



**Testimony of Greg Guice
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**Before the
House Committee on Energy and Commerce
Subcommittee on Communications and Technology**

5G and Beyond: Exploring the Next Wireless Frontier

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Chairman Doyle, Ranking Member Latta and members of the Subcommittee: Thank you for inviting me to testify on this important topic. My name is Greg Guice and I am the Director of Government Affairs for Public Knowledge, an organization that is dedicated to promoting freedom of expression, an open internet, and access to affordable communications tools and creative works. Public Knowledge is also a member of the Public Interest Spectrum Coalition, which includes national public interest, civil rights, consumer, education, and social justice organizations focused on ensuring that spectrum policies take into account the needs of all users.

I have been doing telecommunications policy work for the last 24 years and over that period, I have seen spectrum morph from a topic only a few understood (or needed to understand) to a central input of growth in our economy enabling so many services that help consumers learn, work, have fun, stay healthy, and stay connected. The framing of this hearing, the next wireless frontier, calls for a review of where we find ourselves today given that the “frontier” we are exploring is less like the “Oregon Trail” and more like downtown D.C. on a weekday -- congested. As more and more devices and services demand spectrum resources, the policy to satisfy that demand is becoming increasingly challenging. To meet the challenge:

- 1) We must use all of the tools in the toolbox to provide access (like licensed, unlicensed, sharing, and open spectrum access).
- 2) We must insist on good coordination, led by the Federal Communications Commission (FCC) and National Telecommunications and Information Administration (NTIA).
- 3) Decisions about spectrum policy should emphasize the public interest first and foremost.

Supporting those structural components will allow policymakers to address with greater certainty the specific spectrum needs to secure those opportunities for all Americans. I mention a few such needs at the end of my testimony.

Current Environment for Spectrum Opportunities Is Increasingly Challenging

As members of this Committee, you are keenly aware that the environment for exploring spectrum opportunities has greatly evolved over the last few decades. The “connectivity revolution” has changed the way we engage with our world. To get a sense of the scope and speed of this connectivity revolution, the number of connected devices per home rose from 11 in 2019 *to 25* by 2021 – a growth of over 100% in 3 years.¹ That number is shocking until we consider the devices beyond our smartphone and laptop that are now connected. Televisions, watches, earbuds, speakers, doorbells, and alarms all rely on a connection to spectrum, much of which depends on unlicensed technologies.

Similarly, demand for internet access has continued to grow. In a report released by the FCC last week, internet connections overall (fixed and mobile) increased by about 4.7% in 2019 to 449 million, with mobile connectivity increasing by 5.1% to 336 million.² Consumers rely on their mobile devices for so much, spending on average five hours a day on them to check email, shop, make calls, and surf the web.³

That demand on unlicensed and licensed spectrum underscores just how critical it is that we continue to search for new spectrum opportunities using a mix of access regimes. Demand and past efforts to meet it also means that there are few “greenfield” opportunities remaining. This presents a challenge to policymakers because as more and more services are packed closer and closer together, the need to ensure efficient spectrum use practices becomes ever more critical. For example, in the past a receiver could listen out of its band without much consequence, but as services are packed closer together, more efficient use of spectrum means receivers must listen only within their band and reject signals from other frequencies. Additionally, incumbent holders of spectrum need to evaluate what their true needs are and consider whether they may be able to share during times when they are not using it or in geographic places where they no longer need it to further promote more efficient use of spectrum they hold.

Everyone has to work to enhance efficiency.

Mix of Access Regimes Critical To Promote Efficiency and Opportunity

¹ [Connectivity and Mobile Trends Survey: How the Pandemic Has Stress Tested the Crowded Digital Home](#), Deloitte Center for Technology, Media & Telecommunications (2021).

² [Internet Access Service: Status as of June 30, 2019](#), Federal Communications Commission, Industry Analysis Div., Office of Economics and Analytics (Mar. 9, 2022).

³ [45 Mobile Internet Stats You Need to Know](#) (2022).

One of the great developments in spectrum management over the last decade has been a greater awareness of the need to explore alternative access regimes to promote more efficient uses of spectrum overall. Back in 2009 and 2010, when I had the honor of serving as counsel on this Committee for then-Chairman Waxman, he, Representatives Doyle and Eshoo along with others, made the case that we did not need to frame our spectrum policy in terms of a fight between whether we licensed spectrum for exclusive use *or* made it available for unlicensed or sharing opportunities. They were calling then for what we now know is the sounder framing – yes, we need licensed spectrum, but we also need robust unlicensed and sharing opportunities to make certain that we are using spectrum efficiently and to promote a healthy and vibrant wireless sector.

