Testimony of

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On

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Chairman Thune, Ranking Member Schatz, Chairman Wicker, Ranking Member Cantwell and members of the Subcommittee, thank you for the opportunity to testify today on the state of U.S. Spectrum Policy; it is truly an honor and pleasure to be here today.

The timing of this hearing is particularly significant as today is also the beginning of the long-awaited Citizens Broadband Radio Service (CBRS) auction of Priority Access Licenses (PALs). This culminates more than eight years of challenging, yet highly-productive work among many stakeholders including our federal partners, the FCC and NTIA. I think CBRS is an example of what has worked well in U.S. spectrum policy, while also highlighting some areas where we can improve upon the spectrum management processes and interactions among stakeholders within both government and industry.

Spectrum is the lifeblood that our nation needs in order to realize the economic and social benefits of new technologies and myriad resulting wireless services such as the mobile cellular networks, Land Mobile Radio, broadcast, satellite, microwave, CBRS, Wi-Fi and millions of innovative unlicensed devices, and many more.

The U.S. has long been the world leader in wireless technologies and innovative ways to wring every hertz out of a spectrum allocation. Some of the recent innovations around dynamic spectrum sharing have been critical to introducing new wireless services. We will be building on dynamic sharing as we investigate new spectrum opportunities.

We must also look for ways to use spectrum more efficiently and to make spectrum available more quickly. Eight years to commercialize a band like CBRS is too long. While we are improving on that timeline, there is still work to be done. To be sure, each spectrum allocation proceeding moves at its own pace. For example, while access to the 6 GHz spectrum appears to be progressing rather quickly at this time, the lower mid-band (3100-3550 MHz) will likely take longer to be available for commercial use. We must shorten the spectrum availability pipeline – the period from when spectrum is identified to when it is put into service.

One significant contributing factor to the extended length of many of these spectrum proceedings is the simple reality that because we are a leader in wireless technologies (for both commercial and government uses), we have allocated virtually all of the low and mid-band frequencies. Efforts to repurpose or share those bands for next-generation services inherently involve incumbent users and discussions on the impacts to existing services. Many of these incumbents are federal spectrum users.

CommScope supports a comprehensive, long-term national spectrum policy that addresses the nation's anticipated needs for new allocations of licensed and unlicensed frequencies, the time-tested allocation types upon which we have established our existing wireless leadership. In addition, our spectrum policy should incorporate newer, dynamically-coordinated sharing regimes, building upon the innovative approaches in CBRS and 6 GHz. These newer coordinated sharing regimes should accommodate a range of access types, including "quasi-licensed" and "quasi-unlicensed," and are able to rebalance how bands are allocated over time in response to demand, thus providing

a complement to the traditional allocations and offering regulators and policymakers a new tool in their spectrum management toolkit.

Reallocating spectrum for clearing or shared use brings up the issue of how to address incumbents. Our experience is that one of the best ways to address incumbent issues is to establish a framework for collaboration among stakeholders early in the process. Examples of such successful collaboration include AWS-3, CBRS, and the recent and ongoing collaborations in the 3.7 GHz and 6 GHz bands.

As a nation we must leverage and strengthen these collaborations among all spectrum stakeholders in order to maintain and extend America's leadership in wireless technologies and services. NTIA and DoD have highlighted the critical role of industry in areas of national interest such as 5G services for federal users and spectrum management systems modernization. CommScope continues to engage in these activities, along with other critical public/private collaborations such as federal support for next generation Open RAN architectures which will help accelerate America's 5G buildout.

Finally, some of the work of the Commerce Spectrum Management Advisory Committee (CSMAC) at NTIA is worth considering. One of their working groups will be suggesting an implementation structure and governance model in consideration of the pending National Spectrum Strategy.

