

**Before the
U.S. DEPARTMENT OF COMMERCE
NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION
Washington, DC 20240**

In the Matter of)	
)	
Request for Public Comment on the State of)	Docket No. NTIA-2024-0001;
Development of Sixth Generation (6G))	240430-0121
Wireless Communications Technology)	RIN 0660-XC062

COMMENTS OF CTIA

Umair Javed
Senior Vice President and General Counsel

Scott K. Bergmann
Senior Vice President, Regulatory Affairs

Mike Beirne
Director, Regulatory Affairs

CTIA
1400 Sixteenth Street, NW
Suite 600
Washington, DC 20036
(202) 736-3200
www.ctia.org

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CTIA¹ submits these comments in response to the Request for Public Comment (“RFC”) issued by the National Telecommunications and Information Administration (“NTIA”) on the state of development of 6G wireless technologies.²

I. INTRODUCTION AND SUMMARY.

The United States has been at the forefront of the global digital transformation, enabling our nation to take the mantle in wireless innovation and deployment. Even as CTIA’s members continue to expand 5G across America, there is ongoing work to build on this next generation of advanced wireless connectivity in the coming years. As the Commerce Spectrum Management Advisory Committee (“CSMAC”) has stated, “[w]hile 6G deployment may be years out (2030 often cited as a target), the U.S. must take steps now to better influence the complex process of technology development, standardization, and regulations, and lay the foundation for its

¹ CTIA – The Wireless Association® (“CTIA”) (www.ctia.org) represents the U.S. wireless communications industry and the companies throughout the mobile ecosystem that enable Americans to lead a 21st century connected life. The association’s members include wireless providers, device manufacturers, suppliers as well as apps and content companies. CTIA vigorously advocates at all levels of government for policies that foster continued wireless innovation and investment. The association also coordinates the industry’s voluntary best practices, hosts educational events that promote the wireless industry and co-produces the industry’s leading wireless tradeshow. CTIA was founded in 1984 and is based in Washington, D.C.

² *Request for Public Comment on the Current State of Development of Sixth Generation (6G) Wireless Communications Technology*, 89 Fed. Reg. 45648 (May 23, 2024) (“RFC”).

success.”³ CTIA agrees and appreciates that NTIA is thinking ahead about how we can continue our wireless leadership in 6G.

As with past generations of wireless, the linchpin for 6G leadership is a roadmap for secure, reliable, full-power, licensed spectrum in globally harmonized frequency tuning ranges to support 6G connectivity for American consumers, enterprises, and Government agencies. With adequate commercial spectrum, the U.S. Government can promote leadership in advanced wireless connectivity—and attain the economic and national security benefits such leadership brings. Without it, these goals are put at risk.

Additionally, standards play a pivotal role enabling wireless technologies to scale globally and provide a level of support, portability, and systems interoperability and compatibility that consumers have enjoyed for a decade. Global technology standards and a global framework for standard-essential patents have enabled U.S. inventors and innovators to lead the world in the development of technologies that are essential to today’s and tomorrow’s wireless networks and digital infrastructure worldwide. For 6G, the U.S. Government should recommit to supporting standards development led by the private sector and focus efforts on harmonization and collaboration with trusted global allies. The U.S. will not maintain its position as a global technology leader if it is on a wireless technology island.

Finally, as the Government considers ways to advance next-generation wireless, it should promote policies for resilient, efficient, technology-neutral, and cost-effective infrastructure deployment and ensure that providers have the inputs they need to adopt and efficiently deploy infrastructure to support the new technology.

³ *Commerce Spectrum Management Advisory Committee, Report of Subcommittee on 6G, Final Report*, NTIA at 5 (Dec. 2023), https://www.ntia.gov/sites/default/files/2023-12/6g_subcommittee_final_report.pdf (“CSMAC 6G Report”).

Taking steps consistent with these comments will position the U.S. as a leader in wireless connectivity for years to come.

II. 5G CONTINUES TO SUPPORT U.S. ECONOMIC COMPETITIVENESS AND OUR NATIONAL SECURITY, AND U.S. POLICY SHOULD ADVANCE 6G TOWARD THESE GOALS.

The U.S. wireless marketplace is an American success story, producing a proliferation of high-quality, consumer-enhancing innovations across a robustly competitive ecosystem that are benefitting both our nation’s economy and national security.⁴ As the White House recently recognized, future-generation wireless networks and other critical and emerging technologies are “potentially significant to U.S. national security, including economic security and the defense of democratic values.”⁵ CTIA agrees and urges the Government to lay a foundation for 6G that will expand the U.S. economy, bolster national security, and promote innovations in new products, services, and business models that benefit American consumers, enterprises, and the Government alike.

Wireless is a Boon for the U.S. Economy. The wireless industry is a key driver of our economy, and favorable spectrum and siting policies can ensure those benefits extend into the 6G environment.⁶ Today, the U.S. wireless industry supports 4.5 million jobs and contributes \$825 billion to our economy each year—equivalent to the 19th largest global economy.⁷ In

⁴ See, e.g., John W. Mayo, *The Evolution of Consumer Welfare in the Mobile Wireless Service Industry* (Jan. 9, 2024), https://api.ctia.org/wp-content/uploads/2024/01/Mayo-Paper_Final.pdf.

⁵ Statement and Release, The White House, *Fact Sheet: Implementing the National Standards Strategy for Critical and Emerging Technology* (July 26, 2024), <https://www.whitehouse.gov/briefing-room/statements-releases/2024/07/26/fact-sheet-implementing-the-national-standards-strategy-for-critical-and-emerging-technology/> (“National Standards Strategy Implementation Plan Fact Sheet”).

⁶ See RFC, 89 Fed. Reg. at 45648 (highlighting the societal and economic potential of new and emerging 6G-enabled applications).

⁷ See Meredith Attwell Baker, *#RestoreAuctionAuthority with a Spectrum Pipeline*, CTIA BLOG (Mar. 8, 2024), <https://www.ctia.org/news/restoreauctionauthority-with-a-spectrum-pipeline>; Val Elbert et al.,

nominal dollars, U.S. wireless providers invested more than \$364 billion between 2010 and 2022 to improve their networks.⁸ A recent report found that the five publicly traded U.S. wireless providers have invested an average of \$54 billion per year since 2020, making the wireless industry the second-highest investing industry sector for the U.S. economy.⁹ While U.S. policy requires a mix of licensed, unlicensed, and shared spectrum, licensed spectrum in particular is central to wireless innovation and the backbone of our nation’s wide-area wireless broadband deployments, contributing more than \$5 trillion to the U.S. economy in the last decade.¹⁰

Wireless Leadership is Essential to Our National Security. Wireless competitiveness in today’s economy and leadership in tomorrow’s technology marketplace are a national security imperative.¹¹ As U.S. and trusted vendors work to continue expanding 5G and look ahead to 6G technologies, China is likewise seeking to dominate various emerging technology sectors, and spectrum is a key aspect of its initiative. Specifically, China actively participates in international spectrum allocation and standards setting processes to advance its interests and undermine U.S.

