Before the
U.S. DEPARTMENT OF COMMERCE
NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION
Washington, DC 20230

In the Matter of	)
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Implementation of the National Spectrum Strategy	)
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COMMENTS OF CTIA

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CTIA[1] submits the following response to the Notice for Opportunity for Public Input ("Notice") issued by the National Telecommunications and Information Administration ("NTIA") on implementation of the National Spectrum Strategy ("Strategy").[2]

I. INTRODUCTION AND SUMMARY.

CTIA appreciates the Administration's National Spectrum Strategy effort and its focus on establishing a pipeline of spectrum to support 5G and other applications that can drive future jobs and innovation.[3] To meet growing consumer and enterprise demand for 5G, close America's widening 5G spectrum deficit, and counter China's global ambitions, America's wireless providers need 1,500 megahertz of additional licensed, full-power mid-band spectrum

[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] *Implementation of the National Spectrum Strategy*, 88 Fed. Reg. 85266 (Dec. 7, 2023) ("Notice"); *see also National Spectrum Strategy*, The White House (Nov. 13, 2023), https://www.ntia.gov/sites/default/files/publications/national_spectrum_strategy_final.pdf ("Strategy").

[3] *See Memorandum on Modernizing United States Spectrum Policy and Establishing a National Spectrum Strategy*, The White House, at Sec. 4 (Nov. 13, 2023), https://www.whitehouse.gov/briefing-room/presidential-actions/2023/11/13/memorandum-on-modernizing-united-states-spectrum-policy-and-establishing-a-national-spectrum-strategy/ ("Presidential Memorandum").

within the next ten years. Pillar 1 of the Strategy takes a key step toward meeting this need by identifying spectrum in the lower 3 GHz (3.1-3.45 GHz) and 7/8 GHz (7.125-8.4 GHz) bands for in-depth study for wireless broadband use. As the Strategy acknowledges, delivering on this spectrum is critical to maintaining America's economic competitiveness and U.S. national security.

NTIA's Implementation Plan must now provide a blueprint for realizing the vision set out in the Strategy and revamping America's spectrum policies. Successful implementation requires actionable steps to put our nation's airwaves to productive and beneficial use, consistent with the President's stated policies in the Presidential Memorandum. To that end, the Implementation Plan should identify specific objectives and advance concrete and detailed actions for studying the spectrum bands in Pillar 1 of the Strategy and identifying broad swaths of spectrum for repurposing to licensed, full-power use.[4]

First, as the Notice sets forth, NTIA should identify the objectives to be achieved in the near term—i.e., in the next one to three years[5]—and, more specifically, during the two-year study period the Presidential Memorandum sets for the identified spectrum bands.[6] Central to this phase of implementation should be how to promote the rapid and efficient expansion of wireless technologies and services, which is essential to the Administration's goals of promoting innovation, job creation, and broadband deployment.[7]

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[4] *See* Strategy at 6-7; *see also* Presidential Memorandum at Sec. 3(c).

[5] *See* Notice, 88 Fed. Reg. at 85266.

[6] *See* Presidential Memorandum at Sec. 4.

[7] *See id*. at Sec. 1; *see also* Press Release, The White House, *Fact Sheet: Biden-Harris Administration Issues Landmark Blueprint to Advance American Innovation, Competition and Security in Wireless Technologies* (Nov. 13, 2023), https://www.whitehouse.gov/briefing-room/statements-releases/2023/11/13/fact-sheet-biden-harris-administration-issues-landmark-blueprint-to-advance-american-innovation-competition-and-security-in-wireless-technologies/ ("White House Fact Sheet")

Second, NTIA should establish a clear and public benchmark for the amount of spectrum to be identified for licensed, full-power use in the planned spectrum studies. As the White House stated, "[i]nnovations ranging from 5G networks, to precision agriculture . . . take large amounts of spectrum to operate," and "[m]eeting the demands of innovation requires America's spectrum policy to adapt and improve."[8] To that end, the Presidential Memorandum requires that the Strategy include "plans to optimize United States spectrum management" by considering the benefits of exclusive-use licensing as a spectrum access model.[9] NTIA should implement the Strategy consistent with the President's stated commitment to establishing a pipeline of 5G licensed spectrum and in doing so recognize the need for an additional 1,500 megahertz of spectrum for licensed, full-power wireless use over the next decade.

Third, given the pressing need for additional mid-band spectrum for licensed, full-power use, NTIA should make clear that it will lead the continued studies of the lower 3 GHz band and the 7/8 GHz band and prioritize those studies for completion within two years. The United States has an opportunity right now to act as a first mover and lead the world in these bands, which have the potential for globally harmonized tuning ranges, and help define the ecosystems that will develop in them. In addition, the Presidential Memorandum unequivocally recognizes NTIA as "the executive branch agency principally responsible for advising the President on

("[The Strategy] includes new actions to improve spectrum management and spectrum access—including a study of more than 2,700 megahertz of spectrum for potential repurposing that will help ensure that both the public and private sectors have the spectrum resources they need to deliver critical services to every community in America.").

[8] *See* White House Fact Sheet.

[9] Presidential Memorandum at Sec. 3(c).

telecommunications and information policies."[10] It also requires federal agencies to coordinate with NTIA on any spectrum study or testing plan.

Fourth, NTIA should clearly define the study process and associated responsibilities, including ensuring all options for commercial access are studied. NTIA should consider lessons learned from past spectrum analyses, including in the Advanced Wireless Service ("AWS") bands, the evaluation by America's Mid-Band Initiative Team ("AMBIT") of the 3.45 GHz band, and the preliminary investigation of the 3.1-3.45 GHz band as part of the Partnering to Advance Trusted and Holistic Spectrum Solutions ("PATHSS") process. Based on this experience, NTIA should quickly identify categories of information that will be needed from government and industry stakeholders to undertake meaningful, transparent, and near-term review of the spectrum bands identified for study in Pillar 1 of the Strategy.

