

How to Avoid Spectrum Crunch

The FCC's \$44 billion auction is just one step in a program to facilitate mobile broadband use.

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America has enormous infrastructure needs that will require the federal government, together with local governments, to make significant, high-value investments. In one critical area—the revolution in mobile broadband communications—the government doesn't need to invest its own money, but instead can encourage private investment and make a profit for taxpayers along the way.

That is exactly what is happening now at the Federal Communications Commission's 2015 spectrum auction, as the agency is facilitating the sale of spectrum that will be repurposed for mobile broadband use. Bidding has topped \$44 billion, and the proceeds will fund the first-ever nationwide network for first responders, pay down the deficit, and cover adjustment costs for federal agencies that previously used the spectrum. The auction is an important step toward President Obama's goal of freeing up 500 megahertz of spectrum by 2020, nearly doubling the amount available for mobile broadband use.

Mobile broadband is central to a technological revolution that is transforming the way Americans work and play. As smartphones and tablets become ubiquitous, individuals are using ever-increasing amounts of bandwidth. Wireless data traffic in the U.S. has grown at high double-digit-percentages for each of the past seven years. Absent any change, these trends could create a "spectrum crunch" as the frequencies used to carry this traffic become exhausted. While steps such as increasing the density of cell towers or improving compression technology are helping, they will not be enough without reallocating more spectrum.

Though the laws of physics preclude the production of more spectrum, the laws of economics tell us that there can be large benefits from using a scarce resource like spectrum more efficiently.

For example, the National Oceanic and Atmospheric Administration operates a system of satellites that transmit weather data back to earth, and the spectrum used for those transmissions was originally reserved for NOAA, to avoid any interference from ground-based communications. Under President Obama, NOAA has agreed to reduce the number of ground stations that need to receive the satellite weather data, while private participants in the auction have agreed to respect exclusion zones around the remaining stations. This sharing arrangement contributed to the 65 MHz of newly freed spectrum for the auction, unlocking billions of dollars of value. Because the remaining ground stations can retransmit weather data over the Internet, the public does not lose access to this information.

The success of the auction demonstrates how important it is to continue making bandwidth available. Government agencies, led by the National Telecommunications & Information Administration, will continue to identify ways to improve the use of spectrum or reallocate it, while protecting essential government services.

Some of the biggest gains will come from the private sector thanks to a 2012 law that allows television broadcasters with extra spectrum to voluntarily relinquish some or all of their frequencies in exchange for a portion of the proceeds from auctioning the spectrum. The extraordinary demand for bandwidth revealed by this auction only increases the importance of moving quickly to reallocate more spectrum; the FCC is planning another auction for early 2016. When the spectrum shifts to more valuable uses, broadcasters, wireless companies and taxpayers are all better off—but most important, the workers who build the networks and the consumers who use them also benefit.

Ultimately, reaching the president's 500 MHz goal will require changing the traditional spectrum model of exclusive, licensed use. Many organizations have begun to explore new technologies for sharing spectrum more efficiently and new economic models for allocating this scarce resource. For example, the FCC already designates some spectrum for public use without a license, albeit with limitations on range and power. Home Wi-Fi and garage-door openers are two examples of products that run on unlicensed spectrum.

Another approach to spectrum sharing envisions a priority system whereby, for example, the government can pre-empt other users during rare emergencies but would sell the residual rights to the private sector. Private users, in turn, would allow others to access their spectrum provided there is no interference at a particular point in time. Such a system would rely on new technologies, many of which are already under early development, that would allow communications devices to determine—in real time and without any human input—how best to share the spectrum. And it will require new economic models to allocate these rights to their best uses and to allow taxpayers to capture their share of the value.

The Obama administration will continue to take an all-of-the-above approach to making more spectrum available, one of the most critical infrastructure projects of the 21st century.

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