

Testimony of

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on

“The State of U.S. Spectrum Policy”

before the

U.S. Senate

Committee on Commerce, Science, and Transportation

Subcommittee on Communications, Technology, Innovation and the Internet

July 23, 2020



Chairman Thune, Ranking Member Schatz, and members of the Subcommittee, on behalf of CTIA and the U.S. wireless industry, I appreciate the opportunity to testify today. Let me start by expressing our strong appreciation for the leadership exhibited by this Committee and the FCC in responding to the COVID-19 crisis, which has highlighted the critical role that wireless plays in keeping us connected to our family and friends, our jobs, our schools, and our communities. Your leadership has allowed the wireless industry to dynamically respond to the needs of its customers, even as this situation evolves.

Your leadership will be just as critical to ensuring a strong foundation for our nation's 5G economy over the next decade. The combined efforts of this Committee, Congress, the FCC, and the Administration have facilitated a historic four years of spectrum successes. In that time, we completed the first ever incentive auction and, under Chairman Pai's 5G FAST Plan, we completed the first ever high-band spectrum auctions. We now have the opportunity to build on this foundation to make more spectrum available for 5G -- particularly in the critical mid-band.

I have served at the FCC, NTIA, the White House Office of Science and Technology Policy, and in the private sector, and I know very well the essential role that spectrum management policies play. Indeed, the availability of, and access to, sufficient and appropriate spectrum is *the* key to reaping the full benefits of 5G – not only in terms of economic growth, job creation, and public safety – but also by ensuring we are able to meet unexpected and unprecedented demands when the need arises. So today, I'd like to describe the wireless landscape in the U.S., note the priorities we need to balance as we deploy 5G and

in mid-band spectrum, and point out some opportunities to improve the processes government uses to identify and repurpose underutilized spectrum.

The Current Wireless Landscape: Continuing Demand for Wireless Services, the Importance of Investment, and the Work that Remains

This Committee's actions have already facilitated America's fast start in the global 5G marketplace. U.S. wireless providers gained a first mover advantage last year when they were the first to deploy commercial 5G networks.¹ The U.S. wireless industry is projected to invest \$275 billion on 5G deployments, create three million jobs, and add \$500 billion to GDP. These investments will be made possible by your leadership; the certainty you fostered has driven faster deployment, with residents from South Dakota to Hawaii and beyond already enjoying the benefits of 5G. And with scale, 5G will be even more transformative – improving the lives of all Americans through access to connected hospitals, safer and more efficient smart cities, and the life-changing applications that will grow out of our burgeoning 5G ecosystem.

Unprecedented Growth in Wireless. The U.S. continues to experience unprecedented growth in demand for wireless services, especially since the onset of the pandemic. In 2018 alone, we saw an 82 percent increase in mobile traffic. The increase from 2018 to 2019 was greater than the *total amount* of mobile traffic on U.S. networks just four years ago.² And when, in a matter of days, much of the U.S. transitioned to staying at home, we witnessed a dramatic increase in demand for wireless services. Almost overnight, voice traffic jumped 20-40 percent; major providers saw a 25 percent increase in texting; data traffic grew nearly 20 percent, with one nationwide provider reporting an increase in mobile device hotspot usage

of nearly 40 percent; and applications that provide telehealth and web/video conferencing services saw huge usage increases – well over 1,000 percent.³ U.S. wireless carriers handled that increased demand with barely a hitch. In fact, despite these trends, U.S. average mobile download speeds actually went up slightly.⁴

The Importance of Investment. U.S. wireless providers rose to this occasion thanks to continued and massive year-over-year investments. In 2018, the wireless industry made capex investments of \$24.7 billion primarily for expanding network capacity and coverage and making upgrades to support 5G.⁵ According to a recent NERA study, these investments allowed the industry to meet customer demand while simultaneously delivering better value than carriers in any of 36 other countries studied; U.S. consumers save nearly \$10 billion per year by virtue of the superior value that U.S. wireless providers offer.⁶

The Work that Remains: The Need for Mid-band Spectrum. As successful as we have been, the next few years will define our 5G future. The U.S. led the world in 4G – both as the first mover in network deployment and in market-transforming innovation. We rapidly made available a world-leading 752 megahertz of low-band spectrum,⁷ the propagation characteristics of which allowed carriers to quickly deploy 4G networks over large geographic areas. Today carriers have been repurposing some of that low-band spectrum to 5G. Carriers have also gained access to significant amounts of high-band spectrum, which is ideal for delivering very high speeds and low latency over discrete geographic areas. But while this progress on low- and high-band spectrum is important, the key to ensuring U.S. leadership will be the availability of mid-band spectrum, which sits at the 5G “sweet spot” offering

capacity *and* coverage. Mid-band spectrum is perfectly suited to deliver higher speeds and improved latency, particularly in more rural areas.