Finally, the longer-term goals of the Strategy, including assessment of the viability of dynamic spectrum sharing technologies, require additional work that cannot be achieved in the next two years. NTIA's focus for the Implementation Plan should be on actionable plans for putting spectrum to work in the commercial sector in the near term so industry can rapidly and effectively help achieve the Administration's economic and national priorities.

II. THE IMPLEMENTATION PLAN SHOULD FOCUS ON GOALS TO BE ACHIEVED IN THE NEAR TERM.

The Presidential Memorandum correctly identifies the parallel goals of advancing the economic and security benefits of private sector investment and innovation, and ensuring the

[10] *Id*. at Sec. 1 (quoting 47 U.S.C. § 901(b)(6)); *id*. at Sec. 5; *see also* White House Fact Sheet (stating that the Presidential Memorandum "reaffirms joint management of our nation's spectrum resources by NTIA and Federal Communications Commission (FCC) and reiterates that NTIA is the President's principal advisor on spectrum issues and the voice of the Administration in matters before the FCC").

continuation or enhancement of critical federal missions that serve the same national priorities.[11] The Strategy also envisions myriad important, lofty goals for achieving the directives in the Presidential Memorandum. In the Notice, NTIA seeks comment specifically on implementing the Strategy, "with a focus on the next 1-3 years."[12] In particular, NTIA should focus the Implementation Plan on the steps to be taken, and objectives to be achieved, during the two-year study period that the Presidential Memorandum established for evaluating the targeted spectrum bands.[13]

While NTIA will correctly need to commence efforts to address the President's longer-term objectives, the urgent need to support wireless innovation and deployment in the near term should be the central focus of the current inquiry. Specifically, the Implementation Plan for the next two years should focus on identifying spectrum to promote the rapid introduction of new spectrum resources for licensed wireless services that can help achieve the nation's most pressing economic, policy, and national security objectives, including bridging the digital divide.

III. NTIA SHOULD ESTABLISH AND MAKE PUBLIC A CLEAR BENCHMARK FOR THE AMOUNT OF SPECTRUM TO BE IDENTIFIED FOR LICENSED, FULL-POWER WIRELESS USE IN PLANNED SPECTRUM STUDIES.

A. Closing the Licensed Wireless Spectrum Deficit Is Essential to Myriad Administration Priorities.

The Presidential Memorandum requires that the Strategy consider the exclusive licensing access model, among others, as it develops "plans to optimize United States spectrum

[11] *See* Presidential Memorandum at Sec. 1.

[12] *See* Notice, 88 Fed. Reg. at 85266.

[13] *See* Presidential Memorandum at Sec. 4 ("The Implementation Plan shall include a schedule for detailed studies of the pipeline bands identified in the Strategy to be completed within 2 years of the submission of the Strategy or, in the case of proposals by agencies to conduct studies under the Spectrum Pipeline Act of 2015 (Public Law 114-74), within 2 years of the date of receipt of funding.").

management and use" to advance U.S. interests.[14] This requirement recognizes the value that licensed, full-power spectrum can bring to our economy and national security, including in service of the Administration's goal to "accelerate" U.S. leadership in wireless and "unlock" innovations for the American people.[15]

As the White House noted, "America's economy, technological leadership, and security depend on spectrum . . . [which] underpins the digital economies of the U.S. and our allies and partners . . . [and] is a scarce resource—one that needs careful management to sustain American innovation and security."[16] Licensed spectrum in particular is central to wireless innovation and the backbone of our nation's wide-area wireless broadband deployments. The U.S. wireless industry is at the forefront of the nation's economic success, with licensed, full-power spectrum contributing more than $5 trillion to the U.S. economy in the last decade, and providers investing a historic $39 billion in 2022 alone.[17] In nominal dollars, U.S. wireless providers invested more than $364 billion between 2010 and 2022 to improve their networks.[18]

As CTIA detailed in comments on the development of the Strategy, wireless is a catalyst for digital transformation across industries, including transportation, manufacturing, agriculture,

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[14] *Id*. at Sec. 3(c).

[15] *See id*. at Sec. 1.

[16] *See* White House Fact Sheet.

[17] *See* 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://www.ctia.org/news/the-importance-of-licensed-spectrum-and-wireless-telecommunications-to-the-american-economy. *See also* CTIA, *2023 Annual Survey Highlights*, at 4 (July 25, 2023), https://www.ctia.org/news/2023-annual-survey-highlights.

[18] *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.

education, healthcare, and energy, and 5G-enabled technologies have proven invaluable in helping to achieve the Administration's goals of combatting climate change.[19] Critically, full-power commercial licensed spectrum allocations directly implicate our national security interests as well by supporting the domestic and overseas needs of the Department of Defense ("DoD") while also helping the U.S. initiative for technological superiority with international implications in countering China's ambitions abroad.[20]

Today, there is a clear deficit of licensed mid-band spectrum available for wireless use, especially as compared to peer nations, which the Implementation Plan should address. Global mobile data traffic has more than doubled on average every second year for the last 10 years thanks to increasing demand, expanded network deployments, the introduction of new services, and improved quality of service, among other factors.[21] By some estimates, North American mobile data traffic could grow nearly four-fold by 2029 as compared to 2022,[22] and potentially six-fold in the next ten years.[23] Yet, as CTIA previously highlighted, low- and mid-band

[19] *See* CTIA Strategy Comments at 14-16; *see also, e.g.*, *5G Connectivity: A Key Enabling Technology to Meet America's Climate Change Goals*, ACCENTURE, at 50 (Jan. 26, 2022), https://www.ctia.org/news/5g-connectivity-a-key-enabling-technology-to-meet-americas-climate-change-goals.

[20] *See* CTIA Strategy Comments at 16-19; *see also, 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.

[21] Ericsson, *Ericsson Mobility Report*, at 11 (Nov. 2023), https://www.ericsson.com/4ae12c/assets/local/reports-papers/mobility-report/documents/2023/ericsson-mobility-report-november-2023.pdf.

[22] *Id*. at 39.

