

ELECTROMAGNETIC SPECTRUM

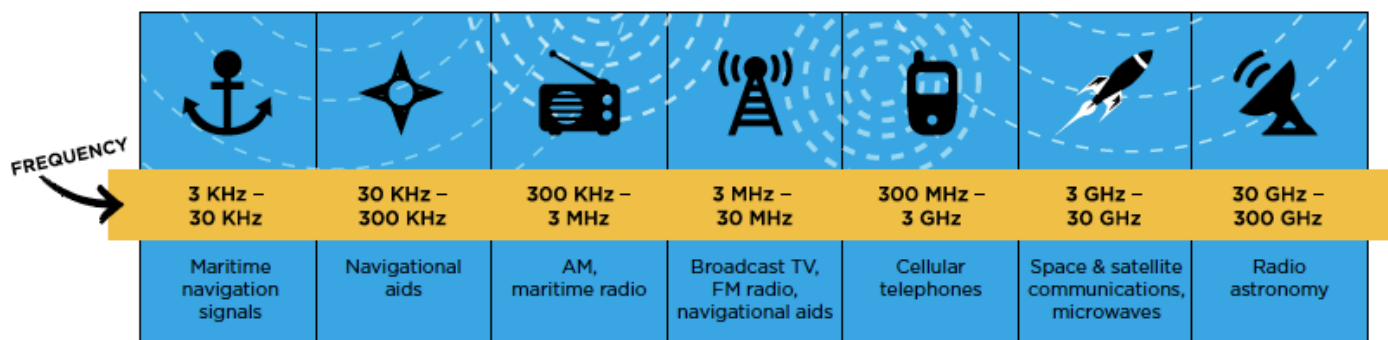
Since it can't be seen by human eyes, electromagnetic spectrum is easily overlooked. Most people live their everyday lives without giving second thought to the range of frequencies that connects their radios, cell phones, and laptop computers to other devices around the globe. Contrary to this popular unawareness, the use and allocation of spectrum is a significant public policy issue on which the future of technological development hinges.

THE HISTORY OF SPECTRUM AND ITS REGULATION

Although scientific awareness of electromagnetic waves can be traced back to the Ancient Greeks, spectrum did not have any technological significance until the German physicist Heinrich Hertz invented a device to send and receive radio waves in 1886. Four decades later, the advent of commercial radio was in full swing, prompting the federal government to pass the Radio Act of 1927 requiring licensure to transmit broadcasts in the United States. However, the act quickly proved too vague to meet the demands of a rapidly growing industry and was superseded by the Communications Act of 1934 only seven years later. The new law established the Federal Communication Commission (FCC) to oversee the allocation of spectrum for public and private use. Almost a century later, the FCC remains the regulatory agency managing spectrum use in America.

THE CURRENT ALLOCATION OF SPECTRUM

To avoid more than one broadcast on a frequency, the FCC designates ranges of spectrum for particular uses and licenses organizations to transmit at a specific wavelength. Below is a table of the current landscape of spectrum allocation (3).



The growing popularity of mobile broadband on cell phones has caused demand for spectrum to outstrip its current commercial supply, with the FCC projecting a 275 MHz deficit by 2014 (4). Fortunately, there is a wide range of unused spectrum that can be made commercially available to meet the growing demand.

QUICK FACTS

- The U.S. is experiencing a shortage of commercially available spectrum, threatening to severely slow technological development.
- The American economy loses hundreds of billions of dollars each year because of the federal government's hoarding of available spectrum (1).

NOTABLE & QUOTABLE

"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."

- **Ronald Coase** (2)

Thanks to the United States' recent transition from analog to digital television, many TV companies own licenses to frequencies that they no longer broadcast from. The FCC is planning to hold a reverse auction for this spectrum in upcoming years to transfer licenses from broadcast television to wireless broadband use. Furthermore, various federal agencies like the military own large segments of unused spectrum that can similarly be auctioned off for commercial use. Unfortunately, the FCC has been notoriously slow in auctioning off this prime electromagnetic real estate because of bureaucratic inefficiency and perverse incentives. Most government agencies do not pay user fees to own spectrum, making them unwilling to give up property that doesn't cost them a dime. President Obama issued a 2010 memorandum requiring the FCC to auction off 500 MHz of public and commercial spectrum for wireless broadband use in 10 years. The government's success in accomplishing this tremendous task will largely determine the pace of America's technological development.

THE FUTURE OF SPECTRUM

While demand for spectrum can be met in the short-term if the FCC meets its auction goals, it is clear that the agency needs to streamline its management of the frequencies to facilitate technological innovation in the future. For that reason, it established a taskforce in 2002 to recommend reform to its command-and-control oversight (5). The taskforce suggested a two-pronged approach of giving companies greater property rights and freedom to experiment on spectrum. Regarding the former, the taskforce proposed the FCC adopt an exclusive-use model in which companies would be free to buy and sell spectrum independent from government auction. Regarding the latter, the taskforce also suggested the FCC designate certain frequencies on spectrum for common use, so individuals and companies can freely experiment to make spectrum usage more advanced and efficient in the future. To date, the FCC has not adopted the taskforce suggestions, but doing so would certainly be a step in the direction of markets that free enterprise has proven to drive prosperity.

CONCLUSION

With the ever-increasing demand for wireless broadband, America's economic development hinges on the FCC's efficient management of electromagnetic spectrum. Auctioning off unused frequencies would meet Americans technological needs and increase economic activity. Beyond that, structural reform of spectrum's ownership may accelerate technological innovation and America's economic prosperity.

Endnotes:

1. Thomas W. Hazlett & Roberto E. Munoz, "A Welfare Analysis of Spectrum Allocation Policies," *The Rand Journal of Economics*, Vol. 40, No. 3 (July 2009), <http://mason.gmu.edu/~thazlett/pubs/Hazlett.Munoz.RandJournalofEconomics.pdf>.
2. Ronald Coase, "The Federal Communications Commission," *Journal of Law and Economics*, Vol. 2 (October 1959), <http://www.eecs.berkeley.edu/~dtse/coase.pdf>.
3. Brent Skorup, "Reclaiming Federal Spectrum: Proposals and Recommendations," Mercatus Center (November 2012), <http://mercatus.org/publication/reclaiming-federal-spectrum-proposals-and-recommendations>.
4. "Mobile Broadband: The Benefits of Additional Spectrum," Federal Communications Commission (October 2010), <http://download.broadband.gov/plan/fcc-staff-technical-paper-mobile-broadband-benefits-of-additional-spectrum.pdf>.
5. Stuart Minor Benjamin, Douglas Gary Lichtman, Howard Shelanski, Philip J. Weiser, *Telecommunications Law and Policy*, 3.3.1, Carolina Academic Press (2006).

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