Before the
NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION
Washington, DC 20230

In the Matter of	)	
	)	
Implementation of a National Spectrum Strategy	)	Document No. 2023-26810
	)	

COMMENTS OF T-MOBILE USA, INC.

T-Mobile USA, Inc. ("T-Mobile")[1/] submits these comments in response to the above-referenced Notice of Opportunity for Public Input issued by the National Telecommunications and Information Administration ("NTIA") on the implementation of the National Spectrum Strategy ("NSS").[2/] T-Mobile applauds the efforts the Administration has taken to create the NSS and, through the Presidential Memorandum on Modernizing United States Spectrum Policy and Establishing a National Spectrum Strategy ("Presidential Memorandum"), improve spectrum management.[3/] A comprehensive and carefully implemented spectrum strategy is vital to ensuring that the U.S. can satisfy current and future spectrum access requirements for both Federal and non-Federal users and maintaining U.S.-leadership in next-generation wireless communications and technologies.

1/ T-Mobile USA, Inc. is a wholly-owned subsidiary of T-Mobile US, Inc., a publicly traded company.

2/ *See Implementation of the National Spectrum Strategy*, Notice of Opportunity for Public Input, NTIA, 88 Fed. Reg. 85266 (Dec. 7, 2023); *see also National Spectrum Strategy*, THE WHITE HOUSE (Nov. 13, 2023), https://www.ntia.gov/sites/default/files/publications/national_spectrum_strategy_final.pdf ("*NSS*").

3/ *See National Spectrum Strategy*; *Memorandum on Modernizing United States Spectrum Policy and Establishing a National Spectrum Strategy*, Memorandum for the Heads of Executive Departments and Agencies, THE WHITE HOUSE (Nov. 13, 2023) ("*Spectrum Policy Memo*").

I. INTRODUCTION AND SUMMARY

Spectrum is a limited, scarce resource and a key input to commercial wireless networks. Those networks have faced relentless pressure to meet the ever-increasing demand for wireless connectivity and will continue to experience capacity constraints without additional spectrum.[4/] T-Mobile appreciates that the NSS identifies nearly 2,790 megahertz of spectrum for study. Much of the spectrum identified has been targeted for an evaluation of *shared* use. But commercial wireless networks require licensed, exclusive-use spectrum that can be deployed for high-powered services that meet consumer and business needs for increasing amounts of data. T-Mobile therefore urges NTIA, in implementing the NSS, to ensure that *at least* 1,500 megahertz of the spectrum identified for evaluation is ultimately designated for licensed, high-power commercial use. NTIA should also consider including *other* spectrum bands in its evaluation, including spectrum below 3.1 GHz and above 4 GHz to support the deployment of 5G and 6G networks.

To achieve those goals, NTIA, as the entity responsible for Federal spectrum management, must ensure that Federal spectrum users make the most efficient use of their spectrum and return any unused spectrum so that it may be employed by non-Federal users. While T-Mobile understands that the Federal government has important spectrum needs, and it supports those uses, NTIA could implement a variety of tools to allow Federal spectrum to be made available for commercial use and achieve a win-win result for Federal and non-Federal users.[5/]

4/ *See NSS* at 1 ("As a result of ongoing innovations in wireless technologies, demand for spectrum access is growing rapidly.").

5/ *See* Joe Kane and Jessica Dine, *Building on Uncle Sam's "Beachfront" Spectrum: Six Ways to Align Incentives to Make Better Use of the Airwaves*, ITIF, at 7 (2023), https://www2.itif.org/2023-federal-spectrum.pdf ("ITIF Report").

NTIA could reach that goal by considering mechanisms that would allow Federal users to upgrade to more efficient spectrum technologies and by meaningfully assessing Federal spectrum that could be re-designated for commercial use. As a part of that process, Federal agencies must be required to demonstrate that they are using the spectrum for which they are authorized. And NTIA should rely on a source outside the Federal agency itself to confirm that use, such as the Institute for Telecommunication Sciences ("ITS").

In addition, NTIA should foster collaboration among Federal and non-Federal spectrum users to evaluate current Federal spectrum needs. In particular, it should rely on existing organizations and processes and build on past successes to encourage dialogue between interested parties. Those efforts should result in an evaluation that compares the relative benefit of repurposing spectrum for non-Federal use against the costs of maintaining it for Federal purposes. To the extent that existing incentives alone are insufficient to encourage efficient spectrum use, NTIA should further consider applying additional economic incentives by assessing fees on Federal entities for their continued access to spectrum.

In determining how spectrum should be made available for non-Federal use, NTIA must recognize that sharing is not appropriate in all circumstances and that any sharing regime that is implemented must result in reliable access to spectrum in a way that meets the needs of commercial users on a continued basis. The Implementation Plan should not focus solely on dynamic spectrum sharing techniques that may be inappropriate to support nationwide commercial wireless networks. Instead, NTIA should first focus on making spectrum available for exclusive, high-power flexible use and only consider sharing if that is not feasible. At a minimum, any sharing approach must ensure sufficient and reliable access for non-Federal users. And NTIA should particularly consider sharing based on geographic or spectral separation

between Federal and non-Federal users – an approach that has been used successfully numerous times it the past.

Finally, NTIA should promote the development of a well-trained spectrum workforce by cooperating with third parties to raise awareness of the career opportunities in the wireless industry. This should include coordination between commercial and Federal interests and a consolidation of spectrum expertise that can promote a better understanding of spectrum use by policymakers.

II. A SPECTRUM PIPELINE MUST FOSTER THE ALLOCATION OF SPECTRUM FOR EXCLUSIVE, HIGH-POWER COMMERCIAL USE

A. Strategic Objective 1.1 – Ensure Sufficient Spectrum Access to Support Federal Agency Missions Now and Into the Future

T-Mobile supports NTIA's Strategic Objective 1.1 to ensure that there is adequate spectrum for Federal government entities to meet their critical missions.[6/] It appreciates the actions the Presidential Memorandum has already taken to achieve that goal by, for example, "ensur[ing] that the views of the executive branch on spectrum matters are properly developed, documented, and, if necessary, presented to [the Federal Communications Commission ('FCC')]."[7/] But, NTIA must continue to ensure that Federal spectrum is used efficiently as part of its management responsibilities.