[23] *See* Coleman Bazelon & Paroma Sanyal, *How Much Licensed Spectrum is Needed to Meet Future Demands for Network Capacity?*, THE BRATTLE GROUP, at 7-9 (Apr. 17, 2023), https://www.ctia.org/news/how-much-licensed-spectrum-is-needed-to-meet-future-demands-for-network-capacity ("Brattle Group April 2023 Report").

spectrum availability has increased in the U.S. by only about two times since 2012,[24] and the U.S. trails peer nations by an average of 378 megahertz of mid-band spectrum for licensed use.[25]

The dramatic increases in data traffic cannot be met through network efficiencies alone, and existing licensed spectrum allocations are not sufficient to meet this surging demand. As a result, experts project a deficit of approximately 400 megahertz of mid-band spectrum by 2027 and nearly 1,500 megahertz by 2032.[26] Yet there is currently no licensed spectrum coming to the nationwide marketplace for wireless use, and the general authority for the Federal Communications Commission ("FCC") to auction spectrum licenses has lapsed for the first time in 30 years.

Despite the directive in the Presidential Memorandum that the Strategy consider opportunities for licensed spectrum and the clear need for more licensed spectrum to meet growing demand, the Strategy does not contain any goal for identifying and making available spectrum for licensed, full-power use. A plan for near-term action thus requires setting clear, public benchmarks regarding the amount of licensed mid-band spectrum to be made available following investigation of the targeted bands. NTIA should underscore the opportunity by acknowledging the need for 1,500 megahertz of mid-band spectrum for licensed, full-power wireless use over the next ten years and developing actionable benchmarks and steps to take over the next two years toward meeting this need.

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[24] *See* CTIA Strategy Comments at 4-5; Val Elbert, et al., *Accelerating the 5G Economy in the US*, BOSTON CONSULTING GROUP, at 6 (Apr. 17, 2023), https://www.bcg.com/publications/2023/accelerating-the-5g-economy-in-the-us.

[25] Janette Stewart, Chris Nickerson, & Juliette Welham, *Comparison of total mobile spectrum in different markets*, ANALYSYS MASON, at 10-11 (Sept. 2022), https://www.ctia.org/news/comparison-of-total-mobile-spectrum-in-different-markets ("Analysys Mason Sept. 2022 Report").

[26] Brattle Group April 2023 Report at 3-4, 24; CTIA Strategy Comments at 5-8.

B. Making Licensed Spectrum Available in the Near Term Should Be the Top Priority for Implementing the Strategy.

While CTIA has long supported an approach to spectrum that enables full-power commercial licensed, unlicensed, and shared use, current U.S. spectrum allocations are out of balance and necessitate a focus on licensed spectrum.

Today, the amount of mid-band spectrum designated for unlicensed and shared use eclipses licensed spectrum by four to one.[27] In recent years, U.S. policy has committed 1,350 megahertz of prime mid-band spectrum to unlicensed and dynamically shared use—the Citizens Broadband Radio Service ("CBRS") in the 3.5 GHz band and all of the 6 GHz band. The unlicensed disparity continues in the millimeter wave bands, where three times more spectrum has been dedicated to unlicensed, as compared to licensed use.[28] As a result, the United States leads the world in unlicensed and shared spectrum availability, particularly in the critical mid-band range.[29] Yet, while unlicensed spectrum offers the benefits of Wi-Fi and Bluetooth, for example, and CBRS is being used as a localized supplement to wide-area network capacity, neither can provide the same guarantee of access, coverage, security, or performance of traditional commercial licensed network deployments.[30] In fact, both unlicensed and shared use frameworks rely on licensed networks for wide-scale connectivity,[31] and a recently adopted

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[27] *Spectrum Allocation in the United States*, ACCENTURE, at 2 (Sept. 28, 2022), https://www.ctia.org/news/spectrum-allocation-in-the-united-states ("Accenture Spectrum Report").

[28] Analysys Mason Sept. 2022 Report at 16.

[29] *See* Accenture Spectrum Report at 18, 32.

[30] *See* CTIA Strategy Comments at 20-21, 28-30; *see also 5G: The Greatest Show on Earth!*, SIGNALS AHEAD (Nov. 30, 2023), https://signalsresearch.com/issue/5g-the-greatest-show-on-earth-37/ (discussing testing that showed CBRS "does a reasonably decent job of providing additional capacity" but "is impractical for macro network coverage due to its low power limitations").

[31] *See, e.g.*, CTIA Strategy Comments at 29; Reply Comments of CTIA, WT Docket No. 23-319, RM-11966, at 3-4, 6-7 (filed Nov. 8, 2023) ("CTIA Spectrum Screen Reply Comments").

Commerce Spectrum Management Advisory Committee ("CSMAC") report acknowledged concerns raised by numerous stakeholders regarding the limitations of the CBRS band for wide-area deployments, which informed the lessons learned and recommendations for the framework moving forward.[32]

Meanwhile, nations around the globe are leveraging the lower 3 GHz, 4 GHz, 6 GHz, and 10 GHz bands for licensed 5G use, and such allocations are expected to expand following the outcomes of the 2023 World Radiocommunication Conference ("WRC-23") that recently concluded in Dubai. Dozens of countries (including NATO nations) are making spectrum in the lower 3 GHz range available for licensed wireless use, with nearly 30 European countries either already deploying 5G in this spectrum band or in the process of doing so, including nations that rely on the same Airborne Warning and Control System ("AWACS") radars as those used by the U.S. military in this band.[33] WRC-23 also added a new mobile allocation to the 3.3-3.4 GHz segment in Region 2 (the Americas Region), meaning there is harmonized use of the lower 3 GHz band for 5G International Mobile Telecommunications ("IMT") across the Americas, Europe, the Middle East, and Africa.[34]

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[32] *See* NTIA, Commerce Spectrum Management Advisory Committee (CSMAC), Report of Subcommittee on CBRS, at 6, 8, 10-11, 16-17 (Dec. 2023), https://www.ntia.gov/sites/default/files/2023-12/cbrs_subcommittee_final_report.pdf.

[33] *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://www.ctia.org/news/successful-military-radar-and-5g-coexistence-in-the-lower-3-ghz-band-evidence-from-around-the-world ("CTIA Lower 3 GHz Report"); *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.