Accelerating the 5G Economy in the US, BOSTON CONSULTING GROUP, at 2 (Apr. 17, 2023), <https://api.ctia.org/wp-content/uploads/2023/04/accelerating-the-5g-economy-in-the-us-1.pdf>.

⁸ See Bryan Keating, *An Economic Analysis of Mobile Wireless Competition in the United States*, COMPASS LEXECON, at 5 (Dec. 11, 2023), https://api.ctia.org/wp-content/uploads/2023/12/CL_Dec-2023.pdf.

⁹ See Timothy J. Tardiff, *Wireless Investment and Economic Benefits*, ADVANCED ANALYTICAL CONSULTING GROUP (Apr. 2024), <https://api.ctia.org/wp-content/uploads/2024/04/Wireless-Investment-and-Economic-Benefits.pdf>.

¹⁰ See, e.g., *How Licensed Spectrum Fuels U.S. Economic Competitiveness*, CTIA (May 6, 2024), <https://api.ctia.org/wp-content/uploads/2024/04/American-Competitiveness.pdf>; Comments of CTIA, Docket No. NTIA-2023-0003, at 11-14 (filed Apr. 17, 2023), <https://www.ctia.org/positions/documents/comments-of-ctia-before-ntia-in-the-matter-of-development-of-a-national-spectrum-strategy> (“CTIA Strategy Comments”); Aren Megerdichian, *The Importance of Licensed Spectrum and Wireless Telecommunications to the American Economy*, COMPASS LEXECON, at 3 (Dec. 7, 2022), <https://api.ctia.org/wp-content/uploads/2022/12/Compass-Lexecon-Licensed-Spectrum-Report.pdf>. See also *2023 Annual Survey Highlights*, CTIA, at 4 (July 25, 2023), <https://www.ctia.org/news/2023-annual-survey-highlights>.

¹¹ See RFC, 89 Fed. Reg. at 45649 (Question 4, seeking comment on countries or regions that represent challenges to U.S. leadership in 6G).

capabilities and leadership.¹² The U.S. has been setting its own course in terms of spectrum policy, often without the benefit of a broader view of our strategic interests. The United States cannot lead in standards-setting bodies, and we cannot ensure a secure supply chain and bolster trusted suppliers for networks at home and across the globe, if we are not present in global spectrum bands for 5G and next-generation wireless services. China, meanwhile, would benefit from and exert leadership in our absence. Early spectrum policy leadership is of critical importance to vendor certainty and strategic partnerships in the emerging 6G landscape. Other countries and regions will represent a challenge only if the U.S. does not or is unable to advance 6G. Maintaining an edge over key global rivals is therefore imperative.

The Benefits of 5G Wireless Innovation Will Extend to 6G. Wireless innovation is driving enterprise, industrial, and consumer developments across the country today, and these technology advancements are set to benefit our economy and national security into the 6G future.¹³ The flexible and powerful capabilities of 5G networks are enabling integrated wireless connectivity in key sectors of our economy, including agriculture, healthcare, transportation, education, manufacturing, energy, public safety, and more. For example, students across the country are benefitting from 5G-delivered immersive learning experiences, which are closing gaps in STEM education through interactive virtual reality (“VR”) lesson plans and experiences.¹⁴ Smart factories are using 5G to implement automation, quality assurance, and

¹² See, e.g., CTIA Strategy Comments at 16-19.

¹³ See RFC, 89 Fed. Reg. at 45649 (Question 1, seeking comment on use cases that will benefit from 6G); *id.* (Question 5, seeking comment on barriers to adoption of 6G by non-traditional verticals).

¹⁴ *The 5G Innovators: Entrepreneurs Leveraging the 5G Platform*, CTIA, at 5 (Feb. 2, 2023), <https://api.ctia.org/wp-content/uploads/2023/02/2023-CTIA-Industry-Case-Studies.pdf> (“CTIA 5G Innovators Report”).

factory-of-the-future innovations.¹⁵ 5G’s low latency and ability to support enhanced edge computing capabilities is enabling safer, more efficient tactical response by firefighters and other first responders.¹⁶ Our roadways, pedestrians, and passengers are being made safer with 5G-enabled advancements in cellular vehicle-to-everything technologies.¹⁷ And analysts estimate that wireless-powered smart city solutions will add \$1.8 trillion to the U.S. economy and deliver \$160 billion in benefits and savings through efficiencies like lower energy use and reduced congestion, with the added benefit of promoting global climate change objectives.¹⁸

The U.S. wireless industry is also directly advancing our national security, both by enabling the use of next-generation commercial technologies and networks to support Federal missions and by supporting prototyping and testbeds for the use of advanced wireless technologies at military installations.¹⁹ The U.S. military is actively exploring 5G today—including for a variety of logistics applications, augmented reality, and VR for military training and machine maintenance, real-time surveillance, and cutting-edge robotics—and commercial wireless operators are supporting these use cases and developing secure, customizable network

¹⁵ See *id.* at 8; see also *How 5G Is Driving the Auto Industry Forward*, Alliance for Automotive Innovation & CTIA, at 12-16 (June 26, 2024), <https://api.ctia.org/wp-content/uploads/2024/07/How-5G-is-Moving-the-Auto-Industry-Forward.pdf> (“5G Auto Industry Report”) (discussing 5G innovations in the auto manufacturing sector).

¹⁶ See CTIA 5G Innovators Report at 10.

¹⁷ See 5G Auto Industry Report at 5-10.

¹⁸ *The State of 5G: Evaluating Progress and Charting the Path Forward*, CTIA, at 11 (July 13, 2023), <https://api.ctia.org/wp-content/uploads/2023/07/State-of-5G-Report-2.pdf> (“2023 CTIA State of 5G Report”); see also, e.g., *5G Connectivity: A Key Enabling Technology to Meet America’s Climate Change Goals*, ACCENTURE (Jan. 26, 2022), <https://api.ctia.org/wp-content/uploads/2022/01/5G-Connectivity-A-Key-Enabling-Technology-to-meet-Americas-Climate-Change-Goals-2022-01-25.pdf>.

¹⁹ See CTIA Comments on Request for Information on the National Spectrum Research and Development Plan, at 1-2 (filed Mar. 21, 2024), <https://www.nitrd.gov/rfi/2024/89-FR-12871/CTIA-NSRDP-RFI-2024.pdf> (“CTIA NSF R&D Plan Comments”).

infrastructure to support particular national security application needs.²⁰

These functionalities and use cases for consumers, enterprises, and Government are bolstered by network slicing, which enables wireless network operators to provide targeted connectivity that supports differentiated functionalities for non-traditional verticals. Through network slicing, wireless providers can offer a series of logically defined virtual networks over a single physical network for different use cases, including those that benefit from low latency, low jitter, high speeds, and heightened security, as well as those that tolerate low speeds, jitter, and delay. Network slicing can also improve network security and privacy by isolating traffic so that data cannot be intercepted or faked. And it can mitigate environmental impact by sharing the same network between private and public users, thereby reducing the overall power, space, and land used and waste generated.²¹ Many enterprises are also turning to private networks for connectivity, which provide a secure, dedicated network in a specific area that can allow an enterprise or campus, for example, to customize and fully control its network resources. This not only facilitates reliability and quality of service, but it enhances the security of such applications as well.²²

5G innovations will continue to advance through the next decade, and 6G is expected to build on that success—enabling the U.S. to enhance its global competitiveness in a variety of

²⁰ 2023 CTIA State of 5G Report at 31.