That means NTIA should review Federal spectrum use to make certain that entities are using the latest available technologies that take advantage of spectrum efficiencies. Where technological or operational upgrades would result in more intensive use of spectrum without degrading mission-critical use cases, NTIA should require Federal agencies to make those

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6/ *See NSS* at 3.

7/ *Spectrum Policy Memo* §§ 2, 5, 7, 8.

upgrades so that unused spectrum may be made available for commercial use.[8/] Federal users must also consider sharing spectrum with other Federal entities. The spectrum needs of many Federal entities are limited in time or geography, or both.

NTIA should also assess whether Federal users have adequately considered employing commercial networks rather than Federally-assigned frequencies to support their needs. Many providers like T-Mobile offer "network slicing" – a mechanism for "carv[ing] up cellular bandwidth to create unique, logical, and virtualized networks over a multi-domain infrastructure."[9/] As T-Mobile previously explained, these "slices" of private networks can be tailored to the unique mission-critical needs of an agency and employ all of the appropriate safety mechanisms to ensure the security of their operations.[10/] In fact, network slicing may be particularly attractive to Federal spectrum users like the Department of Defense ("DoD"), which already partners with commercial providers, because it can satisfy the agency's communications requirements while simultaneously allowing it to take advantage of commercial networks and technologies.[11/]

8/ Indeed, it is recognized that "[t]he [F]ederal government controls large portions of spectrum in frequency ranges most desirable for wireless services." ITIF Report at 2.

9/ *Network Slicing Promises Optimized 5G Bandwidth for Business-Critical Specialized Services*, T-MOBILE FOR BUSINESS, https://www.t-mobile.com/business/resources/articles/5g-network-slicing (last visited Jan. 2, 2024).

10/ Comments of T-Mobile USA, Inc., Docket No. 210105-0001, at 8 (filed Feb. 10, 2021).

11/ *See id.* at 7; *see also DOD Announces $600 Million for 5G Experimentation and Testing at Five Installations*, DEP'T OF DEFENSE (Oct. 8, 2020), https://www.defense.gov/News/Releases/Release/Article/2376743/dod-announces-600-million-for-5g-experimentation-and-testing-at-five-installati/; Doug Beizer, *AT&T to Assist Marines with Secure Network*, WASH. TECH. (Feb. 22, 2007), https://washingtontechnology.com/2007/02/att-to-assist-marines-with-secure-network/335379/; *U.S. Army Unified Capabilities Soft Client Subscription Service*, AT&T (Apr. 3, 2018), https://www.fbcconferences.com/e/AFCEABelvoir/presentations/TownHall_David%20Blake_1115am.pdf; Marie Sakowicz, *Enterprise Voice Services: Unclassified and Classified Voice Services*, DEFENSE INFORMATION SYSTEMS AGENCY, https://www.disa.mil/-/media/Files/DISA/News/Events/Symposium/1--Sakowicz_EnterpriseVoiceServices_approved-FINAL.ashx (last visited Jan. 2, 2024).

T-Mobile recognizes that there may be costs associated with technology upgrades as well as with considering the potential use of alternative frequency bands or networks. Congress has already provided Federal entities with an important tool – the Commercial Spectrum Enhancement Act ("CSEA") – that can create incentives for Federal entities to evaluate and make more efficient use of their spectrum.[12/] In particular, the CSEA established the Spectrum Relocation Fund ("SRF"), which "provides a centralized and streamlined funding mechanism through which [F]ederal agencies can recover the costs associated with relocating their radio communications systems or sharing the reallocated spectrum."[13/] Federal agencies may also use the SRF to pay for research and related activities to increase spectrum efficiency, such as upgrading their networks.[14/] T-Mobile has consistently supported amendments to the CSEA, including proposals to provide agencies with up-front funding for planning and technology development that would support the reallocation of spectrum.[15/] The CSEA could be further amended to fund regular assessments of Federal spectrum use and support periodic updates to Federal equipment to ensure that Federal users are making the most efficient possible use of Federal spectrum without degrading mission-critical use cases.

12/ *See* Commercial Spectrum Enhancement Act, Title II of Pub. L. No. 108-494, 118 Stat. 3986 (2004).

13/ *See* Gina Raimondo and Alan Davidson, *Commercial Spectrum Enhancement Act: Annual Progress Report for 2022*, DEP'T OF COM., at iii (Oct. 2023) ("*2022 CSEA Report*").

14/ *See* 47 U.S.C. § 928(g)(2)(B).

15/ *See* Comments of T-Mobile USA, Inc., DoD Notice ID 632369514, at 10 (filed Feb. 17, 2023); Letter from Jessica Rosenworcel, Chairwoman, FCC, to the Honorable John Thune, Ranking Member, Subcomm. on Commc'n, Media, and Broadband, U.S. Senate (Mar. 30, 2022) (asking Congress to revise the SRF to provide "federal agencies adequate incentives and assistance, including up-front planning, technology development, and staffing to support the relocation effort").

B. Strategic Objective 1.2 – Ensure Spectrum Resources Are Available to Support Private Sector Innovation Now and Into the Future

While fulfilling the mission of Strategic Objective 1.1 is important, satisfaction of Strategic Objective 1.2 – ensuring sufficient spectrum for the private sector, including to support the deployment of 6G networks – must be *the key* to implementing the NSS. As the NSS correctly observes, commercial networks are experiencing an explosion in the need for additional capacity. Indeed, as the NSS points out, "data traffic on macro cellular networks is expected to increase by over 250 percent in the next 5 years, and over 500 percent in the next 10 years."[16/] Importantly, making additional spectrum available for current and future commercial networks will drive economic growth, a significant National goal. Commercial wireless providers and resellers contributed approximately $270 billion annually in gross output to the U.S. economy and over $1.3 trillion in gross domestic product from 2011 to 2020.[17/] And, while ensuring there is adequate spectrum for Federal users is an important National priority, doing the same for commercial networks must also be. As the Department of Commerce and President Biden have recognized, "[e]conomic security is national security."[18/]

16/ *NSS* at 4. CTIA warns that "with lapsed FCC auction authority and no clear pipeline of spectrum auctions, the U.S. is projected to not have enough spectrum to meet increasing demand for wireless data." *CTIA 2023 Annual Survey Highlights*.