[34] *See ITU-R Preparatory Studies for WRC-23*, International Telecommunication Union, WRC-23 Agenda, Agenda Item 1.2, https://www.itu.int/wrc-23/wrc-23-agenda/ (last visited Dec. 21, 2023) ("WRC-23 Agenda"); ITU, Radio Communication Sector, World Radiocommunication Conference 2023 (WRC-23) Provisional Final Acts, https://www.itu.int/dms_pub/itu-r/opb/act/R-ACT-WRC.15-2023-PDF-E.pdf ("WRC-23 Provisional Final Acts").

The 6 GHz band was identified as the prime opportunity for expanded IMT use by most of the world, even as the U.S. has committed that large, contiguous block of spectrum to unlicensed operations. Region 1 (Europe, Middle East, and Africa) identified the 6.425-7.125 GHz band segment for IMT, and in Region 2 (the Americas Region), Mexico and Brazil added their names to an IMT footnote for the same swath in the 6 GHz band. In the Asia Pacific (Region 3), the 7.025-7.125 GHz portion was identified for IMT this cycle, with five countries also joining the IMT identification across 6.425-7.125 GHz and China requesting to join the footnote at WRC-27.[35] As GSMA noted, "[c]ountries representing more than 60% of the world's population" asked to be included in the identification of the 6.425-7.125 GHz band for licensed use, and the WRC-23 decision to harmonize the band in every International Telecommunication Union ("ITU") Region is a "pivotal milestone" for the "only remaining mid-band spectrum currently available to respond to the data traffic growth in the 5G-Advanced era."[36]

Similarly, a dozen nations at WRC-23 joined the IMT footnote for the 4.8-4.99 GHz segment,[37] and the WRC-27 agenda includes a study item for IMT across the 4.4-4.8 GHz band.[38] A number of countries in the Central and South America also identified the 10 GHz band for IMT.[39]

With no near-term path available in the United States or the Strategy for many of these bands, this makes licensing the 7/8 GHz band even more critical for U.S interests and especially

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[35] *See id*.

[36] Press Release, GSMA, *GSMA Hails Groundbreaking Spectrum Decisions at WRC-23* (Dec. 15, 2023), https://www.gsma.com/newsroom/press-release/gsma-hails-groundbreaking-spectrum-decisions-at-wrc-23/.

[37] *See* WRC-23 Agenda at Agenda Item 1.1; WRC-23 Provisional Final Acts.

[38] *See* WRC-23 Provisional Final Acts at WRC-27 Agenda Item 1.7.

[39] *See* WRC-23 Agenda at Agenda Item 1.2; WRC-23 Provisional Final Acts.

as an emerging band for 6G. At WRC-23, the 7/8 GHz band was included in a future agenda item for harmonization at WRC-27.[40] As discussed below, while America is moving forward with unlicensed operations in the 6 GHz band, the U.S. has an opportunity with the 7/8 GHz band to leverage a globally harmonized licensed tuning range that includes the upper 6 GHz band, which will be made available for IMT in numerous markets across the globe.[41]

Given the amount of spectrum available for unlicensed and shared access today, and recognizing the need for wide-area network coverage to support broadband connectivity, the Implementation Plan should prioritize studying spectrum for licensed, full-power access over the next two years that are aligned with or can benefit from global harmonization activities.[42]

IV. NTIA SHOULD MOVE FORWARD SWIFTLY TO STUDY IDENTIFIED BANDS FOR LICENSED, NEAR-TERM USE.

CTIA fully supports the decision to re-study all options for future full-power commercial access to the lower 3 GHz band and the goal of making the 7/8 GHz band available for 5G and emerging 6G wireless broadband.[43] It is imperative that the Implementation Plan prioritize these studies for completion within two years, as directed in the Presidential Memorandum.[44]

Lack of a clearly articulated and comprehensive national approach to licensed spectrum policy slows our ability to keep pace with our adversaries on the global stage. Today, we see nations like China working to seize the mantle on wireless leadership to the benefit of its own strategic interest.[45] China is leading the U.S. in licensed spectrum availability within its own

[40] *See* WRC-23 Provisional Final Acts at WRC-27 Agenda Item 1.7.

[41] *See*, *infra*, Section IV.

[42] To the extent NTIA considers additional opportunities for unlicensed or shared spectrum, it should do so in millimeter wave spectrum, which is better suited for these types of access models.

[43] *See* Strategy at 6.

[44] *See* Presidential Memorandum at Sec. 4.

[45] *See* CTIA Strategy Comments at 16-19, 31-32.

borders, and—perhaps even more critically—it is embedding its technologies and, by proxy, its influence, in myriad nations around the globe.[46] Prompt action in the study of the lower 3 GHz and 7/8 GHz bands is thus critical for U.S. interests. These investigations should be done expeditiously and discuss all possibilities for these bands— principally, for licensed, full-power use.

Lower 3 GHz. Prior study of the lower 3 GHz band, led by DoD, failed to consider tried-and-true approaches to spectrum sharing—specifically, the potential for clearing incumbents from some or all of the band, tuning incumbents below the band or partitioning the band, or relying on geographic- and/or temporal-based sharing with a coordinated transition to protect federal missions that could include use of auction revenues to pay for relocation, repacking, or upgrading federal incumbent users as necessary.[47] By opting not to explore these options, the PATHSS investigation ruled out critical opportunities for licensed, full-power commercial use of the band.

The Implementation Plan should correct the mistake made in PATHSS. As NTIA Administrator Davidson recognized, NTIA "didn't want to give up" on the lower 3 GHz band despite the PATHSS evaluation; instead, NTIA plans to "re-double [its] efforts to make sure that [it does] two different things: look at spectrum sharing in the band and how we can do that, and also look at whether there's the possibility of relocating some systems."[48] CTIA fully supports this additional step and encourages NTIA to ensure that further investigation of the lower 3 GHz

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[46] *See id*. at 18-19.

[47] *See id*. at 21-27.