As mobile providers are rolling out their 5G networks, delivering not just faster speeds but also a service that will revolutionize opportunities for Internet of Things and machine-to-machine applications, so, too, are technology companies beginning to deliver Wi-Fi 6 with higher throughput and an ability to allow more connected devices to maintain those faster speeds to better meet consumer needs. These innovations are taking place because Congress and policymakers at the FCC and NTIA have focused our spectrum policy on making sure we explore the full array of access regimes across a range of spectrum bands.

That focus was on display in the FCC’s citizen’s broadband radio service, or CBRS, proceeding. Begun in 2015, the CBRS band demonstrates how technology, engineering, and a commitment from policymakers can open up amazing levels of efficiency and opportunity in a single spectrum band. The FCC’s proceeding in the band resulted in the adoption of a three-tiered access regime that balanced the need to protect ongoing incumbent uses (military radar) while creating opportunities for commercial licensed services (priority access licenses or PALs)⁴ as well as open access spectrum use (where users operate on spectrum throughout the band when the frequencies are not in use).⁵ All of this is coordinated through an automated frequency coordinator known as the Spectrum Access System, which relies on sensing technology to detect use in real-time.⁶ This framework allows for a much higher utilization of the band than would have been possible under any single access regime. It is also worth noting that this three-tier sharing has worked, with over 150,000 network nodes deployed in CBRS and no reported cases of interference.⁷ The takeaway from this is that we don’t need to leave large swaths of spectrum unused so long as policymakers remain open to exploring the full suite of access regimes when looking at any band.

⁴ 47 C.F.R. § 96.25.

⁵ 47 C.F.R. § 96.35.

⁶ 47 C.F.R. § 96.53.

⁷ [Taking Stock of Spectrum Sharing](#), John Leibovitz and Ruth Milkman (Sept. 2021). This paper provides a very thorough and thoughtful set of policy recommendations for considering more spectrum sharing opportunities.

New Spectrum Opportunities Require Close Coordination

The members of this Committee are also all too aware of the importance of the spectrum coordination and interagency process working as Congress designed. Again, thanks to Chairman Doyle and Ranking Member Latta for shining a light on this and making clear that this Committee, on a bipartisan basis, intends to insist that the interagency coordination process be followed. The oversight this committee provides is critical to ensuring that spectrum allocation happens in a timely and efficient manner. In a recent paper I co-authored with Joel Thayer of Digital Progress Institute, we outlined how federal agencies and entities under their regulatory purview execute a well-worn playbook to disrupt and thwart the interagency process.⁸

One such instance of disruption concerning the 5.9 GHz band continues to this day. Originally the band had been designated to only be used by automobile manufacturers for development of intelligent transportation systems. But when it became clear that this band was not being used by the auto industry (and had not been used for almost two decades), the FCC pushed for it to become better utilized by studying whether the band could be opened up for unlicensed use. The FCC and NTIA worked to address concerns raised by incumbent automakers in the band, and after running its public process, the FCC unanimously adopted a band plan that provides an opportunity for mixed use of the band. Automakers continue to use the 30 MHz portion, while permitting unlicensed use in the other 45 MHz. Instead of respecting the decision made by the FCC and NTIA, automakers and the Department of Transportation have chosen to undermine it. The DOT recently announced a study that appears to have no other purpose except an attempt to undermine the FCC's decision. This study was spurred by interests intent on reasserting a claim that the automotive industry should control the entire 5.9 GHz band. DOT is conducting this action without seeking public comment and appears to be relying on improper technical assumptions and methodologies. This is just the type of action that undermines the interagency process.

As we wrote in our paper, “the interagency process, when it works well, provides an opportunity for all stakeholders to come forward in a data-driven process to assist the FCC and the NTIA in building a record of evidence to support efficient spectrum usage by helping these agencies understand what the possibilities and concerns are.” Going forward, as the Chair and Ranking Member noted, NTIA is the agency to hear concerns of other federal agencies and is the place for those concerns to be addressed. Further, science and engineering must drive those decisions, not conjecture and fear-mongering. The recent announcement by NTIA and the FCC is very encouraging on this front. It commits the agencies to re-establishing high-level meetings; updating the Memorandum of Understanding recommitting to an evidence-based spectrum compatibility analysis; and developing a national spectrum policy. These efforts will require

⁸ [*The Interagency Process and its Importance in Securing the Future of 5G*](#), Greg Guice, Public Knowledge and Joel Thayer, Digital Progress Inst. (Mar. 2022).

commitment from the whole of government, including federal agencies and Congress, in order to be successful. We are certain that this Committee and its Senate counterpart understand that importance.