17/ *See* Aren Megerdichian, Ph.D., *The Importance of Licensed Spectrum and Wireless Telecommunications to the American Economy*, COMPASS LEXECON, at 15 (2022), https://api.ctia.org/wp-content/uploads/2022/12/Compass-Lexecon-Licensed-Spectrum-Report.pdf.

18/ *See U.S. Department of Commerce Strategic Plan – 2018-2022, Helping the American Economy Grow*, U.S. DEP'T OF COM., at 16 (Oct. 7, 2017), https://2017-2021.commerce.gov/sites/commerce.gov/files/us_department_of_commerce_2018-2022_strategic_plan.pdf; Joseph R. Biden Jr., *Why America Must Lead Again: Rescuing U.S. Foreign Policy After Trump*, FOREIGN AFFAIRS (Jan. 23, 2020), https://www.foreignaffairs.com/articles/united-states/2020-01-23/why-america-must-lead-again.

1. NTIA Should Identify Additional Mid-Band Spectrum for Study

T-Mobile appreciates that the NSS identifies spectrum in the 3.1-3.45 GHz ("Lower 3 GHz"), 7125-8400 MHz ("7/8 GHz"), and 37.0-37.6 GHz ("37 GHz") bands for study for mobile wireless use.[19/] But NTIA should go further in identifying more spectrum for mid-band commercial operations to satisfy near-term and long-term needs. Modern mobile networks rely on mid-band spectrum as a foundational building block.[20/] That is because mid-band spectrum offers an ideal combination of capacity and coverage that allows wireless carriers to deliver next-generation services.[21/] NTIA must therefore ensure that there is "at least 1500 megahertz of government mid-band spectrum that can be auctioned for future full-power 5G use."[22/]

First, in considering the potential use of the Lower 3 GHz band, NTIA should particularly consider whether the 3.3-3.4 GHz band can be made available for non-Federal use on an exclusive basis. The ITU World Radiocommunication Conference 2023 ("WRC-23") identified this band for International Mobile Telecommunications ("IMT") in the Americas region in

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19/ *NSS* at 6. The NSS also identifies other spectrum that may not be appropriate for commercial mobile operations.

20/ *See* Press Release, *T-Mobile Revs Up Millimeter Wave with 5G Standalone*, T-MOBILE (Dec. 6, 2023), https://www.t-mobile.com/news/network/t-mobile-revs-up-millimeter-wave-with-5g-standalone ("5G Standalone Press Release") ("5G mmWave [spectrum] can deliver incredibly fast speeds because it offers massive capacity. But the signal doesn't travel very well through obstacles, making it less ideal for mobile phone users who aren't sitting still.").

21/ *See, e.g.*, Comments of T-Mobile USA, Inc., GN Docket No. 22-352, at 3 (filed Aug. 9, 2023); Comments of T-Mobile USA, Inc., GN Docket No. 22-352, at 1 (filed Dec. 12, 2022); Reply Comments of T-Mobile USA, Inc., GN Docket No. 22-352, at 4 (filed Jan. 10, 2023) ("T-Mobile 12.7 GHz Reply Comments").

22/ *See* Meredith Attwell Baker, *The Time is Now for Bold New National Spectrum Strategy*, CTIA BLOG (Oct. 26, 2023), https://www.ctia.org/news/the-time-is-now-for-bold-new-national-spectrum-strategy#:~:text=Specifically%2C%20the%20strategy%20must%20identify,of%20supporting%20future%205G%20use. According to the Boston Consulting Group, the U.S. "would need to add 30 [percent] to 250 [percent] more [licensed, full-power] mid-band spectrum for mobile use than it currently allocates" to meet anticipated demand. Val Elbert, *et al.*, *Accelerating the 5G Economy in the US*, Boston Consulting Group, at 15 (Apr. 17, 2023), https://api.ctia.org/wp-content/uploads/2023/04/accelerating-the-5g-economy-in-the-us-1.pdf.

addition to 57 countries across Africa and the Asia Pacific region, and harmonizing the 3.3-3.4 GHz band with the 3.6-3.8 GHz band would create 500 megahertz of contiguous spectrum for mobile broadband use, while also protecting Federal incumbent users from interference.[23/] Further evaluation of this band would be consistent with efforts not yet made public by the DoD to assess the potential use of this band for commercial entities.[24/]

NTIA should also evaluate Federal operations in additional bands below 3.1 GHz and above 4 GHz and consider whether those bands may be made available for non-Federal use. Commercial entities are deploying networks using spectrum throughout the 3.45-4.2 GHz band, and spectrum immediately below and above these frequencies could be incorporated into those networks. Below 3.1 GHz, NTIA should evaluate the 960-1100 MHz band, the 1780-1830 MHz band paired with the 2060-2110 MHz band (together the "2 GHz band"), and the 2690-2800 MHz band. Some of these bands – *i.e.*, the 960-1100 MHz and 2690-2800 MHz bands – are allocated for use by the Federal Aviation Administration but have been vastly underutilized or inefficiently utilized.[25/] And the 2 GHz band, in particular, despite comprising only 100 megahertz, may be combined with spectrum used by commercial networks to meaningfully

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[23/] *See World Radiocommunication Conference 2023 (WRC-23) – Provisional Final Acts*, ITU (Dec. 2023), https://www.itu.int/dms_pub/itu-r/opb/act/R-ACT-WRC.15-2023-PDF-E.pdf; *see also* Media Note, *U.S. Department of State Leads Successful U.S. Delegation to World Radiocommunication Conference in Dubai*, U.S. DEP'T OF STATE (Dec. 15, 2023), https://www.state.gov/u-s-department-of-state-leads-successful-u-s-delegation-to-world-radiocommunication-conference-in-dubai/.