[48] *See Telecommunications Official Testifies at Oversight Hearing*, C-SPAN, at 33:16 (Dec. 5, 2023), https://www.c-span.org/video/?532208-1/telecommunications-official-testifies-oversight-hearing (response of Alan Davidson, NTIA Administrator, to Rep. Doris Matsui, House Energy and Commerce Committee, Subcommittee on Communications and Technology) ("Davidson Testimony").

band is transparent and conducted in good faith, as this band is a hallmark of 5G networks around the globe,[49] and it presents an opportunity for spectrum to be made available at auction, which can facilitate technology upgrades for DoD.[50]

7/8 GHz. The investigation of the 7/8 GHz band is critical given the opportunity for economies of scale with the 6 GHz band, where global counterparts are making plans to utilize as much as 700 megahertz in the upper portion of the band for 5G. Wide swaths of the 7/8 GHz band would be beneficial for offering high-capacity wireless services and supporting future 5G and 6G deployments.[51] In addition to its favorable technical characteristics, NTIA previously identified the 7/8 GHz band as lightly utilized by federal agencies, making it ideally suited for investigation for repurposing.[52] NTIA should not pre-judge opportunities in this band and instead should evaluate the entirety of the band, examining the overall potential to identify segments which are suitable for clearing and coordination. Ultimately there may be certain portions more suitable for commercial use, but the study should not be limited to smaller segments. NTIA should take a comprehensive review and avoid the mistakes made in the earlier lower 3 GHz study.

Importantly, the 7/8 GHz band has the potential to enable economies of scale across a larger mid-band range. As discussed, this band will be studied for future harmonization activity

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[49] *See generally* CTIA Lower 3 GHz Report.

[50] *See* CTIA Strategy Comments at 36-37.

[51] *See id*. at 38; *see also* Comments of CTIA, ET Docket Nos. 23-121 & 23-120, RM-11785, at 5-8 (filed Nov. 28, 2023) ("CTIA WRC-15 NPRM Comments").

[52] *See, e.g.*, Comments of CTIA, ET Docket No. 18-295, GN Docket No. 17-183, at 13-16 (filed Feb. 15, 2019); *see also*, *e.g.*, Chriss A. Hammerschmidt, *Broadband Spectrum Survey in the San Diego, California, Area*, NTIA Report No. TR-14-498, Dep't of Commerce, NTIA, at 103-05, 120 (Mar. 2014), https://www.its.bldrdoc.gov/publications/2741.aspx; Chriss A. Hammerschmidt, Heather E. Ottke, & J. Randy Hoffman, *Broadband Spectrum Survey in the Denver and Boulder, Colorado, Metropolitan Areas*, NTIA Report No. TR-13-496, Dep't of Commerce, NTIA, at 115-117, 129 (Mar. 2014), https://its.ntia.gov/publications/details.aspx?pub=2735.

and numerous countries are now supporting licensed access to the upper 6 GHz band.[53] The United States chose an unlicensed path across the full 6 GHz band, and it now has an opportunity to balance its allocations by prioritizing the 7/8 GHz band studies for repurposed licensed, commercial deployments. Specifically, by making licensed opportunities available in the spectrum immediately adjacent to the band segment that will be utilized internationally for IMT, the U.S. will enable the 7/8 GHz band to be developed as part of the same tuning range as the upper 6 GHz band. This, in turn, will present an opportunity for global harmonization in the near term that would benefit consumers through economies of scale in infrastructure, devices, and chipsets—thereby reducing network deployment and consumer costs while also enabling global roaming. It also will support the development of a global market for secure 5G equipment in both the 6 GHz and 7/8 GHz bands that is driven by the United States.

Critically, making licensed spectrum available in the 7/8 GHz range will give the U.S. an early foothold for influencing the international mid-band IMT market, as the 7/8 GHz range is being studied for IMT at WRC-27.[54] Taking near-term steps to study and make available the 7/8 GHz band for licensed use would enable the United States to take a leadership role in promoting trusted, secure partnerships and democratic values in the developing technology ecosystem in this range. Investigating the 7/8 GHz band through this lens is essential to support U.S. leadership in 5G and future 6G technologies, with the attendant economic and security benefits such leadership brings. Both the timing of this effort and U.S. leadership are critical if the United States wishes to advance a global allocation at WRC-27 and become a leader in the next-generation wireless ecosystem.

[53] *See, supra*, Section III; *see also* WRC-23 Agenda at Agenda Item 1.2; WRC-23 Provisional Final Acts.

[54] *See* WRC-23 Provisional Final Acts at WRC-27 Agenda Item 1.7.

Incumbent Relocation. The spectrum studies should also prioritize consideration of ways for federal incumbent users to retune, repack, or relocate to different spectrum to make way for commercial licensed wireless use of the studied bands. As CTIA has explained, there is a long tradition of collaboration between federal agencies and the commercial wireless industry to make spectrum available for commercial use by leveraging the Spectrum Relocation Fund ("SRF") and auction revenues to pay for relocation, repacking, or upgrading federal incumbent users as necessary.[55] Repurposing or sharing government-held spectrum for licensed, full-power commercial wireless services generates billions of dollars in auction revenues that, through the SRF, can fund federal agency investment in modern, more efficient systems and technologies. A coordination framework that promotes opportunities for wide-area commercial licensed use also provides certainty to commercial wireless service providers that the network will be scalable and available for secure connectivity that sustains a quality of service that consumers, enterprises, and government users have come to expect. To make commercial wireless service viable in these bands, studies should consider whether federal incumbents can retune or relocate to different spectrum or coordinate with commercial users through one or more methods. This is consistent with NTIA's inclusive definition of sharing noted at the launch of the Strategy proceeding, which recognizes the potential for repacking or relocation to facilitate commercial use;[56] prior relocation efforts, including with the AWS and 3.45 GHz bands;[57] and the purposes

[55] *See* CTIA Strategy Comments at 21-22.

[56] Development of a National Spectrum Strategy, 88 Fed. Reg. 16244, 16246 (Mar. 16, 2023) ("To implement the most effective sharing arrangement, in some situations incumbent users may need to vacate, compress or repack some portion of their systems or current use to enable optimum utilization while ensuring no harmful interference is caused among the spectrum users."); *see also* CTIA Strategy Comments at 33.

