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Market-Driven Spectrum Reform

by
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This chapter addresses how to improve the way government distributes the electromagnetic spectrum among different uses and users. The economics and science of this issue can become very technical, perhaps why Congress did not address general spectrum reform in the Telecommunications Act of 1996. But spectrum reform is one of the most important issues in technology policy. Land would not have been put to its best use in the 19th century without a system that allowed pioneers to “stake a claim” for plots. Similarly, wireless communication cannot thrive unless the rules of the road support a market in spectrum.

What is the spectrum? The wavelengths upon which televisions, radios, satellite transponders, wireless phones, and microwave dishes receive messages are called the “electromagnetic spectrum.” This spectrum includes radio waves, relatively long waves that travel through solid objects and over great distances. Radio waves (“ultrasonics”) are used in broadcasting by AM radio (one megahertz)¹ and FM radio (100 Mhz), cellular phones (800 Mhz), and digital phones (1850 to 1900 Mhz). Microwaves, used for communications and cooking, are very short waves that bounce off rain drops or snow flakes and travel limited distances (2,450 Mhz). Television uses both ultrasonic and microwaves.

The myth about spectrum is that it is “scarce” in a way that houses and apples and good tailors are not. In truth, there is almost no limit on the capacity of the spectrum, because the technology to use new frequencies and tune out interference keeps improving.² The spectrum does not exist as a physical substance that can be used up. It is a phenomenon created by the “send” and “receive” gizmos on different gadgets. As computer technology upgrades, the spectrum expands. But, just like houses and apples and tailors, *all* resources are scarce, in the sense that two people cannot build a house on exactly the same piece of property at the same time. Spectrum is scarce that way, too: two radio stations beaming out over the same wavelength in the same area

would be unintelligible. Therefore, a system of property rights is necessary, even in a world of growing abundance, to decide between conflicting users.

The idea behind spectrum reform. In the 1920s and 1930s, when the Communications Act was written, the dominant view was that spectrum needed to be managed by the government to control interference and to allocate this “scarce resource” so as to protect the “public interest.” Economist Ronald Coase noted that spectrum could be treated as property, and transferred as freely as real estate, which would protect against interference while avoiding the inefficiencies and rent-seeking inevitable under a regime of government licensing.³

Coase was ignored, however, and government control over the spectrum did indeed become a restraint on competition and innovation.⁴ FCC doled out licenses, sometimes after hearings and sometimes by lottery, but always s-l-o-w-l-y. Spectrum could not be reallocated to new services, such as cell phones, and FCC became a drag on the productivity of the national economy. The decade-long delay in allocating spectrum for mobile cellular telephony in the United States is estimated to have cost at least \$86 billion in lost consumer welfare.⁵

Markets are superior to bureaucratic processes because they allow change and competition, and move resources to their highest valued uses in society. To have markets in spectrum, one must satisfy the following conditions:⁶

- ☞ **Certainty.** Investors in spectrum technology need stable and predictable long-term rights in spectrum, including protection from governmental interference and protection from sudden policy changes or government seizures.

- ☞ **Transferability.** The spectrum holder should be free to trade or lease spectrum without cumbersome licensing or other restrictions.

- ☞ **Flexibility.** The spectrum holder should be free to use the spectrum to provide any service the market demands.

- ☞ **Availability.** Spectrum should be made available to the private sector to be used to provide services, not held dormant or reserved for government users.

In an early step toward reform, Congress passed the Omnibus Budget Reconciliation Act of 1993, authorizing FCC to award wireless licenses

through auctions. Today, new demand for spectrum for Internet access, voice and video applications, and data services will drive policymakers toward more far-reaching reforms. Currently, only about 6 percent of the communications spectrum is managed in a way that satisfies the four conditions for a market in spectrum; over the next few decades, FCC will bring market forces to about 25 percent of the spectrum by opening up more unused spectrum, making regulatory changes, and auctioning returned spectrum now used for analog television.⁷

Spectrum auctions: cash cow for Congress, or economic engine?