There is a growing global consensus that mid-band spectrum should be allocated for 5G. Unfortunately, other nations are beating us to the punch. One study found that 13 other leading countries will have, on average, *five times* more licensed mid-band spectrum than the U.S. by the end of this year.⁸ And even after the U.S. executes on its current mid-band plans through 2022, five countries are expected to have allocated nearly *twice* that amount of mid-band spectrum by then.⁹ As other countries work to seize the mantle of 5G leadership, we need to rapidly employ an “all-of-the-above” spectrum strategy to make as much mid-band spectrum available as possible, with a particular emphasis on repurposing government spectrum.

Balancing Spectrum Allocation Priorities

Spectrum allocation decisions have always required that policymakers balance competing priorities. First, we need to properly allocate spectrum between the federal government and the commercial sector to reflect current national priorities. Most spectrum is currently in the hands of the federal government, a function of the varied role that spectrum has long played in supporting government missions – including national defense. But that spectrum is an increasingly critical input to another national priority – a robust and innovative economy that creates jobs and economic growth for all Americans and empowers their full participation in all aspects of American society.

Second, within the commercial sector, spectrum must be reasonably allocated between licensed and unlicensed use. While unlicensed is indispensable, the U.S. has become a global outlier by allocating such a large share of commercial spectrum for unlicensed use -- particularly in mid-band. The right strategy must properly balance government and commercial needs and licensed and unlicensed use.

Shifting the Balance to Commercial Use. The federal government has long been the largest spectrum user in the U.S., and out of the 5,400 megahertz of mid-band spectrum between 3.0 GHz and 8.4 GHz, DoD alone occupies a total of 3,600 megahertz – 66.67 percent. Decisions that resulted in this allocation were based on national priorities and the state of radio technologies from 50 years ago. Our spectrum management decisions must reflect the new reality of ever-growing demand for commercial wireless services and significant technological advancements across all radio services.

As I know all too well from my time at NTIA, federal systems sometimes rely on decades-old technologies that are not spectrally efficient. Without reform and proper funding, these systems could occupy essential spectrum resources inefficiently for years to come. But if we get our policy decisions right, a shift toward commercial use will allow these federal users to deploy new and more spectrally efficient technologies that can help them better achieve their missions – a spectrum management “win-win.” There is certainly precedent: the AWS-3 auction gave the U.S. the lead in making spectrum available for 4G while simultaneously allowing DoD to upgrade legacy radios, the Department of Energy to

transition microwave systems to more reliable fiber, and the Department of Housing and Urban Development to upgrade to Internet Protocol-based systems.¹⁰

Three bands represent our next “win-win” opportunities:

The Lower 3 GHz Band. This Committee deserves great credit for identifying the Lower 3 GHz band (3.1-3.55 GHz), currently used by DoD to operate high-powered radar systems and by some non-federal secondary users, as suitable for transition to commercial use. We also applaud Chairman Wicker and Ranking Member Schatz for introducing the Supplementing the Pipeline for Efficient Control of The Resources for Users Making New Opportunities for Wireless (SPECTRUM NOW) Act, which will lead to the auction of the 3.45-3.55 GHz band for commercial use. CTIA supports the FCC’s plan to prepare the Lower 3 GHz band for expanded commercial wireless use by removing existing non-federal secondary allocations in 3.3-3.55 GHz and relocating incumbent non-federal operations. NTIA’s recent report sought to evaluate whether commercial and government operators can share this band, but we urge NTIA to examine the potential to clear – rather than share – as much of this band as possible. The Lower 3 GHz band is *the* next major opportunity to expand critical mid-band 5G capacity.