[57] CTIA Strategy Comments at 22-27.

of the Commercial Spectrum Enhancement Act, which acknowledges that spectrum sharing can, and often does, require retuning or relocation to accommodate new commercial use.[58]

Additional Bands for Study. Finally, in keeping with the recognition that additional aspects of the Strategy will need to be implemented over the medium- and long-term, CTIA urges NTIA and the Administration to consider additional bands that may be investigated for non-federal licensed use.[59] Among others, NTIA should continue to encourage dialogue with federal agencies regarding the potential for commercial access to the 4.4-4.94 GHz band segment.

As discussed in our Strategy Comments, the 4 GHz band is a contiguous block of spectrum that already provides high capacity for 5G networks and use cases in many other countries.[60] Indeed, harmonization of this band is expanding, as discussed above, with a dozen additional nations at WRC-23 joining the IMT footnote for the 4.8-4.99 GHz segment,[61] and the WRC-27 agenda includes a study item for IMT across the 4.4-4.8 GHz band.[62] It is also standardized within 3GPP band class n79, which encompasses the 4.4-5.0 GHz range.[63] Although this band is currently licensed for federal use, reallocating spectrum in this band for non-federal uses would make a large, contiguous block of mid-band spectrum available to support 5G deployment and use cases. Such consideration is all the more essential given the

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[58] *See* Commercial Spectrum Enhancement Act, Pub. L. No. 108-494, § 202, 118 Stat. 3986, 3991-93 (2004).

[59] *See* CTIA Strategy Comments at 37-38 (discussing the 4 GHz band and opportunities for longer term access to the 7-15 GHz range); *see also* CTIA WRC-15 NPRM Comments at 8-9.

[60] *See* CTIA Strategy Comments at 37-38; *see also* Analysys Mason Sept. 2022 Report at 13.

[61] *See* WRC-23 Agenda at Agenda Item 1.1; WRC-23 Provisional Final Acts.

[62] *See* WRC-23 Provisional Final Acts at WRC-27 Agenda Item 1.7.

[63] *See, e.g.*, n79 (4700 MHz), Powertex Wireless Technology, https://portal.powertec.com.au/technical-library/wireless/wireless-technologies/cellular/5g-nr/5g-frequency-bands/n79-4700-mhz (last visited Dec. 21, 2023).

uncertainty surrounding opportunities for licensed, full-power, nationwide spectrum access in other critical mid-band spectrum such as the lower 3 GHz band.

V. NTIA IS THE APPROPRIATE AGENCY TO CONDUCT THE STRATEGY'S TRANSPARENT, DATA-DRIVEN SPECTRUM EVALUATIONS.

Managing the diverse and competing demands on our airwaves requires careful planning and coordination, as the Presidential Memorandum states, and "[a]gencies and private-sector users must address these challenges by working together in the best interests of the American people."[64] The Implementation Plan should reinforce the core theme from both the Presidential Memorandum and the Strategy that NTIA is the lead voice on behalf of federal agencies in such discussions.[65] Critically, as Administrator Davidson has recognized, NTIA is the appropriate lead agency for coordinating and implementing the studies of the spectrum bands identified in the Strategy to be undertaken over the next two years.[66]

In detailing its next steps, NTIA should leverage lessons learned from prior spectrum band evaluations. In particular, NTIA should facilitate transparent dialogue that includes detailed, real-world information regarding incumbent operations, a focus on making licensed spectrum available at full power, and ensuring that any sharing that is being considered for the lower 3 GHz or 7/8 GHz bands is meaningful and consistent with NTIA's approach to sharing in prior successful spectrum contexts.

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[64] *See* Presidential Memorandum at Sec. 1.

[65] *See* Strategy at 3-4 (reaffirming existing U.S. policy and statute regarding NTIA's role in spectrum policy and management).

[66] *See* Davidson Testimony at 32:50 ("I'm gratified that [the Presidential Memorandum] puts NTIA clearly in the central role that we, by statute, should be playing, which is to be not just the federal spectrum manager, but the principle advisor to the President on these issues, the leader of the studies that we're going to do, in close collaboration with our colleagues in the federal government.").

A. Prioritize Licensed, Full-Power Use.

For any band studied, NTIA should first require study of licensed, full-power use to help meet pressing near-term spectrum needs. Exclusive-use spectrum provides rights of assured access and interference protection against other operations, allowing the holder to manage interference to its network and provide a high and consistent level of service.[67] Unlike shared-access or unlicensed spectrum frameworks, exclusive-use spectrum is the preferred course for wide-area network deployments, which are foundational to achieving the Administration's goal of bridging the digital divide.[68] Licensed, full-power spectrum should thus be prioritized in the Implementation Plan. Only if NTIA determines that such use is not possible should other access models be considered.

B. Leverage an Inclusive Definition of Spectrum Sharing.

NTIA should adopt a definition of spectrum sharing that includes all proven sharing techniques that have been used in the past, and this includes clearing, re-tuning, and repacking. NTIA should also investigate all four levers for managing interference between uses—power, frequency, geography, and time—and properly evaluate the many mitigating technologies available, such as beam muting, nulling, EIRP monitoring, and control. As discussed, an inclusive definition of spectrum sharing that acknowledges the potential for relocating federal incumbents to accommodate new licensed, full-power commercial operations is in keeping with past successful spectrum reallocation decisions and the intent of Congress in establishing the SRF.[69]

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[67] *See* CTIA Strategy Comments at 19-20; *supra*, Section III.

[68] *See*, *e.g.*, CTIA Spectrum Screen Reply Comments at 6-7; *supra*, Section III.

[69] *See*, *supra*, Section IV.

Where spectrum sharing is contemplated, responsibility for the success of the framework should be borne by all stakeholders. In particular, the success of any coordination or sharing framework requires an understanding of the incumbents' actual operations, limitations, and needs, as discussed in more detail below, along with the capabilities and needs of the new entrants to the band. Importantly, to make the most efficient use of available spectrum, consistent with the goals of the Strategy, all users must share responsibility to minimize interference while being resilient within the operational environment. Good engineering by all parties along with sound spectrum policy are prerequisites for efficient spectrum sharing solutions.