[24/] Pursuant to Congressional directive, the DoD has been studying the potential for commercial operations below 3.45 GHz. *See* Infrastructure Investment and Jobs Act, Pub. L. No. 117-58, § 90008(b)(1)(A), 135 Stat. 429, 1349 (2021). The DoD's assessment has resulted in a report that has not yet been released to the public. While NTIA should certainly take the DoD report into consideration, the DoD's self-assessment must be subject to independent review.

[25/] Other bands may be used inefficiently by non-Federal users. For example, operations in the 2 GHz band, such as broadcast auxiliary services, can and should be relocated to other bands or moved to commercial technologies such as 5G. *See* Reply Comments of T-Mobile USA, Inc., GN Docket No. 22-352, at 13 (filed Sept. 8, 2023).

supplement current systems.[26/] NTIA should therefore assess whether Federal operations are still required in the bands identified above or whether they can be similarly relocated.

Above 4 GHz, NTIA should evaluate the 4.4-4.94 GHz band. As a result of its width, the 4.4-4.94 GHz band could enable many 5G and 6G use cases, including smart cities and autonomous vehicles.[27/] Further, the 4.4-4.8 GHz band has been identified for study for IMT in Europe, Africa, the Middle East, and the Asia Pacific regions under ITU WRC-27 Agenda Item 1.7.[28/] NTIA should also work with the FCC to include the 5.925-7.125 GHz ("6 GHz") band as part of an overall review of spectrum options covering the 5.925-8.4 GHz range to determine the most appropriate mix of Federal and non-Federal operations, in order to maximize the amount available for exclusive commercial use. The 6 GHz band is ideal mid-band spectrum with favorable propagation characteristics for 5G and 6G applications. Although the Commission has already decided to permit unlicensed use in the 6 GHz band,[29/] other countries have opened the upper 6 GHz band (*i.e.* 6.425-7.125 GHz) for the development and deployment of 5G and future 6G use.[30/] WRC-23 also recently decided to identify spectrum in the upper 6 GHz range for IMT across all three ITU regions, which include the Americas, Europe, Africa, the Middle East as

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[26/] The spectrum is adjacent to current Advanced Wireless Service ("AWS") 3 spectrum at 1755-1780 MHz and AWS-1 spectrum at 2110-2155 MHz.

[27/] *See* Accenture, *Spectrum Allocation in the United States*, at 36 (2022), https://api.ctia.org/wp-content/uploads/2022/09/Spectrum-Allocation-in-the-United-States-2022.09.pdf ("Accenture Report").

[28/] *See Draft Allocation of ITU-R Preparatory Work for WRC 27*, ITU (Dec. 21, 2023), https://www.itu.int/md/R23-CPM27.1-231218-TD-0001/en ("Draft WRC 27 Preparatory Work Allocation").

[29/] *See Unlicensed Use of the 6 GHz Band; Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, Report and Order, 35 FCC Rcd 3852, ¶¶ 17-18 (2020).

[30/] *See* Doug Brake, *China Commits to 5G Mid-Band Spectrum with 6 GHz Allocation: U.S. Needs Clear Response*, CTIA BLOG (June 29, 2023), https://www.ctia.org/news/china-commits-to-5g-mid-band-spectrum-with-6-ghz-allocation-u-s-needs-clear-response.

well as the Asia Pacific region.[31/] In light of these recent developments, NTIA, in cooperation with the FCC, should re-consider whether some or all of the 6 GHz band should be made available for licensed mobile use in the U.S. There are meaningful benefits to making internationally-harmonized spectrum available in the U.S., including creating economies of scale and scope that generate efficiencies and reduce the cost of devices and services.[32/] NTIA should unlock these benefits for American consumers by working closely with the FCC to re-evaluate the 6 GHz band. ITU WRC-27 Agenda Item 1.7 also includes study of the 7.125-8.4 GHz band (or parts thereof) for potential IMT identification and should be considered along with the 6 GHz band.[33/]

2. NTIA Should Prioritize the Identification of Spectrum for Exclusive, High-Power Use

In conducting these studies, NTIA and Federal agencies must prioritize making spectrum available for exclusive, high-powered commercial use. Licensed, exclusive-use spectrum provides the certainty necessary for commercial wireless carriers to provide the high-quality, interference-free services that consumers and businesses have come to expect and require.[34/] NTIA and Federal agencies must also be particularly mindful of proposed "sharing" that is, in fact, not sharing at all. That means not only taking into consideration, as often occurs, potential

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31/ *See* Press Release, *GSMA Hails Groundbreaking Spectrum Decisions at WRC-23*, GSMA (Dec. 15, 2023), https://www.gsma.com/newsroom/press-release/gsma-hails-groundbreaking-spectrum-decisions-at-wrc-23/#:~:text=The%20WRC%2D23%20decision%20to,the%206%20GHz%20equipment%20ecosystem.

32/ *See* Accenture Report at 11.

33/ *See* Draft WRC 27 Preparatory Work Allocation.

34/ *See* Recon Analytics, *CBRS: An Unproven Spectrum Sharing Framework*, at 6 (Nov. 2022), https://api.ctia.org/wp-content/uploads/2022/11/CBRS-Recon-Analytics.pdf ("Recon Analytics CBRS Report") ("[C]ommercial users, by necessity, expect that their network of choice [will] be available at the performance characteristics they expect on a consistent basis."); *see also Spectrum Policy*, CTIA, https://www.ctia.org/spectrum (last visited Jan. 2, 2024).

interference *from* commercial operations to Federal systems, but also evaluating interference *to* commercial operations and whether sharing can be accomplished in such a way as to support meaningful commercial operations. Effective sharing cannot exist when commercial systems are unable to operate because Federal operations prevent consistent, reliable use of non-Federal network base stations and user devices. For example, some coordination agreements with Federal users have effectively precluded licensees in the 3.45-3.55 GHz ("3.45 GHz") band from providing *any* service in certain portions of their license areas. Not only does that preclusion prevent licensees from providing service to the public, but it will also make it difficult for them to satisfy their buildout requirements.