Return Focus to the Public Interest

The core of the FCC's responsibility over spectrum is to ensure that every allocation serves "the public interest, convenience, and necessity." This means more than simply making spectrum available for new services. It includes ensuring that all members of society enjoy the benefits of these new spectrum technologies – both as consumers and as creators and innovators. While every American deserves a fiber connection to the home, every American also deserves access to the same level of quality, affordable mobile services. As this Committee is all too aware, rural communities, low-income communities, and communities of color have long suffered from digital exclusion. Congressional and FCC spectrum policy must explicitly focus on mobile digital inclusion as well as bringing fixed broadband into every home.

In addition, the last five years have seen an increase in concentration in wireless services. Thanks to the merger of T-Mobile and Sprint, we have gone from four national, facilities-based carriers to three. The Department of Justice merger conditions attempted to create a new, fourth national carrier by spinning off certain assets to DISH Network. While DISH has invested in building out its new, cloud-based network, it has yet to achieve the intended goal of a new, nationwide competitor. Meanwhile, consolidation in the mobile virtual network operator or MVNO market has eliminated independent MVNOs. Today's MVNO providers are vertically integrated with either existing national wireless carriers (such as AT&T and Verizon) or with cable broadband providers. It remains to be seen whether these vertically integrated MVNOs will provide adequate competition to bring down prices for all Americans.

It is tempting to view promoting digital inclusion and competition as separate from spectrum policy. This would be a tremendous mistake. Spectrum policy should serve the public interest as set forth in Section 1 of the Communications Act to provide access to *all* Americans to wire and radio service, with adequate facilities at reasonable charges.⁹ This focus on the public interest should begin with the distribution of new spectrum licenses and continue throughout the spectrum ecosystem. It includes ensuring that wireless providers build out their networks to all Americans or make room for community-based providers who will serve local communities the larger carriers do not consider adequately profitable. It must include requiring that networks work together to maintain operations during crisis and disasters – both natural and man-made. It must include adequate security in the face of a world populated with both criminals and hostile nations eager to compromise our communications infrastructure to advance their own ends.

⁹ 47 U.S.C. § 151 (emphasis added).

While both Congress and the FCC have taken steps towards these goals over the years, more must be done.

Specific Areas for Future Opportunities

The reason I spent some time discussing access regimes and interagency coordination is because those two elements will be key to the next phase of exploring the wireless frontier and ensuring that the next phase serves the broader public interest. Much of what we need to do next to continue to satisfy consumer demand and promote innovation will need all of us – policymakers, public interest advocates, engineers, technology companies, and other stakeholders – working cooperatively. Here are a few areas where that work needs to start:

1. **Renew FCC auction authority.** The FCC’s auction authority, first granted in 1993 and renewed by Congress prior to its expiration since, is slated to expire at the end of September of this year. The FCC will begin an auction of the 2.5 GHz band this summer. Congress should make certain the authority is extended to ensure that this auction can be completed.
2. **Support public interest needs with auction funds.** Revenues generated by auctions should be considered for advancing public interest needs of the telecommunications sector. One area for targeted funding could be digital equity. The digital divide, as Chairman Pallone has said, requires addressing access, affordability, and adoption. Digital equity (literacy, training, device access) helps promote adoption. Congress provided some funding in the Infrastructure Investment and Jobs Act, but a more sustainable source is needed to advance equity goals. Public Knowledge recently joined with other public interest organizations to launch the “Airwaves for Equity” initiative, which proposes setting aside spectrum auction revenues to fund digital inclusion efforts.¹⁰

But this is only one such public interest need. FCC Chairwoman Rosenworcel recently proposed using auction revenues to support the transition to next-generation 911.¹¹ As the Chairwoman observed, building a modern, digital 911 system will not come cheap, and we must be prepared to spend what is necessary to ensure that all Americans have the ability to call for help, and receive that help, wherever they may be, whoever they are, regardless of race, gender, disability, or income, and without regard to whether or not they speak English. Additionally, Public Knowledge has supported other uses for spectrum auction funds. These could include creating both a permanent wireless

¹⁰ See [Airwavesforequity.org](https://airwavesforequity.org).