C. Gather and Share Detailed Information on Incumbent Operations.

As directed in the Presidential Memorandum, the Strategy must rely on data-driven processes that "increase transparency into current and future Federal and non-Federal spectrum use."[70] The Strategy, in turn, acknowledges that information and data sharing is "critical to the success" of the evaluations to be undertaken.[71] To achieve the goal of a transparent, data-based investigation of the lower 3 GHz and 7/8 GHz bands, NTIA must assess and provide insights into incumbent usage of the bands. Gathering this information will require a detailed quantitative assessment for each band under study.

As a general matter, NTIA should assess how widely the incumbent systems are deployed on a geographic basis, how much spectrum they occupy (i.e., system bandwidth), and how often they are used, as well as other operational characteristics such as transmitted power profile and duty-cycles. Importantly, NTIA should gather and provide information regarding actual usage—

[70] Presidential Memorandum at Sec. 3(b).

[71] Strategy at 4.

not just allocations—as such information is essential to determining the potential for clearing or sharing a given band segment. Indeed, the Strategy acknowledges the importance of each of these elements, highlighting that "[d]ata about current real-world usage, the purpose and type of use (active or passive), as well as occupancy in the time, frequency, and geography domains, is needed as the basis for assessing the potential for increased capacity."[72] Such information will be informative not only for assessing co-channel protection criteria, but for addressing the potential for adjacent-channel interference concerns as well.

To that end, NTIA should provide the following information, at a minimum and consistent with the above-mentioned principles, for the relevant services in the lower 3 GHz and 7/8 GHz bands as part of the studies:

- *Fixed and Mobile Services*: Number of links, geographical distribution, and use cases (e.g., backhaul/transport, last mile connectivity);
- *Military or Other Federal Radars*: How widely the radar is deployed in the frequency band geographically and by bandwidth, whether the services are intermittent or continuous, and the operational characteristics of the radar during testing, training, and deployments. This could include, for instance, the range, transmit power, receiver sensitivity, antenna characteristics (e.g., patterns, orientation, beamwidth, beamforming capabilities), pulse characteristics, and interference margin and mitigation capabilities;
- *Fixed Satellite Services*: Operational characteristics such as power, EIRP, beamwidth, and altitude, the geographical coverage, any concerns regarding operations in the relevant band across international borders, whether the services are direct to users or distributed via ground stations, the number of subscribers and/or ground stations, and what part of the spectrum is used for uplink and downlink operations;
- *Mobile Satellite Services*: Geographical coverage, number of users, and what part of the spectrum is used for uplink and downlink operations;
- *Radiolocation Services*: Limitations on geographic areas or times, whether they are for military or civilian use, and their protection criteria;
- *Radionavigation Services*: Actual geographic, frequency bandwidth, and time of use; and

[72] *Id*. at 12.

- *Space Research Services*: Location of main sites and their protection criteria.

Further, consistent with its commitment to consider "the potential for improved efficiency and mission effectiveness through new technological developments (such as compression and modulation technology) and coexistence techniques,"[73] NTIA should consider the impact of planned federal upgrades that are already underway or that are expected to free up more spectrum in a particular band. For example, study of the lower 3 GHz band should consider the upcoming replacement of the AWACS fleet—which has an average age of more than 44 years of service and is slated for replacement starting in 2027.[74] The successor to AWACS, the Wedgetail aircraft, is currently being equipped with the Multi-Role Electronically Scanned Array surveillance radar, a system that is already being used in other countries operating below the 3 GHz band. This enhanced technology should be designed to coexist with the 5G networks that are deployed in the lower 3 GHz band and adjacent spectrum abroad *and* in the United States.[75]

Information regarding the technology service sunset and evolution of AWACS or other systems, including repacking possibilities and incentives to enable the transition of aging or obsolete equipment towards more efficient technologies, or to transition to a different spectrum band altogether, is relevant and informative for discussions regarding the potential introduction of commercial services in both the lower 3 GHz and 7/8 GHz bands. Similarly, transmit and receive characteristics of existing incumbent devices, including the state of the technical

[73] *Id*. at 4.

[74] CTIA Lower 3 GHz Report at 6.

[75] *Id*.

capability of the incumbent systems and the costs for potential upgrades, is relevant and informative to the inquiries.[76]

D. Use Realistic Modeling Assumptions.

It is essential for NTIA to ensure that any coexistence discussions reflect real-world modeling scenarios and parameters rather than scenarios that may not represent federal missions or operational commercial network deployments. Among other things, information regarding the modeling assumptions for the relevant federal operations will enable stakeholders to better assess whether the modeled system locations, orientations, and uses are correlated with actual (rather than theoretical) scenarios that require protection. With such information, including a comparison to historical usage patterns for the systems, stakeholders will be better able to validate the proposed locations and orientations and further assess alternative scenarios that may utilize more realistic positioning and orientation. Supplementary information regarding whether the operational parameters (such as modeled elevation angle and mask angle) are typical for federal missions involving the relevant equipment will be similarly useful, as will information regarding whether the modeling tool will consider terrain blockage and the curvature of the Earth. Additionally, a comparison of the modeling assumptions against those utilized in prior coordination processes will be useful for stakeholders to understand how coordination and coexistence might differ from commercial operations in adjacent spectrum bands.

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[76] *See, e.g.*, *Report to the President: Realizing the Full Potential of Government-Held Spectrum to Spur Economic Growth*, Executive Office of the President, President's Council of Advisors on Science and Technology, at 33-38, App. D (July 2012), https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/pcast_spectrum_report_final_july_20_2012.pdf (discussing the role of receiver performance in spectrum management). *See also*, *e.g.*, *Principles for Promoting Efficient Use of Spectrum and Opportunities for New Services*, Policy Statement, FCC 23-37 (rel. Apr. 21, 2023) (providing spectrum management policy principles for non-federal transmitters and receivers); Comments of CTIA, ET Docket No. 22-137, at 8-9 (filed June 27, 2022).