Similarly, sharing is not attractive where spectrum is only available to commercial networks in limited geographic areas or at limited times. Subscribers expect and require network capacity that is always available. In some cases, sharing is not a viable option at all. Indeed, commercial mobile networks are critical safety-of-life tools for both civilians and first responders in emergency situations. Thus, in times of emergencies, subscribers *must* be able to rely on networks at all times and everywhere they travel.

The marketplace has demonstrated that most commercial networks are unwilling to rely on spectrum available through dynamic spectrum sharing. Where spectrum is available on a shared basis for commercial systems – as it is in the Citizens Broadband Radio Service ("CBRS") band – the spectrum has been underutilized.[35/] Reports have concluded that the sharing regime adopted by the FCC in that band has not only resulted in low use of the band, but also failed to generate the innovative use cases that were promised.[36/] This is, in part, because

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35/ *See* Recon Analytics CBRS Report at 4 (explaining that the "CBRS is greatly underutilized").

36/ *See* T-Mobile 12.7 GHz Reply Comments at 7.

"the sharing is unequal; [F]ederal governmental users can use the licenses whenever they want or need them" while non-Federal "users do not possess reliable, predictable access to use CBRS spectrum."[37/]

Accordingly, in implementing the NSS, NTIA should seek to limit the use of dynamic spectrum sharing and similar techniques. Instead, for the reasons discussed above, NTIA should evaluate segmenting Federal spectrum and making some portion of the spectrum available on an exclusive-use basis for full-power commercial services.[38/] Band segmentation – where a spectrum band is bifurcated between Federal or non-Federal users – must also be considered a type of sharing. Indeed, a bifurcated approach will be necessary for some spectrum bands where co-channel sharing between Federal and non-Federal users is infeasible. For example, segmentation of the Lower 3 GHz band, which is one of the bands that is subject to further study under the NSS, could permit exclusive commercial use of part of the band (*i.e.*, the 3.3-3.4 GHz band) while allowing Federal use in another segment of the band (*i.e.*, the 3.1-3.4 GHz band).

In no case should current Federal use of a band result in the *a priori* exclusion of that band from the spectrum pipeline. NTIA notes, for example, that there are mission-critical Federal operations in the 7/8 GHz band.[39/] But the existence of those operations does not mean that Federal entities cannot be relocated out of the 7/8 GHz band and into other bands, utilize other technologies, or rely on commercial systems. This could be facilitated by the CSEA, as discussed above. Alternatively, it may be feasible to relocate systems from the 6 GHz band into the 7/8 GHz band, if those systems, which are already sharing spectrum on an unlicensed basis,

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37/ *See* Recon Analytics CBRS Report at 6.

38/ *See id.* at 4 ("Licensed spectrum . . . has been shown to be increasingly well utilized.").

39/ *See NSS* at 6.

are capable of sharing with Federal operations in the 7/8 GHz band. That approach could clear a portion of the 6 GHz band and make it available for exclusive, high-power commercial use, as discussed above.

C. Strategic Objective 1.3 – Maintain the Spectrum Pipeline by Applying Guiding Principles and Leading Program Management Practices to Identify Additional Bands for Study

T-Mobile agrees with the NSS that it is critical to "create a permanent framework for conducting activities that support long-term spectrum planning in the United States."[40/] In order to accomplish this objective, meaningful, robust assessments of Federal spectrum use must be implemented to determine if more efficient practices could result in spectrum being re-designated for commercial use. T-Mobile supports the actions the NSS and Presidential Memorandum identify to ensure that occurs.[41/] For example, T-Mobile supports the continued use of NTIA's Interdepartment Radio Advisory Committee ("IRAC"). It also agrees that NTIA should "solicit views of stakeholder agencies in a timely fashion and provide sufficient time and procedures for such agencies to present their views and supporting technical information to NTIA."[42/] In addition to those actions, T-Mobile offers the following suggestions.

First, NTIA should institute a regular spectrum monitoring program similar to the pilot program directed by the 2013 Presidential Memorandum.[43/] While T-Mobile recognizes that some bands may not be used continuously and at all times, if there is spectrum allocated to Federal users that is not being used consistently, either time-based or geographically, in a

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40/ *See id.* at 7.

41/ *See id.* at 8; *Spectrum Policy Memo* §§ 2, 5, 7, 8.

42/ *See Spectrum Policy Memo* §§ 2, 5.

43/ *See Spectrum Monitoring*, ITS, https://its.ntia.gov/research-topics/spectrum-management-r-d/spectrum-monitoring (last visited Jan. 2, 2024).

meaningful manner to support Federal needs, NTIA should understand why and consider any such spectrum for re-assignment to other Federal or non-Federal users.

Second, NTIA should require Federal spectrum users to demonstrate that they are using the spectrum for which they are authorized, just as commercial users are required to do. The FCC routinely requires exclusive-use spectrum licensees to satisfy not only buildout obligations, but also ongoing renewal and continuity of service requirements.[44/] A similar demonstration should likewise be required by Federal users within a reasonable time after authorization is obtained and periodically thereafter to ensure that the authorized spectrum continues to be used. If a Federal user fails to provide that information or if its demonstration is found insufficient, the Federal user should be required to return the spectrum to the Federal inventory for re-assignment to other Federal entities or re-designation for use by commercial licensees. Requiring a demonstration of use will promote a more realistic Federal planning process with meaningful commitments to use authorized spectrum.

Third, NTIA should rely on ITS to evaluate Federal spectrum requirements and whether the spectrum that an agency says it needs is actually required to perform its Federal functions. In conducting that evaluation, ITS should assess whether (i) newer, more efficient technologies could make more efficient use of spectrum without degrading Federal operations; (ii) commercial networks could be used instead; and/or (iii) the proposed spectrum use could be combined with other Federal operations.

Fourth, NTIA should engage in a comparative evaluation of proposed spectrum use. That is, NTIA and Federal agencies should take into consideration the economic value that converting spectrum for commercial use will generate compared with the relative cost to satisfy

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44/ *See, e.g.*, 47 C.F.R. §§ 1.946, 1.949, 1.953.

Federal spectrum needs in another manner. Because U.S. wireless networks are an economic force multiplier, NTIA should evaluate these economic benefits against the cost of maintaining spectrum for Federal use.