¹¹ Remarks of Chairwoman Jessica Rosenworcel: FirstNet 10-year Anniversary Celebration, National Press Club, Washington D.C., February 22, 2022, available at: <https://docs.fcc.gov/public/attachments/DOC-380562A1.pdf>

infrastructure fund and a dedicated fund to support upgrading networks to enhance reliability, as well as using funds to address supply chain security concerns.

The point here is that the public interest use of the public airwaves should begin from the moment of distribution of exclusive licenses. Congress should stop thinking of spectrum auctions as merely a “pay for” to reduce the deficit. Distribution of licenses by auction is not intended to raise revenue, but to provide a rational means of distributing licenses to those with both the interest and capacity for using them to offer services to the public.¹² The revenues obtained should therefore be dedicated to serving these same public interest goals.

3. **Add more capacity for unlicensed use of Wi-Fi 6.** In 2020, the FCC designated the 6 GHz band for unlicensed use. Congress, the FCC, and NTIA should begin the process of exploring opportunities to add to the 6 GHz band for unlicensed use by studying whether sharing of the lower 7 GHz band is possible. There are military systems in the band so NTIA would need to coordinate with the Department of Defense and the FCC through the interagency process to work through the engineering.
4. **Facilitate consideration of the lower 3 GHz band (3100-3150 MHz) for commercialization.** Clearing spectrum for auction can be enormously expensive as we saw with the clearing costs associated with auctioning the 3.45-3.55 GHz band – \$14.7 billion for 100 MHz.¹³ If Congress does not mandate that all of this spectrum be auctioned, there may be opportunities for sharing and other access regimes that will produce greater utilization of the band. The Spectrum Innovation Act contemplates just such a structure and we look forward to working with this Committee to get this important legislation completed this Congress.
5. **Promote sharing of the existing 12 GHz band on a secondary basis with mobile services, as proposed in the January 2021 Notice of Proposed Rulemaking in Docket No. 20-443.**¹⁴ The Commission should also authorize an unlicensed underlay in the band and consider rules for other forms of opportunistic sharing. This will promote competition in the mobile space, provide greater access to spectrum for broadband in rural areas, and make critical spectrum available for deployment of gigabit capacity for Wi-Fi 7. Public Knowledge believes these additional uses can be authorized without

¹² See 47 U.S.C. § 309(j)(3) (requirement that auctions promote the public interest goals of Section 1 and other goals enumerated in this section); 309(j)(7)(B) (public interest finding cannot be based “solely or predominantly” on maximizing auction revenue).

¹³ Auction of Flexible-Use Service Licenses in the 3.45-3.55 GHz Band for Next-Generation Wireless Services: 33 Applicants Qualified to Bid in Auction 110, Public Notice, 36 FCC Rcd 9272 (Sept. 17, 2021).

¹⁴ Expanding Flexible Use of the 12.2-12.7 GHz, WT Docket No. 20-443; *Expanding Flexible Use in Mid-Band Spectrum, 3.7-24 GHz*, GN Docket 17-183 (Rel. January 15, 2021).

compromising the existing satellite TV and broadband satellite uses, creating a win-win solution for everyone.

6. **Promote spectrum sharing by supporting sensing technologies and advances in incumbent informing capabilities, or IIC.** Sensing technologies, like those used in the 3.5 GHz band, detect and communicate the presence of a signal from an incumbent user to an automated frequency coordinator in order to facilitate shared spectrum access. Incumbent informing capability is a database management tool that allows incumbent spectrum users, like DOD, to update automated frequency coordination database in real time to convey its use of specific spectrum channels so that lower priority operators, such as schools, that share the band can be informed of the need to move to other frequency channels. Both of these technologies seek to facilitate the same goal – greater, more robust spectrum sharing. As such, Congress should support the development of both sensing technologies and IIC.

We are an increasingly connected nation and spectrum is a critical input to that connectivity. To address the challenges we face in meeting the needs of consumers, we will need to use every access tool available -- including licensed, unlicensed, sharing, and open access -- along with expert coordination by the FCC and NTIA to meet this demand. As we venture into this next phase of the wireless frontier, we should ensure that our spectrum policy prioritizes the public interest needs we face. By ensuring all are connected and have the tools they need, we will help realize the full benefits of greater connectivity.

Thank you. I am pleased to answer any questions you may have.