

# Allocating Airwaves

BY TIM SABLİK

The 21st century has witnessed the decline of broadcast media and the rise of wireless communication. In the 1960s, nearly all TV-owning households in the United States relied solely on over-the-air broadcast transmissions; today, only about 7 percent do. In contrast, data traffic in the United States from smartphones and other wireless devices ballooned from 388 billion megabytes per year in 2010 to nearly 1.5 trillion megabytes in 2012, nearly a fourfold increase. The spectrum currently allocated to broadcast TV is highly desired by mobile providers because of its ability to carry signals over long distances and penetrate obstructions like buildings. In its 2010 National Broadband Plan, the Federal Communications Commission (FCC) set a goal of making slightly over 40 percent of that spectrum available for new uses through a new “incentive auction” process.

That auction was scheduled to take place this year but was delayed until mid-2015 due to its complexity. While the FCC has conducted nearly 100 spectrum auctions since 1994, they were mostly conventional “one-sided” auctions — participants bid on a predetermined supply of spectrum. The incentive auctions will be “two-sided” — one auction to determine supply and one to determine demand. In the supply auctions, better known as “reverse” auctions, TV licensees will place bids signaling the amount of money they would accept either to cease broadcasting or to share spectrum with another station. TV stations also have the option to continue broadcasting. The FCC will then move the spectrum allocations of the remaining TV stations to create a continuous band of free spectrum to offer in the demand (or “forward”) auctions.

The primary challenge with this new approach is coordinating both auctions. In order to pay for the spectrum offered by stations in the reverse auction, the FCC must raise enough money in the forward auction. At the same time, the FCC does not know how much supply it has to offer in the forward auction until it conducts the reverse auction.

Although the FCC will not announce the official rules for its auction until later this year, economists have suggested a few solutions to the coordination challenge. One approach would be to conduct both auctions simultaneously using a descending clock auction format. The FCC would set an initial price and check which participants are willing to sell (in the case of the reverse auction) or buy (in the case of the forward auction) at that price. The price would then move down or up in regular intervals until there are no participants left in the auction. The FCC could use this data to construct supply and demand curves and calculate the optimal reallocation of spectrum.

The advantage of the more complex two-sided auction is that it allows for the new spectrum band plan to be market-determined. In previous auctions, like the 2008 auction for spectrum freed up by the nationwide switch from analog to digital TV, the FCC split available spectrum into blocks of varying size and geographic coverage.

In a 2013 paper, University of Maryland economics professor Peter Cramton found that prices in the 2008 auction were significantly higher for blocks with larger geographic coverage. Wireless companies were mostly interested in assembling continuous coverage, he argued, and while bidders could assemble such coverage from small licenses, that carried greater risk. The bidder might fail to acquire all the necessary pieces for the desired package or be forced to pay higher prices to holdouts on key licenses. The incentive auctions could mitigate these problems by offering generic licenses in the initial forward auction, allowing bidders simply to signal the quantity and distribution of spectrum they desire, leaving the assignment of specific frequencies for later.

The FCC has said that its role as an auction facilitator will help bidders overcome the costs of negotiating with hundreds of license holders, but not everyone agrees it is the best solution.

“The system is extremely rigid because of the nature of the rights that have been assigned,” says Thomas Hazlett, a professor of law and economics at George Mason University who contributed to the National Broadband Band Plan. “Those rights are not spectrum ownership rights, but rather very truncated rights to do particular things.”

Hazlett argues that even if TV licensees were willing to sell their holdings to wireless companies in the market, those companies could only use the new spectrum for TV broadcasting because of the way the licenses were originally structured. Hazlett applauds the FCC’s decision to offer flexible-use licenses in the incentive auctions, giving buyers more control over how the spectrum is used in the future, but he would take it one step further. The FCC has the authority to issue overlay licenses to the TV band, which would allow TV broadcasters to continue broadcasting if they want, but would also grant rights for other uses, allowing them to sell their licenses freely to non-broadcasters outside of an FCC auction process.

The FCC considered using overlays in its National Broadband Plan but dismissed them as too costly for bidders to negotiate with licensees. But Hazlett argues that the incentive auctions also entail costs that the FCC did not consider, such as administrative and legislative delays.

“It’s an economic problem we face,” he says, “not an engineering one.”

EF