Finally, NTIA should take the actions recommended by the Government Accountability Office ("GAO") in previous evaluations of Federal spectrum management. In particular, in 2011, the GAO released a study evaluating NTIA's spectrum management practices and found that NTIA's Federal spectrum plan "has several limitations, does not identify governmentwide spectrum needs, and does not contain key elements and best practices of strategic planning."[45/] The GAO therefore recommended that NTIA (i) develop a more robust Federal spectrum plan; (ii) examine the assignment review processes and consider best practices to determine if the current approach for collecting and validating data from Federal agencies can be streamlined or improved; and (iii) establish internal controls for oversight of the accuracy and completeness of reported agency data.[46/]

A more recent study conducted by the GAO found that the information technology ("IT") solutions used by Federal agencies like NTIA and DoD are outdated, do not support efficient spectrum use, and should be modernized. Specifically, the GAO found that "increasing demand for more spectrum would likely necessitate increased spectrum sharing" and "existing spectrum-related IT is not sufficient to support the change."[47/] It added that outdated IT is difficult to maintain, and limitations in existing spectrum-related IT systems can delay spectrum

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45/ *See Spectrum Management – NTIA Planning and Processes Need Strengthening to Promote the Efficient Use of Spectrum by Federal Agencies*, Report to Congressional Committees, GAO (Apr. 2011), at i, https://www.gao.gov/assets/gao-11-352.pdf ("GAO Spectrum Management Report").

46/ *Id.* at 38.

47/ Letter from Andrew Von Ah, Director, Physical Infrastructure, GAO, to Jack Reed, Chairman, Committee on Armed Services, U.S. Senate, *et al.*, at 6 (Feb. 17, 2022).

management decisions.[48/] The GAO concluded that there are three primary opportunities to improve current Federal spectrum management IT systems and processes: (i) increasing automation, including by leveraging artificial intelligence; (ii) improving data and analysis standards by developing standardized engineering software for tasks like analyzing the source of harmful interference; and (iii) enhancing cybersecurity by addressing current vulnerabilities.[49/]

Many of the GAO's recommendations have been incorporated into NTIA's Plan to Modernize and Automate the Infrastructure of NTIA Related to Managing Federal Spectrum Use.[50/] To best implement the NSS, NTIA should implement the GAO's recommendations to the extent that it has not yet already done so and to the extent the recommendations are consistent with the other NSS goals described here.

III. COLLABORATION AND ACCURATE INFORMATION SHARING ARE ESSENTIAL

A. Strategic Objective 2.1 – Establish a Persistent Strategic Spectrum Planning Process Guided by the Best Available Science and Data

An important part of the NSS will be continued communication among stakeholders. As NTIA notes, there are existing organizations and processes that promote collaboration between Federal agencies themselves and between Federal agencies and commercial entities.[51/] And those processes have produced useful results. For example, in 2021, the National Spectrum Consortium ("NSC") established its Partnering to Advance Trusted and Holistic Spectrum

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48/ *Id.*

49/ *See id.*

50/ *See Plan to Modernize and Automate the Infrastructure of NTIA Related to Managing Federal Spectrum Use*, NTIA Office of Spectrum Management (Sept. 2021), https://www.ntia.gov/sites/default/files/publications/ntia_spectrum_it_mod_report_to_congress.final__0.pdf.

51/ *See NSS* at 9-10.

Solutions ("PATHSS") task group to aid the DoD in its statutorily required examination of the Lower 3 GHz band.[52/]

Critically, the PATHSS task group included a sub-group, PATHSS-C, which was comprised of members who are authorized to review and evaluate classified material.[53/] That allowed Federal and non-Federal users to share valuable information about Federal spectrum use that is not available to other technical bodies and to create informed technical recommendations that are effective and protect national security.

This and similar collaborative efforts should continue to be used as a framework for future collaboration to make spectrum available for commercial use. However, those efforts must be conducted by NTIA as the spectrum manager for Federal operations. And they should focus on developing a better understanding by Federal entities of *both* the need by industry for additional commercial spectrum *and* the specific radiofrequency spectrum ranges that can best offer additional capacity. That collaboration should also emphasize to Federal agencies that commercial networks have the capacity and availability to satisfy the requirements of Federal systems and encourage Federal systems to use those networks.

B. Strategic Objective 2.2 – Develop and Document an Evidence-Based National Spectrum Decision-Making Methodology

As noted above, a key to implementing the NSS will be the identification of spectrum used for Federal operations that can be re-designated for exclusive commercial use to support 5G and 6G deployments. And achieving that outcome can only occur with the assessment and

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52/ *See* Comments of the National Spectrum Consortium, Docket No. NTIA-2023-0003-0001, at 6 (filed Apr. 17, 2023).

53/ *See* C. Todd Lopez, *Spectrum Sharing is Way Ahead to Maintain Economic Dominance, Defense Official Says*, U.S. DEP'T OF DEFENSE (Sept. 21, 2022), https://www.defense.gov/News/News-Stories/Article/Article/3165774/spectrum-sharing-is-way-ahead-to-maintain-economic-dominance-defense-official-s/.

confirmation of spectrum use by Federal entities. However, the mere submission of the type of information T-Mobile suggests Federal entities provide to NTIA above is not sufficient. As Strategic Objective 2.2 recognizes, there must also be an evaluation of an agency's spectrum needs independent of an agency's claims – both in the context of seeking use of additional spectrum *and* seeking protection from non-Federal operations that could allegedly cause harmful interference to Federal operations.[54/]

That assessment must be science-based. It should therefore be led by an entity like ITS that is not associated with the agency asserting a spectrum need or protection requirement. Indeed, the purpose of ITS is to "serve[] as a principal Federal resource for solving the telecommunications concerns of other Federal agencies."[55/] ITS already has experience evaluating the needs and protection requirements of Federal agencies. For instance, leading up to the AWS-3 auction, ITS was instrumental in ensuring coordination between non-Federal licensees and Federal government incumbents in the 1695-1710 MHz band.[56/] Because of those efforts, commercial use of the frequencies was expanded, while Federal use was maintained when and where necessary.