²¹ Comments of CTIA, GN Docket No. 24-119, at 18-19 (filed June 6, 2024).

²² See, e.g., Ericsson, Private Networks, <https://www.ericsson.com/en/private-networks> (last visited Aug. 14, 2024); Intel, Accelerate Your Private Network Deployment, <https://www.intel.com/content/www/us/en/wireless-network/private-networks.html> (last visited Aug. 14, 2024); Nokia, Private Networks, <https://www.nokia.com/networks/private-networks/> (last visited Aug. 14, 2024); Qualcomm, Expanding 5G NR to industrial IoT, <https://www.qualcomm.com/research/5g/5g-industrial-iot> (last visited Aug. 14, 2024); Samsung, Tapping into Industry 4.0, <https://www.samsung.com/global/business/networks/solutions/private-networks/> (last visited Aug. 14, 2024).

market sectors and support our national defense while retaining scalability and cost-effective, flexible deployment models. In particular, the International Telecommunication Union (“ITU”) envisions six usage scenarios for 6G—or “International Mobile Telecommunications (‘IMT’)-2030”—including immersive communication, hyper reliable and low-latency communication, massive communication, ubiquitous connectivity, artificial intelligence and communication, and integrated sensing and communication.²³ Each of these scenarios will bring new capabilities that are expected to enhance and expand the benefits that 5G is already bringing to American consumers and businesses. Moreover, these benefits are expected to happen through an industry-driven technology evolution, with the transition to 6G enabled in some scenarios by software-based feature upgrades to network elements. Industry anticipates 6G will be interoperable and backward compatible with 5G and, as with prior generations of wireless, will incorporate robust security measures by design to protect against emerging threats and vulnerabilities. Government regulators and lawmakers should ensure that U.S. policies facilitate the benefits of 5G and promote further enhancements that can extend into the 6G environment.

III. AMERICA’S COMPETITIVENESS IN THE ADVANCED WIRELESS ECONOMY REQUIRES CERTAINTY THAT LICENSED, FULL-POWER SPECTRUM WILL BE AVAILABLE AND HARMONIZED WITH TRUSTED ALLIES ABROAD.

A. Licensed, Full-Power Spectrum is Essential to Supporting Expanded 5G and 6G, and U.S. Anchor Spectrum Will Foster Innovation and Investment.

In February 2024, the United States—along with the Governments of trusted allies Australia, Canada, the Czech Republic, Finland, France, Japan, the Republic of Korea, Sweden, and the United Kingdom—jointly committed to pursuing policies that will support our 6G

²³ See *Framework and overall objectives of the future development of IMT for 2030 and beyond*, Recommendation ITU-R M.2160-0, ITU, at 12-14 (Nov. 2023), https://www.itu.int/dms_pubrec/itu-r/rec/m/R-REC-M.2160-0-202311-I!!PDF-E.pdf (“ITU IMT-2030 Framework and Objectives”); see also CSMAC 6G Report at 32-34.

future.²⁴ CTIA supports policies that will promote trusted, secure, and resilient technologies; global, industry-led standards; and a globally competitive supply chain. An important element of the shared 6G principles is the commitment to make use of new spectrum allocations for 6G²⁵—and that focus should be on making additional licensed, full-power spectrum available, which is the focus of our allies and partners developing 6G and will be beneficial for the types of use cases that are envisioned. As U.S. operators and vendors look ahead to 6G, there is a need for predictability regarding the principal spectrum that will be opened to support this advanced connectivity. The U.S. should facilitate this innovation certainty by working now to identify and support the development of licensed, full-power, harmonized spectrum for wireless use.²⁶

Licensed, full-power spectrum is essential to wireless networks and will continue to be necessary in the 6G environment. Licensed, full-power spectrum provides security, predictable access, and quality of service that consumers expect and that are needed to support mission-critical, interference-protected use cases.²⁷ Importantly, full-power spectrum is the lodestar for wide-area coverage, including in rural and remote parts of the country—a critical element of bridging the digital divide today and of supporting the international goal of wide-scale

²⁴ NTIA, *Joint Statement Endorsing Principles for 6G: Secure, Open & Resilient by Design* (Feb. 26, 2024), <https://www.ntia.gov/speechtestimony/2024/joint-statement-endorsing-principles-6g-secure-open-resilient-design> (“Joint Statement on Principles for 6G”); see also, e.g., U.S. Department of State, *Joint Statement of the United States of America and the Kingdom of Sweden on Cooperation in Advanced Wireless Technologies* (Aug. 6, 2024), <https://www.state.gov/joint-statement-of-the-united-states-of-america-and-the-kingdom-of-sweden-on-cooperation-in-advanced-wireless-technologies/>.

²⁵ See Joint Statement on Principles for 6G (declaring the signatories’ intent to adopt and advance relevant policies and research, development, and standardization for, among other principles, “6G technologies that could make use of new spectrum allocations or spectrum that has already been allocated for wireless services”).

²⁶ See RFC, 89 Fed. Reg. at 45649 (Question 9, seeking comment on what can be done now with 5G to enable 6G success); *id.* (Question 3, seeking comment on how the Government can ensure the benefits of 6G extend across society).

²⁷ See, e.g., CTIA Strategy Comments at 19-21.

connectivity in the next generation of wireless. As outlined in the ITU IMT-2030 Framework and Objectives, 6G is expected to further the goals of achieving “inclusivity” and “ubiquitous connectivity that would provide digital inclusion for all by meaningfully connecting rural and remote communities, further extending into sparsely populated areas, and maintaining the consistency of user experience between different locations, including deep indoor coverage.”²⁸ These goals cannot be achieved without access to licensed, full-power spectrum.²⁹

The U.S. is lagging its international peers in spectrum for licensed, full-power use.³⁰

The U.S. trails peer nations by an average of 378 megahertz of mid-band spectrum for licensed use, putting at risk the benefits of innovations in 5G and beyond.³¹ Increases in data traffic cannot be met through network efficiencies alone, and existing licensed spectrum allocations are not sufficient to meet growing demand.³² As a result, experts project a deficit of approximately

²⁸ ITU IMT-2030 Framework and Objectives at 5-6, 8.

²⁹ See, e.g., CSMAC 6G Report at 52-53 (“Licensed spectrum is typically used to achieve wide-area coverage, critical performance, and/or security requirements,” whereas “unlicensed spectrum can support wireless backhaul; localized terrestrial use cases complemented by other services such as satellite or fiber connectivity; and low-power uses such as picocell and indoor enterprise or residential use.”).