Internationally, our 5G competitors have already made an average of nearly 200 megahertz available for commercial use between 3.3 and 3.6 GHz – compared to 0 megahertz in the U.S. (albeit with the 3.5 GHz auction underway that includes 3.55-3.6 GHz).¹¹ The 3.1-3.55 GHz band is a crucial near-term opportunity for the U.S. to make licensed mid-band spectrum available, and if the U.S. moves quickly, it has the opportunity to be a key benchmark band for U.S. leadership. Unlocking this band will also allow U.S. device and

network equipment manufacturers to build to globally harmonized international specifications, creating economies of scale and driving down the cost of wireless equipment and services for U.S. companies and consumers. But there is much work to do, and time is not a luxury we have.

1.3 GHz and 1.7 GHz bands. Two low-band opportunities will be key to meeting Congress's requirement in the Spectrum Pipeline Act of 2015 that NTIA identify and reallocate at least 30 megahertz of spectrum below 3 GHz for commercial use.¹² The potential for repurposing spectrum in the 1.3 GHz band is being studied by a pioneering cross-agency program, and could provide up to 50 megahertz -- while helping the Federal Aviation Administration and other incumbent users modernize legacy radar and related systems. Similarly, the 1.7 GHz band could offer 50 megahertz directly adjacent to AWS-3 spectrum, presenting great synergies with existing wireless offerings. We all need to stay committed to these efforts.

Balancing Licensed and Unlicensed Use. Sound policy also requires us to balance the amount of commercial spectrum available between licensed and unlicensed use, in the mid-band in particular. With the FCC's recent decision¹³ to commit all 1,200 megahertz of the 6 GHz band to unlicensed use, there are now 1,860 megahertz of mid-band spectrum available for unlicensed operations. By contrast, today's 3.5 GHz auction represents the very first opportunity for carriers to access *licensed* mid-band spectrum -- and it is only 70 megahertz. While thanks to the leadership of the FCC, the C-band auction in December will make another

280 megahertz available that will bring the total amount of licensed mid-band spectrum to only 350 megahertz.¹⁴

In contrast, five leading nations in the 5G race are each expected to bring 660 megahertz of licensed mid-band spectrum to market by 2022. That's nearly *double* the licensed U.S. spectrum. A total of 350 megahertz is simply not enough licensed spectrum to stay competitive, especially in 5G. Access to more licensed mid-band spectrum is the key to U.S. 5G leadership.

Opportunities to Improve U.S. Spectrum Management Policies

There are also real opportunities for the U.S. to improve its spectrum management practices as we lean into 5G.

Repurposing Federal Spectrum. The U.S. has an ever-improving track record when it comes to creating “win-win” outcomes through repurposing federal spectrum – in large part because of the leadership of this Committee. In 2004, Congress passed the Commercial Spectrum Enhancement Act (“CSEA”). The CSEA created the innovative Spectrum Relocation Fund (“SRF”), which incented agencies to relocate by providing certainty that they would receive sufficient funding to maintain their federal missions. The SRF funds federal agency efforts to identify spectrum available for commercial use, guarantees that they will be reimbursed for their relocation costs and, critically, then replenishes the monies with the auction revenue made possible by the relocation. The SRF has already transferred nearly \$4.6 billion to federal agencies to upgrade their systems – and there has been remarkable progress.

The 2006 AWS-1 auction was the first time the U.S. government applied the CSEA. That auction, and a follow-on auction in 2008, generated a total of \$13.7 billion in winning bids, at a federal relocation cost of \$1.55 billion.¹⁵ I am no economist, but 775 percent is a pretty solid ROI, and doesn't even include the value of the resulting new jobs and increased GDP. And it's worth noting that the complexity of the process did not prevent its success; this transition required the relocation of 1,990 NTIA-issued federal frequency assignments from 12 federal agencies. These incumbents ranged from fixed microwave systems used to transmit voice and data signals to more specialized law enforcement video and surveillance systems and mobile aeronautical systems.¹⁶

The CSEA also played a key role in the highest grossing spectrum auction in U.S. history, the AWS-3 auction in 2015. There, the FCC auctioned two federal spectrum bands that contained more than 200 systems or programs that qualified for CSEA transition funding, ranging from National Oceanic and Atmospheric Administration microwave operations to DoD air combat training.¹⁷ All told, the AWS-3 auction brought in \$41.3 billion, with total federal relocation costs of \$5.1 billion¹⁸ – another ROI of more than 700 percent.