C. Strategic Objective 2.3 – Define Requirements and Implement Capabilities to Capture Essential Data and Information on Spectrum Use.

T-Mobile agrees with the premise underlying Strategic Objective 2.3 – that "[s]pectrum management relies on trustworthy data."[57/] As suggested above, credible data regarding the

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54/ *See NSS* at 11.

55/ *ITS: The Nation's Spectrum and Communications Lab*, Institute for Telecommunication Sciences, https://its.ntia.gov/about-its/its-the-nation-s-spectrum-and-communications-lab/ (last visited Jan. 2, 2024) ("*About ITS*").

56/ *See The Federal Communications Commission and the National Telecommunications and Information Administration: Coordination Procedures in the 1695-1710 MHz and 1755-1780 MHz Bands,* Public Notice, 29 FCC Rcd 8527 (2014).

57/ *NSS* at 12.

Federal government's current and future uses of its spectrum resources can be developed if the data is evaluated by an independent party like ITS. If ITS is responsible for assessing data as T-Mobile proposes, it follows that ITS should also take a lead role in developing data requirements for those assessments. Indeed, as the research and engineering arm of NTIA, ITS has the capabilities to produce such requirements and is in the best position to do so.

IV. THE FEDERAL GOVERNMENT SHOULD PURSUE SPECTRUM INNOVATION BUT NOT AT THE COST OF COMMERCIAL USE

A. Strategic Objective 3.1 – Improve Spectrum Efficiency and Bolster Coexistence by Facilitating Investments in New and Emerging Technologies

Pursuing spectrum efficiency by enhancing spectrum management frameworks, processes, and tools, as NTIA envisions in Strategic Objective 3.1, is precisely how the Federal government can and should make additional spectrum available for commercial use.[58/] As NTIA recognizes, this may include reviewing the performance of receivers and other technologies.[59/] But NTIA should not confuse spectrum efficiency with the use of spectrum sharing technologies or techniques that may produce inefficient results. While incorporating new spectrum management technologies may lead to more efficient spectrum use among commercial and Federal spectrum users, implementing spectrum sharing techniques may not. To the contrary, spectrum sharing could create the unintended effect of even greater spectrum *inefficiency* if spectrum sharing is neither warranted nor appropriate for a particular band. As noted above, sharing in the 3.5 GHz CBRS band has yielded inefficient results and ineffective use of spectrum to provide commercial services much needed by U.S. consumers.

58/ *See id.* at 13.

59/ *See id.* at 13-14.

Because of the billions of dollars commercial providers have invested in spectrum resources to support their networks, they are naturally incented to use spectrum efficiently.[60/] Federal agencies, likewise, should be subject to an incentive structure that encourages efficient spectrum use. For example, as noted above, Federal agencies could be required to comply with performance requirements for the spectrum to which they are assigned. Federal agencies could also be subject to regular, periodic assessments of their spectrum use and future spectrum needs to support their mission-critical use cases. As also noted above, the CSEA can be used to promote spectrum efficiency, which can create opportunities for re-designation of Federal spectrum for commercial purposes.

But incentives and the promise of, for example, upgraded technology may not alone be sufficient to encourage evaluation of spectrum use. Therefore, to support efficient Federal spectrum use, NTIA should consider creating metrics that value spectrum authorized to Federal users and assess fees to agencies based on that value.[61/] And if an agency's spectrum is laying fallow, NTIA should, even if the agency is paying fees, focus on clearing the spectrum so that it may be used in high-power commercial networks.[62/] NTIA should not, as discussed above, focus on dynamic spectrum sharing to improve spectrum efficiency.

60/ *See, e.g.*, CTIA, *2023 Annual Survey Highlights* (July 25, 2023), at 4, https://api.ctia.org/wp-content/uploads/2023/11/2023-Annual-Survey-Highlights.pdf ("*2023 CTIA Annual Survey Highlights*") ("Wireless investment has increased for the fifth year in a row, with a historic $39 billion invested in wireless networks in 2022 – up nearly 12% from last year's previously record-setting total.").

61/ *See* ITIF Report at 7 ("[A]gencies' budgets should reflect the costs of maintaining access to the wavelengths they use.").

62/ *See* Rysavy Research, LLC, *5G Mid-Band Spectrum: The Benefits of Full Power, Wide Channels, and Exclusive Licensing*, at 7 (2022), https://api.ctia.org/wp-content/uploads/2022/11/Rysavy-5G-Midband-Spectrum.pdf (recognizing that "exclusive access to wide channels at full power with sufficiently large license boundaries [] facilitate[s] rapid deployment").

B. Strategic Objective 3.2 – Commit to Improving Collective Understanding of the Electromagnetic Spectrum Through Coordinated, Focused, and Sophisticated Research and Development

T-Mobile supports the Federal government's spectrum research and development efforts, as outlined in Strategic Objective 3.2.[63/] Those efforts, however, should be centralized and take advantage of existing expertise within the Federal government, such as through ITS. Indeed, one of the principal functions of ITS is to "address[] other [F]ederal agencies' telecommunications and spectrum research needs."[64/] As explained above, Federal agencies should leverage ITS's capabilities and ongoing research to help understand which frequencies may be made available for commercial use.

In addition, the development of the National Spectrum Research and Development Plan, which will appropriately be led by the White House Office of Science and Technology Policy ("OSTP") in coordination with Federal agencies, should take advantage of other existing Federal resources. As the Presidential Memorandum and the NTIA/FCC Memorandum of Understanding recognize, additional spectrum coordination among Federal entities is required to ensure a whole-of-government approach.[65/] But other Federal entities should not simply be allowed to conduct their own spectrum research and development. NTIA must ensure that the

63/ *See NSS* at 15-17.

64/ *See About ITS*.

65/ *See Spectrum Policy Memo* § 1 ("Agencies and private-sector users must address these challenges by working together in the best interests of the American people."); *id.* §2 ("To ensure that the United States manages its spectrum resources in a manner that benefits all Americans, the executive branch must work cooperatively to arrive at consensus positions reflecting my Administration's spectrum policy goals."); Memorandum of Understanding Between the Federal Communications Commission and the National Telecommunications and Information Administration § III (Aug. 1, 2022), https://docs.fcc.gov/public/attachments/DOC-385867A1.pdf ("The FCC and NTIA must work together to ensure that spectrum policy decisions promote efficient use of spectrum by all users.").