Overview of CommScope

CommScope is a leading U.S. developer and manufacturer of wireless network equipment. Our portfolio of products includes the critical building blocks that U.S. carriers and enterprises need to deploy and operationalize their next generation wireless networks – for each and every part of those networks, including fiber infrastructure and backhaul, macro cellular sites, outdoor small cells, in-building and venue wireless (Wi-Fi and cellular), and spectrum management solutions. More broadly, our company is also a key provider of broadband solutions, ranging from innovative technologies which increase the speed and expand the deployment of broadband networks to the customer equipment needed to access these broadband services. Our customers range from small rural wireless Internet service providers to large global wireless operators; from local telecom providers to nationwide cable operators and American companies in virtually every sector of the economy. CommScope's customers operate in every state of the U.S.

CommScope has been, and continues to be, an active and leading participant in numerous spectrum-related proceedings. We are active in nearly 100 Standards Development Organizations, including 3GPP and IEEE. CommScope was a founding member of the CBRS Alliance and fills its Presidency. We also serve on the Board of the Wireless Innovation Forum. CommScope was one of the first authorized CBRS Spectrum Access System (SAS) operators and has been a TV White Space database administrator. CommScope also has over 40 years of spectrum management experience and expertise.

One mission of CommScope is to help make spectrum available for the broadest uses and applications as fast as possible. Our leadership in wireless and spectrum issues has been key in bringing new spectrum bands online for 5G, including:

- Licensed, unlicensed, and shared spectrum solutions and services across the low/mid/high bands,

- Dynamic spectrum sharing (TVWS, CBRS, 6 GHz AFC); both on the RAN and spectrum management systems and supporting services. For instance, CommScope is an FCC-designated SAS/ESC administrator,

- FCC-designated frequency administration for services such as the 70/80/90 GHz service and Wireless Medical Telemetry Service,[1]

- Open RAN development, standardization, and advocacy,

- Close collaboration with various federal agencies, including the FCC, NTIA, DoD, FAA, DoE, etc. on spectrum initiatives such as AWS-3, CBRS, 3.1-3.55 GHz, 7-8 GHz, 70/80/90 GHz, etc. CommScope is also a charter member of the National Spectrum Consortium.

In particular, CommScope is a demonstrated leader in Open RAN initiatives. CommScope has contributed to standardization efforts by the O-RAN Alliance, a consortium of mobile network operators and vendor companies, since it was founded in February 2019 and has actively participated in Open RAN demonstrations with other O-

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[1] CommScope is the technical partner to the American Society for Healthcare Engineering of the American Hospital Association who are the FCC-designated frequency coordinator for the WMTS.

RAN Alliance members. In addition, CommScope is a founding member of the Open RAN Policy Coalition, which promotes policies that will advance Open RAN solutions.

U.S. Leadership in Wireless Technology Relies on Quick Access to Spectrum

In a 2015 report,[2] CTIA indicated that it takes about 13 years to make spectrum available to consumers. We are improving on that timeline thanks in part to your leadership on advancing legislation such as the MOBILE NOW Act. However, we still have much to do. It has taken eight years to commercialize CBRS. And while 6 GHz spectrum may come online in record time, the lower mid-band (3100-3550 MHz) will likely take many years to be realized for commercial use. The C-Band will have taken over six years from the time of the FCC's initial Mid-Band NOI to the time when nationwide wireless services can be deployed.

CommScope commends Chairman Pai and the FCC for their actions under the 5G FAST Plan to identify and accelerate new allocations of licensed, unlicensed, and shared spectrum in the low, mid, and high bands. Collectively, we must seek ways to decrease the time from pipeline identification to commercial use.

We are encouraged by the Committee's leadership in the bipartisan approval of S. 3717, the Spectrum IT Modernization Act, in the fiscal year 2021 National Defense Authorization Act (NDAA). As the nation's demands for spectrum continue to increase rapidly and we seek efficiencies in federal and commercial spectrum utilization, it is

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[2] https://api.ctia.org/docs/default-source/default-document-library/072015-spectrum-timelines-white-paper.pdf.

critical that the spectrum management technologies, tools, and infrastructures of NTIA be improved and modernized. Industry relies heavily on NTIA to perform complex engineering analyses of spectrum usage, spectrum-sharing feasibility and signal coverage. NTIA was invaluable in providing engineering support for AWS-3 and CBRS. We expect that modernizing and improving the capabilities of NTIA and other federal agencies will improve spectrum utilization efficiencies for all U.S. spectrum users.