³⁰ See RFC, 89 Fed. Reg. at 45649 (Question 2, seeking comment on existing or future U.S. Government policies or initiatives that could potentially stifle 6G development and deployment, or harm the ability of companies in the U.S. or its like-minded partners to compete in international markets).

³¹ Janette Stewart, Chris Nickerson, & Juliette Welham, *Comparison of total mobile spectrum in different markets*, ANALYSYS MASON, at 10-11 (Sept. 20, 2022), <https://api.ctia.org/wp-content/uploads/2022/09/Comparison-of-total-mobile-spectrum-28-09-22.pdf> (“Analysys Mason Sept. 2022 Report”).

³² See, e.g., *Ericsson Mobility Report*, ERICSSON, at 39 (June 2024), <https://www.ericsson.com/49ed78/assets/local/reports-papers/mobility-report/documents/2024/ericsson-mobility-report-june-2024.pdf> (projecting North American mobile data traffic will increase more than three-fold by 2029 as compared to 2023); see also *Next G Alliance Report: 6G Spectrum Considerations*, Alliance for Telecommunications Industry Solutions (“ATIS”), at 17 (Aug. 2023), https://nextgalliance.org/white_papers/6g-spectrum-considerations/ (“Next G Alliance Report”) (“[I]t is not possible to meet the capacity needs of the [information and communication technology] industry with existing bands alone. . . . Capacity requirements are increasing both in the near term (before 6G timeframe) and longer term (6G timeframe). Therefore, it is important to ensure new bands are identified.”).

400 megahertz of mid-band spectrum by 2027 and nearly 1,500 megahertz by 2032.³³

Notably, the U.S. is lagging behind other regions across the globe that are using essential spectrum resources for licensed operations. The lower 3 GHz band (3.1-3.45 GHz), for example, has become a central element of 5G strategies across the world, with dozens of countries supporting licensed, full-power operations in this spectrum.³⁴ Additionally, at the 2023 World Radiocommunication Conference (“WRC-23”), a new mobile allocation was added to the 3.3-3.4 GHz segment in Region 2, meaning there is an opportunity for harmonized use of lower 3 GHz band frequencies for IMT across the Americas, the Middle East, and Africa.³⁵ Yet the U.S. is only now exploring the potential for making commercial spectrum available in the lower 3 GHz range, putting American and trusted vendors behind in terms of leading in this harmonized marketplace.

There is an urgency to make additional full-power, licensed spectrum available to support the expanding 5G and 6G vision. While global competitors have freed spectrum at an industrial scale to support advanced services, operators and vendors are planning today for future U.S. networks and equipment without information about the spectrum that will be available to support these innovations and connectivity, creating investment uncertainty. The U.S. should

³³ See Coleman Bazelon & Paroma Sanyal, *How Much Licensed Spectrum is Needed to Meet Future Demands for Network Capacity?*, THE BRATTLE GROUP, at 3-4, 24 (Apr. 17, 2023), <https://api.ctia.org/wp-content/uploads/2023/04/Network-Capacity-Constraints-and-the-Need-for-Spectrum-Brattle.pdf>; CTIA Strategy Comments at 5-8.

³⁴ See *Successful Military Radar and 5G Coexistence in the Lower 3 GHz Band: Evidence from Around the World*, CTIA, at 6 (Aug. 15, 2023), <https://api.ctia.org/wp-content/uploads/2023/08/Lower-3-GHz-Report.pdf>; see also, e.g., *The WRC Series – 3.5 GHz in the 5G Era: Preparing for New Services in 3.3-4.2 GHz*, GSMA (Oct. 2021), <https://www.gsma.com/spectrum/wp-content/uploads/2021/10/3.5-GHz-for-5G.pdf>.

³⁵ See *World Radiocommunication Conference 2023 (WRC-23) Final Acts*, ITU, at Resolution 223 (Rev. WRC-23), MOD 5.429D (2024), <https://www.itu.int/hub/publication/r-act-wrc-16-2024/> (“WRC-23 Final Acts”).

optimize its spectrum management and use policies by making additional licensed, full-power, mid-band spectrum available for commercial use, among other spectrum governance models, and identify licensed, full-power spectrum for 6G deployments, as other countries have done.³⁶

The U.S. has such an opportunity with the National Spectrum Strategy (“Strategy”) and positive results at WRC-27. As NTIA is well aware, the Strategy calls for multi-year studies of the lower 3 GHz and the 7/8 GHz (7.125-8.4 GHz) bands for potential repurposing for commercial wireless use.³⁷ CTIA remains focused on ensuring these studies achieve opportunities for economically viable licensed, full-power wireless connectivity and that the studies are data-driven and as transparent as possible with regard to the study inputs and methodologies.³⁸

Opening up the lower 3 GHz band for licensed, full-power use, particularly in the harmonized range, will allow U.S. wireless providers and U.S.-aligned manufacturers to participate and lead in the global market sector leveraging this band. It will also allow providers and vendors to combine those frequencies across the 3.45-3.55 GHz and 3.7-3.98 GHz ranges to further increase domestic capacity and coverage, including in rural areas. The United States should seize its opportunity to allocate spectrum in this band for commercial licensed use in

³⁶ See, e.g., *Next G Alliance Report: Roadmap to 6G*, ATIS, at 25 (Feb. 2022), https://nextgalliance.org/white_papers/roadmap-to-6g/ (“Next G Alliance 6G Roadmap”) (“Market-ready spectrum policies and incentives for widespread 6G deployment would lay the groundwork for rapid commercialization and deployment.”).

³⁷ See *National Spectrum Strategy*, The White House (Nov. 13, 2023), https://www.ntia.gov/sites/default/files/publications/national_spectrum_strategy_final.pdf (“Strategy”); *National Spectrum Strategy Implementation Plan*, NTIA (Mar. 12, 2024), <https://www.ntia.gov/sites/default/files/publications/national-spectrum-strategy-implementation-plan.pdf> (“Strategy Implementation Plan”).

³⁸ See, e.g., Letter from Umair Javed, Senior Vice President, CTIA, to Scott Blake Harris, Senior Spectrum Advisor, NTIA (dated Jan. 30, 2024) (“CTIA Strategy Implementation Reply Letter”); see also Comments of CTIA on Implementation of the National Spectrum Strategy, at 16 (Jan. 2, 2024) (“CTIA Strategy Implementation Plan Comments”).

alignment with the global community, enabling near-term benefits in terms of economies of scale and process efficiencies for network and device manufacturers, speeding network deployment and improving network performance.³⁹

Additionally, the 7/8 GHz band is now a global target for expanding capacity for 5G and beyond with the WRC-23 decision to include these frequencies in a future agenda item for harmonization.⁴⁰ With many other countries going licensed in the upper 6 GHz band, making suitable licensed opportunities available in the 7/8 GHz band in the near term will give the U.S. an early foothold for influencing the international mid-band IMT market across a broad tuning range, allowing the U.S. to promote trusted, secure partnerships and democratic values in the developing technology ecosystem in this range.⁴¹ Such early leadership can help the U.S. capture substantial economic benefits and ensure more innovations occur domestically: “As was the case with 4G, a significant portion of the U.S.’ economic growth was due to its first-mover advantage and rapid deployment of new networks, which unlocked economic expansion in the form of job growth, cost savings, export competitiveness and net-new innovation (e.g., leadership in device manufacturing, app ecosystems, etc.).”⁴² This leadership requires a comprehensive study of all parts of the 7/8 GHz band for its potential for licensed, commercial, full-power use.

