

TECHFREEDOM

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Comments of

TechFreedom

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In the Matter of

DEVELOPMENT OF A NATIONAL SPECTRUM STRATEGY

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INTRODUCTION

TechFreedom is pleased to provide these comments in response to the National Telecommunications and Information Agency's Request for Comment (RFC) in the above-referenced proceeding.¹ NTIA requests comment on the three "pillars" of the proposed National Spectrum Strategy (NSS) as set forth in the RSC.

Founded in 2010, TechFreedom is a nonprofit think tank dedicated to promoting the progress of technology that improves the human condition. To this end, we seek to advance public policy that makes experimentation, entrepreneurship, and investment possible, and thus unleashes the ultimate resource: human ingenuity. Wherever possible, we seek to empower users to make their own choices online and elsewhere.

TechFreedom has actively participated in federal agency proceedings related to spectrum policy.² We are therefore well-versed in these issues and welcome the opportunity to comment on them to NTIA.

I. There Must Be an All-of-Government Approach to the National Spectrum Strategy (NSS)

TechFreedom applauds NTIA for undertaking the development of the NSS. As stated in the RFC, "NTIA oversees the Federal Government's use of spectrum and serves as the chief advisor to the President on issues of telecommunications policy, which includes the management of spectrum."³ By one estimate, government users have exclusive or priority use of nearly 70 percent of the spectrum between 225 MHz and 3.7 GHz.⁴ NTIA plays a vital role in developing the NSS and must be *the* dominant voice within the federal government on spectrum management. Too many times in recent years, however, NTIA has either

¹ The RFC was published in the Federal Register on March 16, 2023, 88 Fed. Reg. 16244 (Mar. 16, 2023), and set the comment date as April 17, 2023. These comments are timely filed.

² TechFreedom, Comments on Infrastructure Investment and Jobs Act Implementation, Docket No. NTIA-2021-0002 (Feb. 4, 2022), <https://techfreedom.org/wp-content/uploads/2022/02/TechFreedom-Comments-2-4-22.pdf>; TechFreedom, Reply Comments on Modernizing and Expanding Access to the 70/80/90 GHz Bands, WT Docket No. 20-133 (Jan. 3, 2022), <https://techfreedom.org/wp-content/uploads/2022/01/TF-Reply-Comments-70-GHz-1-3-22.pdf>; TechFreedom, Comments on Promoting Efficient Use of Spectrum through Improved Receiver Interference Immunity Performance, ET Docket 22-137 (June 27, 2022), <https://techfreedom.org/wp-content/uploads/2022/06/TechFreedom-Receiver-Performance-Comments-6-27-22.pdf>.

³ National Telecommunications and Information Administration, *Request for Comments*, 88 Fed. Reg. 16244 (Mar. 16, 2023), <https://www.govinfo.gov/content/pkg/FR-2023-03-16/pdf/2023-05406.pdf> [hereinafter Request for Comment]; see also 47 U.S.C. § 902 (functions of NTIA).

⁴ Commissioner Michael O'Rielly, *Enacting More "Sticks": Spectrum Fees for Government Users*, FCC (Sept. 8, 2015, 3:20 PM), <https://www.fcc.gov/news-events/blog/2015/09/08/enacting-more-sticks-spectrum-fees-government-users>.

abdicated its authority, or allowed other agencies to drive spectrum management decisions without NTIA's oversight.⁵ The fact that the RFC must ask commenters to identify the relevant stakeholders indicates that NTIA hasn't prioritized its role in spectrum management.⁶ Now it must play catch-up⁷ and dedicate the necessary internal resources to play the pivotal role Congress has assigned it. Moreover, NTIA cannot allow other agencies to usurp this role or otherwise throw up roadblocks to efficient spectrum management.⁸

One group that the NTIA should consult with are the Native American Tribes, who have successfully deployed 2.5 GHz spectrum for wireless broadband.⁹ Their experience in repurposing this spectrum from its under-use as part of the Educational Broadband Service

⁵ See, e.g., Sam Benzacar, *C-band and Altimeters: As Expected, Filters were the Solution*, MICROWAVE PRODUCT DIGEST (Nov. 21, 2022), <https://www.mpdigest.com/2022/11/21/c-band-and-altimeters-as-expected-filters-were-the-solution/> ("Nearly three years after the FCC proposed auctioning C-band spectrum to wireless carriers, the 'Great C-band Fiasco' seems about to come to an end. Last month, the National Telecommunications and Information Administration issued a 151-page report (NTIA Report 22-562) that described the results of tests conducted to determine whether 5G C-band base stations present an interference hazard to aircraft radar altimeters on approach and landing. It's a comprehensive 151-page document that goes into extraordinary detail about the tests and their results and provides some recommendations. You'd think this would slam the gavel down on this issue because it concludes that while interference is certainly possible, it's highly unlikely if radar altimeters have adequate filtering."); Jon Brodtkin, *FAA forced delay in 5G rollout despite having no proof of harm to aviation*, ARS TECHNICA (Nov. 18, 2021, 4:48 PM), <https://arstechnica.com/tech-policy/2021/11/faa-forced-delay-in-5g-rollout-despite-having-no-proof-of-harm-to-aviation/> ("Mobile carriers aren't alone in being frustrated by the delay. Telecom-industry observers point out that the Federal Communications Commission approved use of the C-Band spectrum from 3.7 to 3.98 GHz only after analyzing the aviation industry's interference claims and finding no evidence to support the claims. The FCC also required a 220 MHz guard band that will remain unused to protect altimeters from interference. That guard band is more than twice as big as the 100 MHz buffer initially suggested by Boeing, the FCC has said.").