Increasing the Flexibility of the SRF. Policymakers should consider upgrading the SRF to fund federal incumbent efforts to enhance their spectrum efficiency. Since 2010, U.S. wireless providers have increased their spectral efficiency 42 times – a rate that federal users cannot match under the current regime.¹⁹ While Congress made targeted SRF modifications in 2012, 2015, and 2017 to increase the program's flexibility by allowing it to support critical research and development, more needs to be done to incentivize federal agencies to more

efficiently use scarce spectrum assets. We therefore again wish to praise Chairman Wicker's and Ranking Member Schatz's efforts through the SPECTRUM NOW Act, as well as the leadership exhibited by Senators Moran and Udall on this important issue.

Improved Transparency and Incentives. Unlike commercial uses, the lost opportunity costs of underutilized federal spectrum are rarely transparent. We therefore applaud Senator Lee for introducing the Government Spectrum Valuation Act, which would better equip this Committee and the Administration to determine the market value of spectrum and to ensure it is being put to its best and highest use. We similarly wish to recognize Senator Markey's work to incentivize agencies to move off spectrum that could otherwise be reallocated to consumer uses. We hope these important legislative efforts move forward this Congress.

Enhancing the Federal Spectrum Framework. We also strongly commend Chairman Wicker and Ranking Member Cantwell, along with Senate Armed Services Chairman Inhofe and Ranking Member Reed, for their collaboration on the Spectrum IT Modernization Act of 2020. We support this legislation and its effort to make the management of federal spectrum more efficient. It often takes well over a decade for federal bands to be identified, reallocated, and deployed by commercial wireless providers. This legislation will allow NTIA, through modernization and forward-thinking planning, to be better-positioned to unlock win-win opportunities more expeditiously. This is certainly a tool I wish we had when I served at NTIA, and I hope this legislation will pass swiftly.

Increasing Industry/Government Collaboration. The feasibility of reallocating federal spectrum must be based on the actual operating characteristics of federal systems – which of course requires the exchange of information that is often deemed classified. Collaboration and trust between government and industry can be challenging to achieve but yields results that benefit federal users, the wireless industry, and consumers alike. For example, the successful AWS-3 information sharing process was driven through a federal advisory committee structure. That process, in turn, was built on the foundation laid by AWS-1.²⁰ Enhanced “Trusted Agent” models could facilitate the exchange of information between federal agencies and industry to drive identification and analysis of federal spectrum uses, protect sensitive government and commercial information, and serve as an impartial clearinghouse for stakeholders to address issues, but create the potential for delay. Policymakers must continue to explore ways to streamline and expedite this process to drive more efficient spectrum management.

Maximizing Intergovernmental Cooperation. We are pleased that Congress continues to recognize the respective allocation of responsibilities between the FCC, NTIA, and federal spectrum users. Commercial spectrum has never been – and should not be – governed by DoD if we want the technological advances and productivity gains that are stimulated by private sector investment. Any consideration of spectrum sharing policy decisions, technologies, or reports involving federal and non-federal spectrum should be led by the FCC and/or NTIA. But as a veteran of both agencies, I know first-hand the challenges posed by the interagency process and shared spectrum jurisdiction. There are very few formal structures

to guide the agencies; a fairly general 2003 Memorandum of Understanding between the FCC and NTIA is the primary guidance document. But as this hearing makes clear, spectrum policy has only become more important over the past two decades, and the existing processes are no longer working as effectively. Stakeholders on all sides agree that the process that preceded the auction of the 24 GHz band – which didn't happen until five years after the FCC identified the band as a candidate for 5G use, and over a year after the FCC put rules in place – was not constructive. I applaud this Committee's commitment to identifying the appropriate structures and processes for the race to 5G and beyond. Our common national interest in sound spectrum management underscores the importance of coordinated spectrum policy decision-making.

Creating a Spectrum Pipeline. This Committee has always been a leader in spectrum policy and we encourage you once again to take up that mantle with a spectrum pipeline bill that charts the course for our country's 5G goals. Chairman Thune and then-Ranking Member Nelson brought us the MOBILE NOW Act, and Sens. Gardner and Hassan followed up with the introduction of the AIRWAVES Act. We are hopeful we can work again with this Committee on the next generation of spectrum pipeline legislation.

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Thank you for the opportunity to testify today. CTIA appreciates this Committee's leadership in promoting 5G through sound spectrum management processes and results. We look forward to continuing to work with all of you to advance our ability to identify and reallocate critical mid-band spectrum that will allow us to maintain our global leadership.