The spectrum is valuable property—especially when the government has for decades maintained a regulatory choke hold on the supply. Some of the first spectrum FCC sold at auction raised billions for the US Treasury. But in 1997, FCC's auction for Wireless Communications Services (WCS) raised only about \$14 million, instead of the expected \$3 billion.⁸ The auction took place before entrepreneurs knew what technologies could best use the new spectrum. In response, in the 1997 Budget Act, Congress required FCC to establish minimum opening bids in future auctions, unless FCC finds this not to be in the public interest.⁹ The wisdom of this was hotly debated, as auctions were not intended as revenue raisers.¹⁰ As FCC tries to set minimum bids high enough to please the budgeters, but low enough to avoid discouraging would-be bidders, the issue remains alive.

Raising money is not the main reason to support spectrum auctions. Their main benefit is that they use market forces to move spectrum quickly in response to consumer demand. Thus, when auctions were first authorized in 1993, FCC was forbidden to take into account how much money the Treasury would raise in considering whether to hold auctions. This was good policy, and should be reinstated. If the government views auctions as a source of revenue, it is tempted to act like the worst kind of monopolist, releasing spectrum into the market in tiny trickles, extending the artificial scarcity of spectrum to hold up the price. The recent WCS auction did not raise the money that was expected, but it did allow the participation of start-ups with relatively little capital. Lower prices for auctions would help smaller businesses participate in the bidding without the need for a trumped-up small-business auction.¹¹

The problem of auctions raising less money than expected—or the opposite concern of drawing wildly inflated bids—cannot be wholly abol-

ished. Spectrum, like everything else, has no objective value except what bidders are willing to pay in the market. Since the market for spectrum *is* the auction (and secondary trading that follows), it will be difficult for government to estimate its value *before* the auction to set an appropriate minimum bid or to predict revenue yields.

Congress should not overreact to these problems. The auction is a crucial device for getting the spectrum out into the market to lower the costs of communications and increase productivity. Even if some spectrum is sold cheaply or before its optimal use becomes clear, auctions will be a success simply because they get the spectrum out to the private sector.

Once spectrum is released, as long as secondary trading is allowed, the market can correctly set the value for spectrum regardless of whether the estimates in the original auction were too high or too low.

Release government spectrum for private use. Another desirable reform is for Congress to make available for other uses spectrum now set aside for the government, which is under-used. Government users (*i.e.*, public safety and defense) enjoy exclusive or preferential use of some spectrum. Much of this bounty is used inefficiently. FAA, for example, is currently facing a serious shortage of radio frequencies for air-traffic control, but the agency still uses wasteful analog technology.¹²

Military and public-safety interests argue that spectrum must be “reserved” for government use.¹³ But our economy does not set aside typists, cars, or paper for government use, even though these are also required for public safety and defense. Government bids for these resources in competition with the private sector, or contracts out with private companies to provide services employing those resources. Markets in spectrum would mean that if government’s needs for spectrum expand, it would be free to buy rights to use more in the market. If the government were competing with private buyers for spectrum now set aside for its exclusive use, it would have an incentive to use spectrum more efficiently.

Secondary markets in spectrum. Secondary markets exist when spectrum users have the right to sell spectrum obtained from the government to others in the private sector, to lease it, or to offer a share in the venture to a new investor.

Today, wireless phone companies can sell their operations, subject to a usually cursory “public interest” review at FCC. On November 9, 2000, the

Federal Communications Commission announced new plans to encourage “secondary markets” in the spectrum used by wireless companies (the new policy is understood to apply to all wireless companies except broadcasters).¹⁴ FCC’s current plan is to continue to remove “unnecessary barriers”¹⁵ to the formation of healthy secondary markets by making it much easier for the owners of spectrum licenses to lease spectrum to others. (The agency should completely abandon its “public interest” inquiry, as the government is not in a good position to second-guess the decisions of the entrepreneurs making the sale.)

Spectrum flexibility. FCC has also reaffirmed its support for “spectrum flexibility” reforms.¹⁶ These would help licensees whose licenses lock them into continuing an obsolete or sub-optimal service. For example, a mobile-radio licensee may invent a new use of its assigned spectrum—but be unable to act because its innovation is not technically a “mobile” service. Petitioning FCC for a waiver of restrictions in its license would take years, by which time the company would lose its competitive advantage—and its investors. Spectrum flexibility is important to broadcasters as well as to wireless point-to-point communications companies. Broadcasters who want to use at least some of their analog-TV spectrum for data transmission or other services should be free to do so, which would help them hedge against the uncertainty of their risky rollout of HDTV.¹⁷

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¹ George Gilder, *Telecosm: How Infinite Bandwidth Will Revolutionize Our World* (New York: Simon & Schuster, 2000), p. 17. One hertz is equal to beating a drum once per second; a Megahertz is one million hertz, a Gigahertz one billion hertz, and a Terahertz one trillion hertz.