Implementation Plan includes a single set of Federal priorities that will guide their work, ensuring the most efficient use of spectrum and the reallocation of any unused spectrum.

OSTP should also include commercial partners to inform the development of the plan. Doing so will ensure that the plan is consistent with, and takes advantage of, the work being performed in the private sector, including, as discussed above, use of commercial networks by Federal entities when and where possible and that can be made available via exclusive allocation of resources as described above. That will help to avoid duplicative efforts and will produce the most informed outcome.

While it is appropriate to establish a national testbed for dynamic spectrum sharing, as well to undertake efforts to improve coexistence among Federal and commercial spectrum users,[66/] doing so should *not* indicate a national preference for spectrum sharing over exclusive-use spectrum (and the clearing that is the precursor for designating spectrum for exclusive use). Efforts to better understand spectrum utilization and spectrum access technologies should also include the assessment of exclusive-use spectrum for commercial entities.

C. Strategic Objective 3.3 – Pursue Spectrum Policies that Maximize Flexible Use of Spectrum, Accommodate New and Innovative Technologies, and Identify Opportunities to Expand Spectrum Access

T-Mobile strongly supports a spectrum policy that encourages and maximizes flexible spectrum use.[67/] In the commercial context, flexible-use policies have allowed providers to respond to market needs, while establishing technical rules to prevent harmful interference to other spectrum users. In fact, the FCC's flexible-use policies have allowed T-Mobile to become a leader in providing fixed wireless access services, with T-Mobile now providing service to

66/ *See NSS* at 16.

67/ *See id.* at 17-18.

over 4.2 million fixed wireless customers.[68/] T-Mobile's 5G Home Internet has created additional opportunities for millions of consumers to secure competitive and reliable internet access at very competitive pricing, often in areas where it did not exist, or it was limited, before.[69/]

However, providing Federal entities with the same flexibility must be carefully considered. Commercial entities pay billions of dollars for the spectrum they hold and, as noted above, they are subject to performance obligations associated with that spectrum. Those performance obligations ensure that a commercial spectrum licensee's ability to use spectrum flexibly will still mean that they use spectrum efficiently and intensely.[70/] Federal users do not have those same incentives today. Therefore, Federal entities that no longer require spectrum for the use for which they originally obtained it and seek to use that spectrum flexibly for other purposes should be required to justify converting the spectrum to a different Federal use, instead of making the spectrum available for commercial operations.

V. A WELL-TRAINED SPECTRUM WORKFORCE IS IN THE PUBLIC INTEREST

Under Pillar Four of the NSS, NTIA commits to a well-trained, diverse spectrum workforce that continues to foster technological innovation and helps maintain national

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68/ *See* Press Release, *T-Mobile Outpaces the Industry on Customer and Service Revenue Growth, Delivers Highest Cash Flow in Company History in Q3 2023 and Raises Guidance Again*, T-MOBILE (Oct. 25, 2023), https://www.t-mobile.com/news/business/t-mobile-q3-2023-earnings; *see also 2022 The State of Fixed Wireless Access*, T-MOBILE (2022), https://www.t-mobile.com/news/_admin/uploads/2022/12/2945098_CCD_State-of-Fixed-Wireless-Access_Infographic-Report_REVW_v19_RGB-2.pdf. 5G Home broadband is now available to more than 94 million U.S. households. *See 2023 CTIA Annual Survey Highlights*.

69/ *See* 5G Standalone Press Release.

70/ *See Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, Report and Order and Proposed Modification, 35 FCC Rcd 2343, ¶ 92 (2020) ("The Commission recognizes the critical role that performance requirements play in ensuring that licensed spectrum does not lie fallow.").

economic growth and U.S. spectrum leadership.[71/] To achieve the goals NTIA identifies, T-Mobile encourages the Federal government to work with third parties – such as members of academia, training centers, and professional societies – to promote information about employment opportunities in the spectrum workforce. The Federal government may also wish to establish a "visiting employee" program pursuant to which private sector experts may devote a limited period to Federal government service. Not only would this further enhance the Federal government's well-established spectrum expertise, but it would also enable Federal agencies to benefit from fresh, new perspectives.

Spectrum expertise should also be concentrated, consistent with NTIA's position as the Federal entity charged with managing Federal spectrum. Doing so will help fill positions in the spectrum workforce with quality, top-tier talent because (i) it will be more attractive for potential employees to work in the entity recognized for its spectrum expertise; and (ii) with only NTIA involved in spectrum management activities, there will be fewer positions that will need to be filled.

Private industry can likewise help improve policymakers' understanding of spectrum considerations through ongoing communication and collaboration with NTIA. For example, the Federal government can invite commercial participation in established (or to be established) Federal-only entities like IRAC, which has been tasked with assisting NTIA with its spectrum management responsibilities, and the Interagency Spectrum Advisory Council, which will replace the Policy and Plans Steering Group "as the principal interagency forum for heads of agencies to advise NTIA on spectrum policy matters."[72/] T-Mobile agrees with NTIA that

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71/ *See NSS* at 19-21.

72/ *Spectrum Policy Memo* § 2.

policymakers at all levels should be encouraged to increase their understanding of spectrum topics, which will help create more informed spectrum decisions that reflect stakeholder interests. Additional coordination among commercial entities and the spectrum experts within the Federal government – which, as explained above, should be consolidated within NTIA – can help achieve that.

VI. CONCLUSION

T-Mobile appreciates the work that has resulted in the NSS. T-Mobile urges NTIA, in implementing the NSS, to continue identifying mid-band spectrum that can be repurposed for exclusive, high-power licensed use to deploy 5G and 6G networks. T-Mobile looks forward to continued collaboration with NTIA and other Federal entities to implement the NSS so that U.S. commercial wireless networks can continue to provide the world-class service for which they are recognized today.

Respectfully submitted,

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