The U.S. needs to expedite ongoing research, development, testing, and evaluation to develop advanced technologies, innovative spectrum-utilization methods, and spectrum-sharing tools and techniques that increase spectrum access, efficiency, and effectiveness.

A comprehensive, long-term national spectrum policy should incorporate traditionally licensed and unlicensed approaches.

We have interests, business, and customers in practically every corner of the spectrum-scape. From traditional and non-traditional wireless operators who use spectrum across the low, mid, and high band ranges to provide 5G services; to enterprises and customers who rely on Wi-Fi devices; to rural wireless Internet service providers who are providing critical communications to rural Americans during COVID; to utilities managing the nation's energy supply, we are acutely aware of the need to have flexible approaches to spectrum allocation and assignment.

The MOBILE NOW Act is a great example of this flexibility. Calling for 500 MHz of spectrum to be allocated to several uses including spectrum below 6 GHz for mobile

and fixed wireless broadband use and spectrum for commercial mobile and unlicensed use, there is something for everyone.

Similarly, the FCC's "Mid-band Notice of Inquiry" resulted in rulemakings that will repurpose 1480 MHz for licensed and unlicensed use in the 4 GHz and 6 GHz bands. This will have profound effects on new technologies and capabilities to support America's increasing need for broadband.

We need to work together to create flexible models for spectrum management, including standards, incentives, and enforcement mechanisms that promote efficient and effective spectrum use, including flexible-use spectrum allocations or licenses, while accounting for critical safety and security concerns.

Spectrum policy should consider and promote spectrum-sharing approaches where appropriate.

Virtually all the spectrum in the low, mid, and high bands has some degree of incumbent use. For example, according to the NTIA, the 3100-3550 MHz bands contain over 330 frequency assignments.[3] In the CBRS band, there are over 7800 grandfathered sites licensed for use by wireless Internet service providers and utilities, there are over 90 fixed satellite earth station sites plus an unknown number of DoD

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[3] NTIA Spectrum Compendium data provided in the following segments:
https://www.ntia.doc.gov/files/ntia/publications/compendium/3100.00-3300.00_01DEC15.pdf,
https://www.ntia.doc.gov/files/ntia/publications/compendium/3300.00-3500.00_01DEC15.pdf, and
https://www.ntia.doc.gov/files/ntia/publications/compendium/3500.00-3650.00_01DEC15.pdf.

radar locations.[4] According to the FCC, the 6 GHz bands (5925-7125 MHz) contain almost 47,700 assignments.[5] In the C-Band, there are 66 satellites and over 18,000 earth stations.[6]

Relocation is often not feasible or takes a long time and ends up delaying the introduction of new wireless services. The recent NTIA analyses on the feasibility of commercial wireless sharing with federal systems in 3100-3550 MHz bands were generally predicated on the assumption that there would be no changes to incumbent operations.[7] In the 6 GHz bands, relocation was not considered.[8] And in the C-Band, *accelerated* relocation will take almost four years to clear the band for mobile use.

Sharing generally obviates relocation or can be used where relocation is not feasible. Sharing systems can be brought online before incumbent operations can be relocated. In cases where the incumbent situation is not complex, good, old-fashioned frequency coordination is a proven sharing solution.