³⁹ *Advancing US Wireless Excellence: The Case for Global Spectrum Harmonization*, ACCENTURE, at 35, 20 (Feb. 7, 2024), <https://www.ctia.org/news/advancing-u-s-wireless-excellence-the-case-for-global-spectrum-harmonization> (“Accenture Global Harmonization Report”).

⁴⁰ See WRC-23 Final Acts at Resolution 256.

⁴¹ See Letter from Scott Bergmann, Senior Vice President, CTIA, to Marlene H. Dortch, Secretary, FCC, ET Docket Nos. 23-120 & 23-121, RM-11785, at 2-3 (filed Jan. 22, 2024).

⁴² Accenture Global Harmonization Report at 8, 20, 36. As Accenture stated further, “A more cohesive global wireless market generates more economic activity in terms of new industries, jobs, and dominant domestic technology companies. Countries that lead the charge on 5G and beyond stand to capture a disproportionate amount of these long-term benefits.” *Id.* at 38.

Government policymakers and lawmakers should also look ahead to further opportunities for mid-band spectrum that can be made available for full-power use to support expanded 5G and beyond. In addition to the lower 3 GHz and 7/8 GHz bands, the U.S. should work to swiftly repurpose additional mid-band spectrum—especially in the 4.4-4.94 GHz band, which has shown increased global interest.⁴³ To that end, we agree with CSMAC that “NTIA should work with the FCC, federal agencies, the White House, and Congress to consider acquisition reform and incentives for federal agencies and commercial industry to use spectrum as efficiently and effectively as possible to increase spectrum sharing and/or facilitate relocation, as appropriate.”⁴⁴ And CSMAC should likewise further explore opportunities and uses for full-power spectrum in the next-generation wireless landscape.⁴⁵

**B. A Balanced Spectrum Framework Requires Evaluation for Licensed Use—
Not Just a One-Size-Fits-All Solution Based on Sharing Techniques.**

CTIA agrees that the U.S. should experiment with and invest in developing commercially viable spectrum sharing techniques.⁴⁶ However, while “moonshot” sharing frameworks such as dynamic spectrum sharing (“DSS”) are worthy of exploration,⁴⁷ they are at present a potential complement to commercial, full-power, exclusive-use licensing, not a replacement. It would be a mistake for U.S. spectrum policy to focus solely on sharing strategies in lieu of identifying full-power, flexible-use allocations to sustain our wireless future. Any long-term research and

⁴³ See, e.g., CTIA Strategy Implementation Plan Comments at 17-18.

⁴⁴ CSMAC 6G Report at 56.

⁴⁵ See RFC, 89 Fed. Reg. at 45650 (Question 29, seeking comment on whether the CSMAC 6G Report is missing any topics for consideration for 6G and whether there are subjects addressed by the CSMAC 6G Report that should be further explored).

⁴⁶ See, e.g., CTIA NSF R&D Plan Comments at 8.

⁴⁷ See Strategy at 13.

development for advanced sharing or DSS should not come at the expense of losing leadership in 6G commercialization.⁴⁸

As an initial matter, shared-use and unlicensed spectrum dominate the much sought-after mid-band spectrum today, with the amount of mid-band spectrum designated for unlicensed and shared use eclipsing licensed spectrum by four to one.⁴⁹ There are thus ample opportunities for spectrum to support shared-use innovations even as the U.S. faces a looming licensed spectrum shortfall to support 5G and 6G innovations. While CTIA has long recognized the need for a mix of licensed, unlicensed, and shared spectrum,⁵⁰ licensed use remains foundational to delivering the ubiquitous, always-on, interference-protected communications that Americans rely on every day.

To be sure, unlicensed sharing and low-power shared spectrum frameworks such as the Citizens Broadband Radio Service (“CBRS”) model serve a role, such as increasing capacity in localized areas. But they cannot extend broadband across the nation, connect all Americans, or provide expansive “on-the-go” connectivity. Such spectrum is thus not a substitute for the wide-area coverage made possible by full-power spectrum. Moreover, sharing frameworks such as CBRS have yet to gain meaningful marketplace traction, as demonstrated by the low level of deployment and some CBRS backers’ public statements to investors.⁵¹ This further underscores the need for spectrum access models that are scalable and incent necessary investment in large-

⁴⁸ See RFC, 89 Fed. Reg. at 45650 (Question 20(j), (l), seeking comment on developments to explore for wireless sensing and spectrum sharing, including dynamic spectrum access).

⁴⁹ See CTIA Strategy Comments at 9 (citing *Spectrum Allocation in the United States*, ACCENTURE, at 2 (Sept. 28, 2022), <https://www.ctia.org/news/spectrum-allocation-in-the-united-states>).

⁵⁰ See, e.g., Comments of CTIA, NTIA Docket No. 181130999-8999-01, at 18-19 (filed Jan. 22, 2019); CTIA Strategy Comments at 9.

⁵¹ See CTIA NSF R&D Plan Comments at 10; see also CTIA Strategy Comments at 28-30; CTIA Strategy Implementation Reply Letter at 14-16.

scale spectrum use, with technical rules including full-power base stations to better align with the coverage of similar spectrum bands. Additionally, such frameworks are not the path other countries are pursuing at present with respect to foundational bands for 6G, risking market fragmentation with a unique U.S. marketplace, nor is spectrum prescribing low-powered use considered foundational for 6G. Further, history has shown that shared access models require years to fine tune after their initial launch, risking spectrum access delays while a sharing framework is developed: it took more than four years for full-scale commercial CBRS deployment to be approved,⁵² and 6 GHz Automated Frequency Coordination administrators were only recently approved following a nearly two-and-a-half-year initial application and testing period.⁵³

It is imperative that U.S. spectrum policy avoid a singular focus on emerging sharing concepts at the expense of the full-power, licensed spectrum access that has made the U.S. wireless ecosystem the global leader in the first 20-plus years of the century. NTIA and the Government should remain focused on the core tenets of wireless success by making additional spectrum available for full-power, licensed use to support wide-area access by myriad use cases and users. This includes completing the studies outlined in the Strategy to make additional

⁵² See *Wireless Telecommunications Bureau and Office of Engineering and Technology Establish Procedure and Deadline for Filing Spectrum Access System Administrator(s) and Environmental Sensing Capability (ESC) Operator(s) Applications*, Public Notice, 30 FCC Rcd 14170 (2015); *Wireless Telecommunications Bureau and Office of Engineering and Technology Approve Four Spectrum Access System Administrators for Full Scale Commercial Deployment in the 3.5 GHz Band and Emphasize Licensee Compliance Obligations in the 3650-3700 MHz Band Under Part 96*, Public Notice, 35 FCC Rcd 117 (2020).