¹ CTIA, *2019 Annual Survey Highlights*, at 6 (June 20, 2019), <https://api.ctia.org/wp-content/uploads/2019/06/2019-Annual-Survey-Highlights-FINAL.pdf>.

² CTIA Blog, *The Wireless Industry Responds to COVID-19* (Mar. 16, 2020), <https://www.ctia.org/news/blog-wireless-industry-responds-to-covid-19>; CTIA, *How Wireless Kept Americans Connected During COVID-19*, at 3 (June 23, 2020), <https://api.ctia.org/wp-content/uploads/2020/06/How-Wireless-Kept-Americans-Connected-During-COVID-19-2.pdf> (COVID-19 Report).

³ COVID-19 Report at 2-3.

⁴ *Id.* at 3.

⁵ *Id.* at 5.

⁶ NERA, *U.S. Wireless Consumers Get the Most Value for their Money* (Mar. 2, 2020), <https://www.ctia.org/news/report-united-states-wireless-consumers-get-the-most-value-for-their-money>.

⁷ Analysys Mason, *Comparison of Total Mobile Spectrum in Different Markets*, at 1 (June 2020), <https://api.ctia.org/wp-content/uploads/2020/06/Comparison-of-Total-Mobile-Spectrum-in-Different-Markets-Final-Report-290620.pdf> (Spectrum Comparison Report).

⁸ Analysys Mason, *5G Mid-Band Spectrum Global Update*, at 1 (Mar. 2020), <https://api.ctia.org/wp-content/uploads/2020/03/5G-mid-band-spectrum-global-update-march-2020.pdf> (Mid-Band Global Update).

⁹ *Id.*

¹⁰ DoD, Releasable Information, DOD\N 1755-1780 (Rev. 4) (Sufficient), at 37 (Aug. 20, 2019), https://www.ntia.doc.gov/files/ntia/publications/releasable_dod_n_1755-1780_rev-4_sufficient_11_13_2019.pdf; Dept. of Energy, Releasable Information, DOE\BPA 1755-1780 (Rev. 1) (Sufficient), at 7 (Mar. 11, 2019), https://www.ntia.doc.gov/files/ntia/publications/releasable_doe_bpa_1755-1780_rev-1_sufficient_11_13_2019.pdf; HUD, Releasable Information, HUD\HUD 1755-1780 (Rev. 2) (Sufficient), at 8 (Mar. 12, 2018), https://www.ntia.doc.gov/files/ntia/publications/releasable_hud_hud_1755-1780_rev-2_sufficient_10_26_2018.pdf.

¹¹ Spectrum Comparison Report at 1.

¹² Bipartisan Budget Act of 2015, Pub. L. No. 114-74, § 1004.

¹³ *Unlicensed Use of the 6 GHz Band; Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, Report and Order and Further Notice of Proposed Rulemaking, FCC 20-51 (rel. Apr. 24, 2020).

¹⁴ Mid-Band Global Update at 1.

¹⁵ Wilbur L. Ross and Douglas W. Kinkoph, US Dept. of Commerce and NTIA, *CSEA Annual Progress Report for 2019*, at I-1 (June 2020),

https://www.ntia.doc.gov/files/ntia/publications/ntia_2019_csea_report_june_2020.pdf
(2019 CSEA Report).

¹⁶ Wilbur L. Ross and Diane Rinaldo, U.S. Dept. of Commerce and NTIA, *Commercial Spectrum Enhancement Act (CSEA) Annual Progress Report for 2018*, at I-1 (Oct. 2019), https://www.ntia.doc.gov/files/ntia/publications/3397-ntia_2018_csea_report102819final.pdf.

¹⁷ *Id.*

¹⁸ 2019 CSEA Report at II-1. The total estimated relocation and sharing costs for the 1695-1710 MHz band were \$527.1 million and the total estimated relocation and sharing costs for the 1755-1780 MHz band were \$4.576 billion.

¹⁹ CTIA, *Smarter and More Efficient: How America's Wireless Industry Maximizes Its Spectrum*, (July 2019), <https://www.ctia.org/news/wireless-providers-increased-spectrum-efficiency-by-42-times-since-2010-new-paper-shows>.

²⁰ Lawrence E. Strickling and Alexander MacGillivray, *AWS-3 Auction Highlights New Approach to Spectrum Policy* (Jan. 29, 2015), <https://obamawhitehouse.archives.gov/blog/2015/01/29/aws-3-auction-highlights-new-approach-spectrum-policy>.