first suggested a BRAC-like commission for federal spectrum in 1996, but the idea went nowhere. In a proposal to the 2011 “super committee” on federal finances, Rep. Adam Kinzinger (R-Ill.) and Sen. Mark Kirk (R-Ill.) resurrected the Pressler idea, offering steps to “BRAC the Spectrum.” In February 2012, Rep. Kinzinger introduced a bill to a House committee that would create a nine-member independent Federal Spectrum Reallocation Commission. The bill requires the commerce secretary to identify and recommend federal spectrum bands for reallocation. A Reallocation Commission would review the recommendations and submit its recommendations to the president. Whatever recommendations the president approved would be implemented and the FCC would commence an auction for those bands within two years, absent a joint resolution from Congress disapproving of the recommendations. Currently, however, the Kinzinger bill has not been brought to a vote.

The bill is a good start and a BRAC-like spectrum reform agency should be established and given various powers to discover what federal systems exist and to compel federal and state

agencies to vacate the bandwidth. This should be a temporary independent agency that exists for only a few years to accelerate the identification, repurposing, and reallocation of federal spectrum. Once agencies are paying approximately market value for their spectrum (a longer-term goal described in the next section), this agency should be disbanded. When pricing is in place, there should not be a pressing need to repurpose federal spectrum through this agency because federal agencies will pay for spectrum use and the distortions present today will be diminished.

Overlay licenses / Such a commission has a few tools for making federal spectrum commercially available. Hazlett and other economists point out that the FCC used the auction of overlay licenses in the 1990s and 2000s to clear billions of dollars' worth of spectrum held by government and nongovernment

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institutions. The FCC's experience with overlays makes this the most promising way of getting federal spectrum “online” fairly quickly once a BRAC-like commission identifies certain bands for auction.

Overlay licenses are flexible-use licenses that have few, if any, use restrictions. Purchasing an overlay license is like purchasing real property that has tenants with an unexpired lease. The tenants have a superior right to use the property, but at a high enough price that they may be willing to abandon the property. The benefit to overlay licenses is that they encourage voluntary settlements between the incumbent user—in this case, a federal agency—and the new service provider. The auction winner receives primary rights to any unused spectrum and secondary rights to spectrum in the band that is used by an incumbent. These licenses are generally accompanied by a deadline for the incumbent users to move out of the band. Before that deadline, the overlay licensees must protect the existing users in the band, but they also reap the rewards if they can convince the incumbents to move or repack to another band.

Overlay licenses were first used in the Personal Communications Service (PCS) license auctions in 1995, which today are used by mobile carriers. The incumbent users in the band were microwave communications systems that were critical for public safety operations and utility companies. Despite outcry that the systems and thousands of users could not be moved, PCS overlay

licensees successfully moved the systems. Incumbents had the right to continue operations until a certain date and could be reimbursed by the overlay licensee to deploy similar systems.

Recent congressional efforts have also achieved success in relocating federal users through overlay licenses. In 2004, Congress passed the Commercial Spectrum Enhancement Act, which streamlined funding for federal agencies vacating spectrum via overlay auctions. The law facilitated the removal of two dozen federal agencies and their dozens of systems from 45 MHz of “AWS-1” spectrum via overlay auctions. Combined with another 45 MHz band, the auction raised nearly \$14 billion in 2006 and is already online and used by millions of consumer devices. The 2012 amendments to the law made spectrum-sharing costs a reimbursable cost, which will make future relocations easier on incumbents.

Price federal spectrum / As Milton Mueller observed in a 1982 *Cato Policy Analysis*, “With practically every other scarce good, the military must justify its needs to the Congress. Radio communication rights, in contrast, are granted free.” Toward that end:

Spectrum fees / Some countries have applied spectrum fees to government users, which generally attempt to approximate the opportunity cost of the spectrum so that users internalize the social value of the spectrum they occupy. If the opportunity cost fees are high, a user will be induced to use less spectrum to reduce its fees or leave the space completely and sell the cleared spectrum for higher-valued uses.

In a 2010 paper, telecom scholars Thomas Lenard, Lawrence J. White, and James Riso propose the creation of a “GSA for federal spectrum.” This proposal is rooted in Coase’s commonsense point that federal agencies pay market prices for most of their important inputs—real property, personnel, aircraft, munitions—so why should they receive spectrum for free? The GSA, they explain, owns many buildings that it leases or sells to federal agencies. The GSA charges agencies the approximate market rental price—opportunity cost—of those properties. In this way, federal agencies receive market signals about the costs of the property they occupy. Agencies must decide between competing priorities, choosing what to purchase and what to relinquish.

Lenard, White, and Riso propose that Congress create a federal agency—the Government Spectrum Ownership Corporation (GSOC)—that would “own” all federal spectrum and lease it to government users, much as the GSA leases real property and facilities to federal agencies and takes in rental payments. The GSOC would approximate market prices based on commercial spectrum valuations and adjust annual “rents” accordingly, depositing the net proceeds in the Treasury. To make this more politically palatable, the authors propose that all first-year “rents” be deposited back with the agencies that paid them. That way, Congress is not tempted to supplement the agency budgets and undermine the incentive effects of paying for spectrum. The amount “refunded” to the agencies in subsequent years could be gradually diminished

until all spectrum rent payments are paid to the GSOC and into the Treasury. Eventually, the system would encourage agencies to economize on scarce spectrum, much as agencies economize on other operational inputs.

CONCLUSION

As Glen O. Robinson observed in a 1998 paper, “The true ‘public interest’ lies in removing obstacles to efficient use of the radio spectrum and allowing it to seek its highest valued use to the public.” There are willing buyers, there is a need, and there are mechanisms in place—auctions and flexible-use licenses—to ensure efficient allocation of spectrum. Unfortunately, the incumbent federal users are reluctant, if not outright averse, to relinquishing their spectrum.

Demand increases rapidly and political pressures are building to make more spectrum available for private and commercial uses. The president has asked for the release of federal spectrum and the NTIA is making some efforts at complying. But with every passing year, tens of billions of dollars of value evaporate. This spectrum shortage is leading to higher prices, less broadband access, slower speeds, and reduced economic growth.

Through overlay licenses and spectrum fees, it may be possible to repurpose federal spectrum and safely relocate federal wireless systems. The creation of a BRAC-like agency would alleviate some of the immediate political resistance. In the long term, a GSA-like agency should be created to incentivize efficient use of federal spectrum. Still, congressional pressure will be necessary to compel federal users to produce accurate recordkeeping of spectrum uses and transparency about how nonclassified systems are using spectrum. By educating policymakers and the public on these alternatives, hopefully spectrum management can look less like the Soviet GOSPLAN and more like a market. R

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