⁵³ See *The Commission Begins the Process for Authorizing 6 GHz Band Automated Frequency Coordination Systems*, Public Notice, 36 FCC Rcd 14098 (2021); *OET Announces Approval of Seven 6 GHz Band Automated Frequency Coordination Systems for Commercial Operation and Seeks Comment on C3 Spectra's Proposed AFC System*, Public Notice, DA 24-166, ¶ 18 (rel. Feb. 23, 2024).

spectrum available in the mid-band range, and looking ahead to additional mid-band airwaves that could be beneficial for advanced generations of wireless innovation.

Finally, as NTIA and the Government move ahead with exploring DSS and advanced sharing techniques, they should consider lessons learned from prior spectrum sharing experiments and experience.⁵⁴ Importantly, DSS should be viewed more broadly than any single implementation, such as CBRS, and realistic modeling assumptions and measurements should be used to ensure any sharing with incumbent Federal systems results in commercial systems adequately, but not overly, protecting such operations in the same frequency band.⁵⁵ Moreover, any DSS evaluation efforts should ensure all potential spectrum research areas are explored, including commercial access for full-power spectrum and sharing between Government uses, and promote equitable transparency and access to technical information in stakeholder engagements.⁵⁶ And, critically, any spectrum research and development efforts, including for 6G, should be oriented toward improving private sector investment and commercially viable deployment. While spectrum sharing may be a laudable academic exercise in some instances, it is imperative that steps are taken to promote investment in innovative spectrum-using technologies and services that can achieve wide-area coverage and the quality of service that consumers and businesses have come to expect. Approaching next-generation spectrum sharing development in this way will better enable the nation to maintain its global standing in next-generation spectrum techniques.

⁵⁴ See RFC, 89 Fed. Reg. at 45649 (Question 14, seeking comment on research areas for the U.S. to focus for 6G and beyond).

⁵⁵ CTIA NSF R&D Plan Comments at 8-10; see also *Commerce Spectrum Management Advisory Committee (CSMAC), Report of Subcommittee on CBRS*, NTIA, at 6, 8, 10-11, 16-17 (Dec. 2023), https://www.ntia.gov/sites/default/files/2023-12/cbrs_subcommittee_final_report.pdf (discussing known challenges with the CBRS framework).

⁵⁶ CTIA NSF R&D Plan Comments at 3-4.

C. Leadership in Advanced Wireless Requires Coordination and Harmonization with Trusted Partners Abroad.

As with 5G, the U.S. and allied nations will benefit from the economies of scale that can be achieved through harmonization in spectrum allocations for terrestrial wireless services, which can promote trusted, resilient, and affordable technologies for use across the globe. It is essential that the United States prioritize spectrum allocations in globally harmonized tuning ranges to enable success in the future worldwide 6G marketplace.⁵⁷

Harmonizing spectrum for substantially similar use worldwide helps minimize the threat of other countries seeking to dominate bands for 5G and beyond. By taking a technological leadership position, the United States can capture more value and influence in the 5G and developing 6G markets, enabling the nation to promote trusted technology vendors that can benefit from economies of scale and thereby bolstering our national security in the face of technology and geo-political threats.⁵⁸ It is thus in our national interest to participate in global spectrum harmonization, rather than having the U.S. on a spectrum island.⁵⁹

As Accenture reported, “[b]y accelerating the allocation of harmonized mid-band spectrum, the U.S. can enable its trusted vendors to benefit from economies of scale driven by the U.S. and nations that follow.”⁶⁰ This, in turn, “will help those vendors compete more effectively in the global market and ensure that global network infrastructure for 5G and future

⁵⁷ See RFC, 89 Fed. Reg. at 45649 (Question 4, seeking comment on what the Government can do and how it should cooperate with like-minded countries on enabling 6G success); *id.* (Question 2, seeking comment on Government policies that could potentially harm the ability of U.S. companies or like-minded partners to compete in international markets).

⁵⁸ Accenture Global Harmonization Report at 39.

⁵⁹ See CTIA Strategy Implementation Plan Comments at 11-12, 15-16; CTIA Strategy Comments at 31-32; *see also* Strategy Implementation Plan at 16, Outcome 3.1(e).

⁶⁰ Accenture Global Harmonization Report at 57.

generations uses trusted and secure equipment.”⁶¹ The stakes are high, and the U.S. has an opportunity now to position domestic innovators for leadership in the developing advanced wireless landscape.

The U.S. cannot afford to cede leadership to China in spectrum policy and technology development. Spectrum harmonization is the equalizer that will allow the U.S. and trusted allies to compete against China’s state-backed champions that already have the benefit of scale—a captured market of one billion people.⁶² As NTIA has stated, “international harmonization of spectrum use is critical to scaling commercial investments and building an ecosystem built around U.S. (rather than [People’s Republic of China]) technology.”⁶³

Harmonization across spectrum tuning ranges also benefits consumers through economies of scale in infrastructure, devices, and chipsets. As the Next G Alliance highlighted, while “[f]ull harmonization is not always feasible in all bands . . . focusing on the priority 6G bands creates an opportunity to minimize spectrum fragmentation and instead to create a sufficient ecosystem for cost-efficient implementations.”⁶⁴ With more harmonization, network devices that support a wide range of frequencies can be simplified, resulting in cost savings for end users, accelerating innovation and network deployment, and promoting earlier adoption of

⁶¹ *Id.*

⁶² See, e.g., Clete Johnson, *The Strategic Imperative of U.S. Leadership in Next-Generation Networks*, CENTER FOR STRATEGIC AND INTERNATIONAL STUDIES, at 10 (Jan. 20, 2023), <https://www.csis.org/analysis/strategic-imperative-us-leadership-next-generation-networks> (“CSIS Jan. 2023 Paper”) (recommending that the Government “lead[] efforts toward globally harmonized licensing of spectrum bands that will enable the global scale necessary for trusted suppliers to design and market semiconductors and other related components”).

⁶³ NTIA, *Advanced Dynamic Spectrum Sharing Demonstration in the National Spectrum Strategy* (June 28, 2024), <https://www.ntia.gov/issues/national-spectrum-strategy/advanced-dynamic-spectrum-sharing-demonstration-in-the-national-spectrum-strategy>.