There are several new and existing spectrum-sharing technologies that should be recalled when identifying bands to repurpose or open to shared use. The CBRS SAS and new 6 GHz AFC are examples of spectrum-sharing systems that will allow for

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[4] FCC Public Access to 3650 grandfathered wireless protection zone filings: https://opendata.fcc.gov/Wireless/ULS-3650-Locations-Default-View/dpvg-tvcx/data
FCC Public access to protected FSS Earth Station Registrations: https://opendata.fcc.gov/Wireless/Protected-FSS-Earth-Station-Registration-Complete-/acbv-jbb4/data;
[5] FCC 6GHz Notice of Proposed Rulemaking, FCC 18-147, ET 18-295.
[6] FCC C-Band Report & Order, FCC 20-22, GN 18-122.
[7] "Technical Feasibility of Sharing Federal Spectrum with Future Commercial Operations in the 3450-3550 MHz Band", NTIA Technical Report 20-546, January 2020.
"Feasibility of Commercial Wireless Services Sharing with Federal Operations in the 3100-3550 MHz Band", July 2020.
[8] 6 GHz R&O at para 1.

deployment and operation of new devices and services without having to relocate incumbent operations.

Spectrum policy must balance the costs, complexities and time frames for making spectrum available on a shared or exclusive basis. We note that sharing is not applicable in all cases and we absolutely support exclusive licensing.

Establish frameworks for collaboration and cooperation among stakeholders

The concept of sharing spectrum sets up a potentially adversarial relationship between incumbents and new entrants. Incumbents might be hesitant to work with new entrants on establishing sharing frameworks particularly at the end of lengthy, complex, and possibly contentious rulemakings. We have found that intentionally establishing a collaborative framework for cooperation among all stakeholders has been quite successful in arriving at mutually-agreeable solutions.

In 2012, NTIA used the CSMAC process to establish a collaboration framework between commercial interests and federal spectrum users in the AWS-3 bands (1695-1710 MHz and 1755-1850 MHz). The plan was to create working groups that would consider ways to facilitate the implementation of commercial wireless broadband into erstwhile federal bands. The working groups produced recommendations to the CSMAC concerning approaches to sharing, transition, and/or relocation of the band that determined the steps that were ultimately taken and any factors that could reduce the projected costs, or limitations or restrictions on spectrum availability. These recommendations also helped to inform the FCC's AWS-3 rulemaking. This AWS-3

collaboration under CSMAC proved to be very successful in helping to craft rules with a clearer mutual understanding of how commercial mobile systems can coexist with a host of federal and DoD systems.

Another direct benefit of this collaboration was the establishment of key relationships with federal spectrum management and policy leaders and counterparts. Working with key individuals such as Mr. Fred Moorefield, Deputy Chief Information Officer for Command, Control, Communications and Computers and Information Infrastructure Capabilities, Office of the Secretary of Defense, Chief Information Officer and Mr. Tom Taylor, Deputy Director, EMS Operations at DoD CIO, and many others, we were able to identify and creatively resolve issues in close collaboration with individuals empowered to find solutions.

Industry collaboration on CBRS among all stakeholders helped identify and address issues relatively quickly. These engagements build upon the AWS-3 collaboration to the extent that there was good familiarity among stakeholders, there was mutual understanding of issues and how to collectively address them, and general willingness to work through issues together. Again, the relationships we had previously established with Mr. Moorefield, Mr. Taylor, and others were critical in working through many challenging issues. The FCC concluded in a November 2018 report to Congress on the status of CBRS that, "[c]ollaboration among all of the stakeholders is excellent."[9] CommScope agrees with that assessment and has seen that excellent collaboration continue to this day.

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[9] Federal Communications Commission, Report to Congress Pursuant to Section 1008 of the Spectrum Pipeline Act of 2015, As Amended by the Ray Baum's Act of 2018, November 2, 2018 at 25.

FCC-endorsed multi-stakeholder group (MSG) collaboration on C-Band and 6 GHz is relatively new, yet shows promise as a framework to coordinate technical discussions among industry stakeholders to achieve mutually-agreeable solutions to several difficult technical questions. For the C-Band, there are currently four technical working groups comprised of some of the industry's best technical experts who are addressing potential in-band and adjacent-band coexistence and sharing issues. For the 6 GHz band, the FCC encouraged the formation of an MSG to study and make recommendations on how to operationalize the AFC and address interference issues.

