

5G Basics and Public Policy

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5G technology is frequently discussed in policy circles, including at the Federal Communications Commission (FCC), in Congress, and in state legislatures. As 5G is deployed in the United States, consumers and lawmakers will hear much more about it. 5G and related wireless technologies raise novel policy issues about tech competition, regulation, and national infrastructure. The following is a primer on 5G and its policy implications.

WHAT IS 5G?

Wireless and computation technology advances quickly. As a result, about once a decade, cellular carriers, chipset makers, and technology companies come together to announce new wireless standards that take advantage of those innovations. 5G, as the name suggests, is the fifth generation of wireless standards. Most people in the United States with a smartphone are using 4G (also called Long Term Evolution or LTE) and 3G. As you might expect, 5G standards require operators to meet higher capabilities. 5G brings two big advancements over 4G technology.

WHAT TECHNOLOGY IMPROVEMENTS DOES 5G BRING?

More wireless capacity. First, 5G standards are designed for higher-capacity wireless services. National governments around the world have freed spectrum from legacy users, including government agencies, and sold it to carriers (such as the FCC's \$20 billion sale of formerly government spectrum in 2015). More spectrum means carriers can offer customers more bandwidth in more places.

More real-time services. Second, 5G standards reduce latency, the speed at which devices connect to the network. In the next few years, cellular carriers should be able to reduce connection times

by 90 percent. 5G devices will be much more responsive than 4G, and this capability means 5G opens up opportunities for real-time services.

WHAT DOES 5G MEAN FOR USERS?

5G is being deployed across the country today and will complement, not replace, existing 4G networks. Smartphone and device companies have started selling 5G-capable units, and many more will be developed and sold in the next few years.

New consumer services. 4G created a massive market for smartphone apps, the most popular of which include ridesharing, home sharing, mobile gaming, and video watching. The 5G improvements mean more consumers can enjoy real-time services and high-bandwidth services. The following are examples of services that will benefit:

- Aira makes “smart glasses” for blind people. These glasses require wireless reliability and real-time responsiveness. A camera in the glasses streams video via a wireless connection to a distant human assistant who verbally helps the customer navigate airports, restaurants, and other public places.
- 5G capacity also means some customers can “cut the cord” and get home broadband wirelessly. This means more competition in home broadband.
- Finally, 5G is made with the internet of things in mind, so that many more home appliances, wearable devices, cars, and parcel deliveries can connect to the internet for tracking, status updates, and diagnostics.

New business services. Whereas the previous four generations of wireless standards were created with consumers and cell phones in mind, carriers and chip companies designed 5G standards with enterprise and industry customers as a priority. Some enterprise services that might benefit from 5G include commercial drones (inspections, medicine delivery, Amazon deliveries, search-and-rescue, etc.), air taxis and flying cars, remote control of autonomous vehicles, and warehouse floor robots.

Network densification and construction. Cellular carriers are building hundreds of thousands of “small cells”—outdoor antennas and wireless infrastructure—to supplement their thousands of 4G and 3G cell phone towers. On average, there are about 1,000 users per 4G cell tower in the United States. Sharing a 4G tower with everyone in your neighborhood means that sometimes networks falter and YouTube videos, games, or video chats stutter. 5G will first be deployed in urban neighborhoods to relieve areas with the most intense network congestion. This upgrade of infrastructure means putting small cells on utility poles and street lights in neighborhoods for several years.

WHAT POLICIES NEED TO CHANGE?

Fewer local restrictions on infrastructure. 5G and other wireless services need infrastructure, including fiber networks and roadside poles to install on. All infrastructure projects on public property require local permitting and fees. Current local regulations were typically made for a different world—a few cell towers in a town, not hundreds of wireless facilities dotting downtowns and roadways—and the permitting and fee process is excessive. The FCC recently identified one case where a small California city charged a company \$60,000 in application fees to install 16 small wireless sites, only to reject the application and charge the company for \$350,000 in attorney’s fees. In many towns and cities, it takes years to process an application. Though these are extreme cases, the FCC found that excessive delays and fees are common nationwide.

One way to build infrastructure quickly and put pricing pressure on city fees is to encourage the construction of 5G and other wireless infrastructure on private property, such as backyards, balconies, and grain silos. Localities could make new antenna installations on private property expensive because the law is unclear about what rights property owners have. The FCC and state governments have authority to prevent most municipal interference with and fees on antenna installations on private property, but the FCC could use additional congressional permission and encouragement.¹ State lawmakers can also protect homeowners from any unnecessary local regulations on antenna installation.

More commercial spectrum. Here and there the FCC is “de-zoning” spectrum so that it can be used for flexible uses (such as 5G) and not be limited to existing uses (such as broadcast or satellite). There’s another source of spectrum: federal agencies. Federal agencies possess about half of the most valuable spectrum in the United States.² However, agencies were gifted this spectrum decades ago and don’t always maximize its use. For 20 years, Congress has occasionally required agencies to give unneeded spectrum to the FCC to sell for commercial operation, but that’s getting harder. FCC Commissioner Rosenworcel has proposed allowing commercial operators to privately negotiate with and compensate agencies for use of federal spectrum. I explore that idea in a 2016 law journal article.³ It’s a good idea that would help fund agencies, reduce government debt, and create commercial wireless services, but agencies need congressional permission to negotiate with private companies.

ABOUT THE AUTHOR

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NOTES

1. Brent Skorup, "Want 5G? Empower Homeowners," *The Bridge*, July 31, 2018; Brent Skorup, "How the U.S. Can Catch Up in the 5G Race," *Wall Street Journal*, February 26, 2019.
2. Brent Skorup, "The Importance of Spectrum Access to the Future of Innovation" (Mercatus on Policy, Mercatus Center at George Mason University, Arlington, VA, December 2016).
3. Brent Skorup, "Sweeten the Deal: Transfer of Federal Spectrum through Overlay Licenses," *Richmond Journal of Law & Technology* 22, no. 2 (2016): 1-36.