⁶⁴ Next G Alliance Report at 18.

industry use cases.⁶⁵ This, in turn, can unlock as much as \$44 billion in value for industry and consumers over the next 10 years.⁶⁶ Failing to leverage global allocations, on the other hand, leads to lost innovation and productivity and higher costs, which put at risk the estimated \$200 billion in economic benefits that spectrum harmonization can bring to the U.S. over the next decade.⁶⁷

If the United States remains behind in identifying and making licensed, full-power spectrum available for 5G and 6G, we will be absent from global spectrum bands, and China and other nations will fill the vacuum in standards-setting bodies and in the supply chain for next-generation wireless infrastructure, to the benefit of their own strategic interests across the globe.⁶⁸ The U.S. must therefore remain focused on identifying opportunities for harmonized spectrum in a mix of bands to support innovations for 5G and beyond, with a near-term focus on mid-band spectrum. As CSMAC recognized, “[t]here is general consensus among mobile industry and academia on the continued use of mid-bands and possible expansion into extended mid-bands for evolution of 5G and emergence of 6G applications.”⁶⁹ While low-, upper-mid, and high-band spectrum will remain important to enable the coverage and capacity to support next-generation services, mid-band spectrum is essential to sustaining 5G and beyond.⁷⁰ It is no surprise, then, that “[m]ost, if not all, of IMT spectrum proposals under consideration in ITU-R

⁶⁵ See Accenture Global Harmonization Report at 8, 20, 38-49; see also CSMAC 6G Report at 54 (discussing that global standardization, global spectrum availability, and global manufacturing economies of scale can all “affect the viability of 6G use cases, given their potential global applicability”).

⁶⁶ Accenture Global Harmonization Report at 8.

⁶⁷ *Id.*

⁶⁸ See CTIA Strategy Comments at 16-19; see also, e.g., CSIS Jan. 2023 Paper.

⁶⁹ CSMAC 6G Report at 39.

⁷⁰ See, e.g., Accenture Global Harmonization Report at 15 (estimating that approximately 65 percent of the projected global 5G GDP benefits expected by 2030 are dependent on mid-band spectrum).

Regions for study toward WRC-27 are in mid-bands.”⁷¹ Recognizing that preparations are already underway for WRC-27, the U.S should act now to make additional mid-band spectrum available for full-power use in globally harmonized tuning ranges, and Government stakeholders should work closely with industry to develop and promote positions for WRC-27 that enable the U.S. to facilitate the identification and use of harmonized spectrum bands into the future.

IV. THE U.S. SHOULD REMAIN COMMITTED TO PRIVATE SECTOR-LED STANDARDS DEVELOPMENT WITH PUBLIC SECTOR SUPPORT.

Industry-driven standards that can be leveraged by trusted vendors around the globe will promote a robust market for 6G products and services, bolstering American and like-minded suppliers and their investments. The United States should therefore remain committed to supporting private sector-led standards development processes that are transparent and demonstrate America’s commitment to an open and competitive marketplace.⁷²

Internationally recognized standards facilitate innovation and competition and have helped U.S. companies become global technology leaders by setting harmonized foundational concepts, reducing fragmentation, facilitating technical interoperability between diverse systems, and promoting responsible operational and management practices.⁷³ In turn, global interoperability allows companies to market their products worldwide, which means larger economies of scale, lower technology development and production costs, reduced pricing for consumers, and more and faster innovation.⁷⁴ As the White House recently recognized,

⁷¹ CSMAC 6G Report at 55.

⁷² See RFC, 89 Fed. Reg. at 45649 (Questions 8, 15, 17, 18, seeking comment on 6G standards development); *id.* at 45650 (Question 20(g), seeking comment on security aspects of 6G).

⁷³ See Comments of CTIA, NIST Docket No. 230818-0199, at 7-8 (Dec. 20, 2023) (“CTIA National Standards Strategy Comments”).

⁷⁴ See *id.* at 8; see also Accenture Global Harmonization Report at 48-51; Next G Alliance 6G Roadmap at 24 (“Standardization complements market-based competition, typically in order to achieve objectives

“[s]tandards are essential to commerce and to the safe, reliable, and interoperable functioning of a broad array of essential products and services” and “provide industries and innovators with a common language that facilitates trade, simplifies transactions, accelerates innovation, and enables people to work across disciplines and borders toward common goals.”⁷⁵ The economies of scale resulting from equipment standardization can, moreover, trigger equipment cost savings by network operators, enabling accelerated network deployment that can have substantial overall economic benefits: even a 2-3 percent reduction in network deployment time triggered by equipment costs savings could contribute approximately \$660 million to \$1 billion in economic benefits.⁷⁶

Industry-driven models have the additional benefit of advancing vendor diversity and a trusted supply chain for the betterment of the security of our advanced wireless ecosystem. As the White House recognized, “our competitors abroad are seeking to influence international standards development to their own advantage, placing at risk leadership opportunities for U.S. innovators and industry and access to quality products and services that benefit all.”⁷⁷

such as the interoperability of complementary products/services, agreed upon test methods, functional requirements, and non-functional requirements.”).

⁷⁵ National Standards Strategy Implementation Plan Fact Sheet; *see also* *U.S. Government National Standards Strategy for Critical and Emerging Technologies (USG NSSCET)*, The White House, at 3 (rel. July 26, 2024), https://www.whitehouse.gov/wp-content/uploads/2024/07/USG-NSSCET_Implementation_Rdmap_v7_23.pdf (“National Standards Strategy Implementation Plan”) (“The private sector-led model for standardization has demonstrated its effectiveness and adaptability for over a century, proving to be a robust framework that responds well to the evolving markets and national priorities.”).

⁷⁶ Accenture Global Harmonization Report at 46.

⁷⁷ National Standards Strategy Implementation Plan Fact Sheet; *see also* *Potential Threats Vectors to 5G Infrastructure*, Cybersecurity and Infrastructure Security Agency, National Security Agency, & Office of the Director of National Intelligence, at 5 (2021), https://www.dni.gov/files/NCSC/documents/supplychain/Potential_Threat_Vectors_to_5G_Infrastructure_.pdf (“Undue influence from nation-states in sector specific or emerging technology standards . . . can negatively affect the competitive balance within the 5G market, potentially limiting the availability of trusted suppliers and leading to a situation where untrusted suppliers are the only options.”).

Consensus-driven standards and vendor diversity provide resilience against this potential for influence by any one actor while allowing vendors to differentiate themselves in a competitive marketplace. For example, in the radio access network market, open standards have fostered a more interoperable, modular network design that will increase competition between suppliers and lower barriers to entry for new entrants in the marketplace.⁷⁸

CTIA’s members have for decades participated in organizations across the wireless ecosystem that lead global standardization processes and development of technical specifications to ensure that communications networks and products are built securely and work together seamlessly for both the domestic and international markets. However, the United States cannot lead in standards-setting bodies, and we cannot ensure a secure supply chain and bolster trusted suppliers for networks at home and across the globe, if we are not present in global bands for 5G and next-generation wireless services. As countries align on spectrum bands to be used for commercial wireless use, standards bodies become further incentivized to define the technical specifications for use of those bands—thereby promoting interoperability and accelerating innovation and new product development.⁷⁹ It is imperative that U.S. policy continue to rely on public-private partnerships to promote transparent, trusted standards that can facilitate secure innovations here and abroad. Indeed, “in an era of rapid technological transformation and global scale, standards will continue to define and drive the markets of the future.”⁸⁰

⁷⁸ CTIA National Standards Strategy Comments at 9.