² *Ibid.*, p. 16.

³ Ronald Coase, “The Federal Communications Commission,” 2 *J.L. & Econ.* 1, 17-35 (1959). For practical plans for carrying out this idea, see Arthur De Vany, “A Property System for Market Allocation of the Electromagnetic Spectrum: A Legal-Economic-Engineering Study,” 21 *Stan. L. Rev.* 1499 (1969); Jora Minasian, “Property Rights in Radiation: An Alternative Approach to Radio Frequency Allocation,” 18 *J.L. & Econ.* 221 (1975).

⁴ See, e.g., Ira Brodsky, “Who Used Up the Radio Spectrum? Treating the Broadcast Spectrum as a Free but Scarce Resource Has Led to Hoarding, Inefficiency, and Waste,” *Business Communications Review* (January 1992), p. 45.

⁵ Robert W. Crandall and J. Gregor Sidak, “Competition and Regulatory Policies for Interactive Broadband Networks,” 68 *S. Cal. L. Rev.* 1203, 1237 n. 29 (1995).

⁶ See *Statement of Evan Kwerel, Office of Plans and Policy, Federal Communications Commission*, at Comdex 2000, Las Vegas, Nevada, 14 November 2000.

⁷ Ibid.

⁸ Tam Harbert, "Into Thin Air; The FCC's Spectrum Auctions Prove Failures," *Electronic Business* (February 1998), p. 42. The WCS Auction was expected to raise almost \$3 billion, but raised only \$13.6 million, and some bidders walked away with licenses for as little as \$1.

⁹ 47 U.S.C. § 309(j)(4)(F) (1997); see *The Conference Report to the Budget Act*, H. R. Rep. No. 217, 105th Congress, 1st Session, 573 (1997).

¹⁰ "Congress To Include Rules in Budget Bill To Protect Against Future Spectrum Auction Embarrassments," *PCS Week*, 18 June 1997. Rep. John Dingell (D-Mich.) asked, "Are we going to deal with [the spectrum issue from] a standpoint of the national interest, or is it going to be dealt with just as a short-sighted attempt to raise money to balance the federal budget?", adding that the minimum bid would "show a fine budgetary judgment that is totally unrelated to reality...We do not know what frequencies will be available. We do not know what the value will be. [The amendment calling for a minimum] is a bad one."

¹¹ Bill Frezza, "Opening Spectrum Is Better Than Opening More Wallets," *InternetWeek*, 19 May 1997. ("Where would we be now if Andy Grove, Bill Gates and Steve Jobs had to pay a billion dollar entrance fee to launch their ventures? How do we expect to get serious competition for the incumbent telco monopolists if barriers to entry aren't lowered? What better way to bring choice to consumers than getting as much cheap spectrum out there as soon as possible?")

¹² Don Phillips, "Radio Crunch Threatens Air Travel," *The Washington Post*, 13 November 2000.

¹³ See, e.g., "Statement of General Campbell, Joint Hearing of the Military Procurement Subcommittee and Military Research and Development Subcommittee of the House National Security Committee," *Federal News Service*, 5 March 1998, in which he says, "Sir, the spectrum is a national asset. It's absolutely critical for national defense. And we need a national strategy, in my view, to protect it...[T]here should be a moratorium on further sell-off of the spectrum until that national strategy has been replaced." At the same hearing, Rep. Curt Weldon (R-Pa.) stated "we should protect some of the frequency of the spectrum for public safety purposes. I mean, we have situations now where public safety units can't communicate one with the other. And there's no available spectrum for them."

¹⁴ Federal Communications Commission, "FCC Takes Steps to Make More Spectrum Available Through the Development of Secondary Markets," news release, 9 November 2000; available at www.fcc.gov.

¹⁵ Ibid.

¹⁶ Ibid.

¹⁷ See Joel Brinkley, "Digital TV Era Still Remains Out of Reach," *The New York Times*, 7 August 2000.