In order to achieve the spectral efficiency and time to market benefits of shared-spectrum regimes and repurposing efforts, collaboration among all stakeholders is required.

Consider CSMAC's recommendations, primarily on the National Spectrum Strategy, when examining the respective roles of the FCC and NTIA in spectrum management and policymaking

CSMAC has been organized since 2004 under the Federal Advisory Committee Act. CSMAC advises the Assistant Secretary for Communications and Information at NTIA on a broad range of spectrum policy issues. CSMAC typically functions through working groups who deliberate on specific tasks or questions provided by the NTIA and makes recommendations to the Assistant Secretary. CSMAC members are spectrum policy experts from outside the federal government. Committee members offer expertise and perspective on reforms to enable new technologies and services, including reforms

that expedite the American public's access to broadband services, public safety, and long-range spectrum planning. Members are selected based on their technical background and expertise. The current CSMAC charter was renewed in October 2019 and expires in September 2021.[10]

In August 2019, the Assistant Secretary provided CSMAC with the following question that is directly related to U.S. spectrum policy:

> What should be the United States implementation structure or governance model for the National Spectrum Strategy (NSpcS)? Consider whether the US spectrum management approach is optimized for the implementation of a 21st century national spectrum strategy, and if not, whether there is value in establishing a new approach or structure to accomplish this. If there is value in a new approach or structure, what are its characteristics?[11]

This working group has been deliberating on this question since October 2019. In January 2020, the working group provided a public update on their deliberations:

> There is general agreement among the working group that our country's current approach for managing the use of spectrum is no longer effectively serving the needs of the entire stakeholder community and would benefit from reform. Moreover, with the increased use of spectrum by all stakeholders, we agree that issues around spectrum sharing and band

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[10] https://www.ntia.doc.gov/files/ntia/publications/csmac_charter_10.1.19.pdf.

[11] https://www.ntia.doc.gov/files/ntia/publications/spectrum_strategy_governance_briefing_012820.pdf.

adjacencies will need to be handled with both speed and skill to ensure

that the US is making the most of its critical national resources.[12]

The deliberations of the working group are ongoing and not yet public. However, the working group is planning to provide a full report on their findings to the Assistant Secretary in the coming months.

Open RAN also will play a significant role in accelerating the rollout of 5G in the U.S. by enabling 5G equipment interoperability.

In contrast to the existing "closed" systems where networks are locked to a single vendor, Open RAN (O-RAN) architectures are a new model where cellular radio networks are comprised of hardware and software components from multiple vendors operating over "open and interoperable" network interfaces. Although CommScope and other industry stakeholders are making significant strides towards O-RAN solutions for 5G wireless networks, ongoing standardization and implementation research and development must still be done. Given the critical role Open RAN can play in advancing 5G, government/industry collaboration, including federal funding, is needed to ensure American leadership in O-RAN research and development efforts.

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[12] https://www.ntia.doc.gov/files/ntia/publications/csmac_sc1_presentation_april_22_2020.pdf.

Summary

Thank you again for the opportunity to testify before the Subcommittee and thank you for your leadership in driving discussion on U.S. spectrum policy.

U.S. spectrum policy is at the nexus of increased demand for spectrum; advanced methods and tools for extracting the maximum use, efficiency, and value of spectrum and a blurring of the lines between spectrum allocations. Indeed, this is perhaps one of the most transitional times in the history of spectrum management.

I think we all have a role in:

- Assuring quick access to spectrum,
- Incorporation of licensed and unlicensed approaches to spectrum allocation,
- Use of spectrum-sharing approaches where appropriate,
- Ensuring collaboration and cooperation among stakeholders,
- Supporting NTIA's recommendations on the National Spectrum Strategy, and
- Support of Open RAN in the rollout of 5G.

We look forward to working together to advance U.S. spectrum policy.