⁷⁹ See Accenture Global Harmonization Report at 55.

⁸⁰ *United States Government National Standards Strategy for Critical and Emerging Technology*, The White House, at 3-4 (May 2023), <https://www.whitehouse.gov/wp-content/uploads/2023/05/US-Gov-National-Standards-Strategy-2023.pdf>; see also National Standards Strategy Implementation Plan at 23 (discussing the critical importance of U.S. participation in international standards activities, especially in the critical early-stage, precompetitive phase of development).

V. EXPANDED TERRESTRIAL WIRELESS CONNECTIVITY AND COMPETITIVE HOME BROADBAND OPTIONS CAN BE BOLSTERED THROUGH SOUND INFRASTRUCTURE DEPLOYMENT POLICIES.

As has been the case with prior generations of wireless, additional network architecture will be needed as providers look to expand and enhance wireless coverage and services, including in the home broadband marketplace through fixed wireless deployments. A focus on full-power, efficient equipment and deployments and sound national siting policies can best facilitate these efforts.⁸¹

Network densification will be essential in the expanding 5G environment, and experience has shown that full-power spectrum is a key facilitator of efficient network buildout. The CBRS band is a prime example of how power levels can result in buildout complexities. With CBRS, the device power limits are up to 650 times lower than standard power levels used in commercial wireless networks in other spectrum bands, which creates a coverage hurdle. To compensate for these coverage gaps, CBRS would require five times the number of cell sites typically deployed in suburban areas and seven times as many in rural areas than a typical mid-band (e.g., C-Band) site configuration would require.⁸² When considering the number of new wireless facilities—including their construction, backhaul, power, and ongoing monthly expenses—that would be needed, deployment using low-power spectrum can be impractical in many cases. Full-power spectrum, meanwhile, has the benefit of reducing the number of facilities needed to cover the

⁸¹ See RFC, 89 Fed. Reg. at 45649 (Question 11, seeking comment on the siting needs for densified network architecture and fixed wireless access); *id.* at 45650 (Question 27, seeking comment on steps that could be taken to reduce the energy consumption associated with 6G equipment); *id.* at 45650 (Question 28, seeking comment on initiatives being undertaken by industry to reduce overall energy necessary to build and install 6G infrastructure).

⁸² *CBRS: An Unproven Spectrum Sharing Framework*, RECON ANALYTICS, at 7 (Nov. 14, 2022), <https://www.ctia.org/news/cbrs-an-unproven-spectrum-sharing-framework> (citing to *5G Mid-Band Spectrum Deployment*, RYSAVY RESEARCH at 3 (Feb. 11, 2021), <https://rysavvresearch.files.wordpress.com/2021/02/2021-02-5g-mid-band-spectrum-deployment.pdf>).

same geography, thereby facilitating more efficient and cost-effective deployment with a reduced environmental footprint. This can be especially important in rural and remote parts of the country where there can be challenging propagation and business viability.

Equipment manufacturers are also developing innovative, energy-efficient composite base stations that can support increasingly more spectrum bands, thereby efficiently providing reliable connectivity across regions and networks.⁸³ These types of multi-band composite devices can reduce environmental waste and increase energy efficiency by 30-45 percent as compared to installation of two separate, single-band base stations.⁸⁴ Such equipment should be incentivized, as it can reduce the overall costs and time associated with network buildout while promoting energy efficiency, ultimately reducing costs for consumers.

Finally, the Government should continue to support bipartisan efforts to streamline siting policies at the Federal and state levels, including on Federal lands and properties, and promote efficient and cost-effective wireless deployment.⁸⁵ The Federal Communications Commission,⁸⁶ Congress,⁸⁷ and states and localities across the country have taken significant steps over the last

⁸³ See Accenture Global Harmonization Report at 53-54; see also *WTB & OET Seek Comment on Ericsson Waiver of Sections 27.53 and 2.947*, Order, 38 FCC Rcd 1253 (WTB 2023); Petition of Samsung Electronics America, Inc. for Waiver, WT Docket No. 23-93 (filed Aug. 23, 2022).

⁸⁴ See Letter from John Godfrey, SVP of Public Policy, Samsung, to Marlene H. Dortch, Secretary, FCC, WT Docket No. 23-93, at 1 (filed Sept. 12, 2023).

⁸⁵ See, e.g., American Broadband Deployment Act of 2023, H.R.3557, 118th Cong. (introduced May 22, 2023); *Update of the Communications Uses Program, Cost Recovery Fee Schedules, and Section 512 of FLPMA for Rights-of-Way*, 89 Fed. Reg. 25922, 25927 (Apr. 12, 2024).

⁸⁶ See, e.g., *Accelerating Wireless Broadband Deployment by Removing Barriers to Infrastructure Investment*, Declaratory Ruling and Third Report and Order, 33 FCC Rcd 9088, 9107 (2018), *aff'd in part*, *City of Portland v. United States*, 969 F.3d 1020 (9th Cir. 2020); *Accelerating Wireline Broadband Deployment by Removing Barriers to Infrastructure Investment*, Third Report and Order and Declaratory Ruling, 33 FCC Rcd 7705 (2018), *aff'd sub nom. City of Portland v. United States*, 969 F.3d 1020 (9th Cir. 2020); *Accelerating Wireless Broadband Deployment by Removing Barriers to Infrastructure Investment*, Second Report and Order, 33 FCC Rcd 3102 (2018).

⁸⁷ See, e.g., Consolidated Appropriations Act, 2018, Pub. L. No. 115-141, Division P, Title VI § 606(a), 132 Stat. 348, 1101-03; Fiscal Responsibility Act of 2023, Pub. L. No. 118-5, 137 Stat. 10.

decade to provide guardrails around the siting process and to streamline deployment timelines and requirements, especially for small wireless infrastructure. These efforts should continue so that the wireless industry and governments have a baseline for acting on siting requests and so there may be more uniformity and predictability in siting processes and environmental and historic preservation reviews nationwide. Government should also foster technology neutral policies that can promote new connectivity and competition, including by recognizing that service providers and infrastructure providers use an array of deployment options, both new tower builds and collocations, to enable increased capacity and network buildout.⁸⁸

VI. CONCLUSION.

U.S. innovation leadership and the economic and security benefits that it brings begins with a collaborative and comprehensive roadmap that ensures a strong U.S. presence in globally harmonized spectrum bands and private sector-led standardization efforts that can support 5G and beyond. CTIA looks forward to working with industry and Government to position America as a leader in 6G as it has been for generations of wireless.

Respectfully submitted,

/s/ Umair Javed

Umair Javed

Senior Vice President and General Counsel

Scott K. Bergmann

Senior Vice President, Regulatory Affairs

Mike Beirne

Director, Regulatory Affairs

CTIA

1400 Sixteenth Street, NW

Suite 600

Washington, DC 20036

(202) 736-3200

www.ctia.org

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⁸⁸ See Comments of CTIA, Docket No. NPS-WASO-PPFL-36986, at 13-14 (filed Aug. 9, 2024).