To facilitate the coexistence dialogue, it will also be important for industry to provide information, including technical parameters, regarding how fixed and mobile wireless services will use the bands, consistent with industry's engagement in prior spectrum repurposing evaluations. Full-power wireless deployments should be used in the modeling, consistent with operations in the 3.45 GHz band, 3.7-3.98 GHz band, AWS-3 bands, and others. This will allow for a robust discussion of how to efficiently make spectrum available for commercial use, while protecting federal missions.

Finally, CTIA and its members are committed to engaging meaningfully in a two-sided information exchange to facilitate the spectrum studies to be undertaken over the next two years. NTIA should leverage concepts for sharing sensitive information that worked well in the AWS, AMBIT, and PATHSS processes (e.g., for sharing unclassified information, controlled unclassified information, and classified information) to facilitate such discussions.

VI. NEW STRATEGIC SPECTRUM PLANNING PROCESSES SHOULD CLARIFY AGENCIES' SPECTRUM ROLES AND RESPONSIBILITIES.

CTIA appreciates that the Presidential Memorandum seeks to provide guardrails around the process for federal agencies to escalate concerns regarding spectrum policy decisions that are being made, or which have already been made, by NTIA and the FCC.[77] As NTIA stated in the Strategy, "the United States needs a better and more consistent process for bringing the public and private sectors together to work through the difficult issues surrounding access to spectrum."[78] A key element of achieving that goal is ensuring stakeholders are clear as to the rights and responsibilities of all parties to the Strategy's spectrum evaluation, and ensuring that

[77] *See* Presidential Memorandum at Secs. 5 & 6.

[78] Strategy at 2.

any concerns presented regarding the inputs or outcomes are raised early and transparently, consistent with processes in place for such concerns to be raised.

We encourage NTIA and the Administration, as part of the Implementation Plan, to provide additional clarity on the anticipated escalation process, which can draw further guidance from the interagency Team Telecom precedent.[79] The Presidential Memorandum envisions that, where an agency raises concerns regarding an action *already* taken by the FCC, and NTIA finds that the disputing agency has not produced sufficient evidence that the new use will risk harmful interference that cannot be reasonably mitigated without FCC action, the complainant agency can escalate the concern to the White House, consistent with procedures outlined in the Presidential Memorandum for concerns raised *prior* to FCC action.[80]

Consistent with the Team Telecom framework,[81] it would be beneficial for the Administration to clarify that, within 21 days of the notification from the disputing agency or agencies of the concern, the Assistant to the President for National Security Affairs and the Assistant to the President for Economic Policy, in consultation with the Director of the Office of Science and Technology Policy and the National Space Council, shall advise NTIA, the FCC, and the disputing agency whether they oppose NTIA's determination that there is insufficient evidence of potential harmful interference. Only where such notification is made would it be appropriate for the dispute to be escalated through the process outlined in the Presidential Memorandum.

[79] *See* Exec. Order 13913, 85 Fed. Reg. 19643 (Apr. 8, 2020) ("Team Telecom Executive Order").

[80] *See* Presidential Memorandum Sec. 6(b); *see also* Team Telecom Executive Order at Sec. 5(c).

[81] *See* Team Telecom Executive Order at Sec. 9(f).

VII. INVESTIGATING THE BENEFITS OF DYNAMIC SPECTRUM SHARING IS APPROPRIATELY CAPTURED IN THE STRATEGY AS A MEDIUM- OR LONG-TERM GOAL.

As outlined in the Strategy, a process is expected to begin in the next year and a half for a "moonshot" effort to advance research for dynamic spectrum access technologies.[82] The newly formed national testbed for dynamic spectrum sharing is intended to enable the identification of short-term access for experimentation in federal and non-federal spectrum segments.[83] While this "technical demonstration platform"[84] may prove informative for future spectrum repurposing discussions, it is highly unlikely that the testbed will be established and provide meaningful results in time to inform the spectrum evaluations that must be completed in the next two years. Indeed, as the Strategy recognizes in establishing a Research and Development Plan for assessing "further development of new methods for improving spectrum efficiency, advancing dynamic and secure spectrum access regimes" (among other topics), shared-use models require additional development.[85] Today, however, they cannot be relied on to achieve wide-area wireless connectivity, making dynamic access inconsistent with the near-term goal of promoting broadband deployment and its accompanying economic benefits.[86]

While novel sharing technologies may be worthy of exploration, implementation of the Strategy in the near term should be focused on principles that can be relied upon in the initial two-year study timeframe, including for identifying spectrum for licensed, full-power use. The studies to be completed in the next two years need not, and should not, be delayed as a result of

[82] *See* Strategy at 13.

[83] *See id*. at 16.

[84] *Id*.

[85] *Id*. at 15-16.

[86] *See*, *supra*, Section III.

establishment of the testbed or the Research and Development plan. CTIA encourages NTIA to leverage its resources within the Institute for Telecommunication Sciences as the testbed discussions move forward. Additionally, to the extent NTIA is seeking to leverage any particular spectrum bands for experimentation in the near term, the lower 37 GHz band would be ripe for such evaluation. NTIA should also consider whether federal-to-federal sharing of like systems or compatible operations may be the best course for initial efforts.

Finally, NTIA should assess economic considerations relating to sharing models, whether dynamic or otherwise. While spectrum sharing may be a laudable academic exercise in some instances, it is imperative that the near-term execution of the Strategy ensure steps are taken to advance commercially viable spectrum access opportunities that will 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. NTIA should therefore keep to its commitment to "study the commercial incentives associated with different approaches to spectrum sharing to ensure that approaches to dynamic spectrum sharing incorporate economic considerations."[87]

VIII. CONCLUSION.

The Administration has taken laudable initial steps to restore a spectrum pipeline for licensed wireless use. CTIA looks forward to engaging with NTIA as it develops its Implementation Plan for the near-term execution of studies of the lower 3 GHz and 7/8 GHz bands to support such use, including identifying a target of making 1,500 megahertz of spectrum

[87] Strategy at 15.

available for licensed use. Such actions will be essential to enhance U.S. wireless leadership and broadband deployment in 5G and beyond.

Respectfully submitted,

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