⁶ Request for Comment, *supra* note 3, at 16244.

⁷ President Trump called on NTIA to create the NSS by July 22, 2019. See Memorandum for the Heads of Executive Departments and Agencies: Developing a Sustainable Spectrum Strategy for America's Future, 83 Fed. Reg. 54513 (Oct. 30, 2018), <https://www.govinfo.gov/content/pkg/FR-2018-10-30/pdf/2018-23839.pdf>.

⁸ The RFC notes the variety of government entities, and their governmental roles that require spectrum to operate. "Sufficient access to spectrum is vital to national security, critical infrastructure, transportation, emergency response, public safety, scientific discovery, economic growth, competitive next generation communications, and diversity, equity, and inclusion. Increased spectrum access will also advance U.S. innovation, connectivity, and competition, create high-paying and highly skilled jobs, and produce improvements to the overall quality of life." Request for Comment, *supra* note 3, at 16245. Indeed, from this laundry list, NTIA may have great difficulty in meeting the needs of all of these perceived constituencies and priorities as articulated in the RFC.

⁹ See FED. COMM'N COMM'N, *Rural Tribal Window Updates*, <https://www.fcc.gov/rural-tribal-window-updates> (last visited Apr. 9, 2023).

(EBS) is an excellent case study; notably, the real-world propagation characteristics of the spectrum have significantly exceeded expectations.¹⁰

The RFC further points out that the NSS can only be accomplished successfully if NTIA properly and fully coordinates with the FCC.¹¹ To this end, TechFreedom is encouraged that NTIA and the FCC recently updated their Memorandum of Understanding after nearly twenty years to better reflect the critical role each agency plays.¹² This cooperation should continue, and NTIA should approach spectrum management with the same vigor as the FCC, as discussed more fully below.

II. Spectrum Efficiency Must Be the Bulwark of the NSS

The days of “greenfield” spectrum laying fallow are all but gone.¹³ These days, any new allocation of spectrum is a *de facto* reallocation—some existing user somewhere is going to be subject to potential interference, either in-band or from operations in an adjacent band. The only way to free up more spectrum is to require existing users to be more efficient in their operations. Both FCC policy and market forces have driven commercial spectrum licensees to strive for increased efficiency, especially for spectrum for which they must pay at auction. By one estimate, commercial licensees are increasing their spectrum efficiency by as much as 30 percent per year in an effort to squeeze the maximum performance possible

¹⁰ See James E. Dunstan, *The FCC, 2.5 GHz Spectrum, And The Tribal Priority Window: Something Positive Amid The COVID-19 Pandemic*, TECH POLICY GREENHOUSE, (Dec. 9, 2020, 12:03 PM), <https://www.techdirt.com/2020/12/09/fcc-25-ghz-spectrum-tribal-priority-window-something-positive-amid-covid-19-pandemic/> (“Early data indicate that the 2.5 GHz spectrum is performing well above theoretical predictions, even on the topographically diverse Navajo Nation. Students who previously had no affordable and reliable broadband service because the total lack of wireline infrastructure can now continue their studies from home. Those relatively close to the towers where 2.5 GHz spectrum antennas are deployed are enjoying 25 Mbps download and 6 Mbps upload speeds. One student lives more than four miles away, and not within line-of-site of the tower, yet is still getting consistent speeds of 8 Mbps down and 10 Mbps up. And that’s with first-generation gear, sure to improve as the 2.5 GHz spectrum is further developed and deployed.”).

¹¹ Request for Comment, *supra* note 3, at 16244.

¹² See MEMORANDUM OF UNDERSTANDING BETWEEN THE FCC AND NTIA ON SPECTRUM COORDINATION (Aug. 2, 2022), <https://www.fcc.gov/document/mou-between-fcc-and-ntia-spectrum-coordination>. See also Press Release, FCC, *NTIA Sign New Memorandum of Understanding On Spectrum Coordination* (Aug. 2, 2022), <https://ntia.gov/press-release/2022/fcc-ntia-sign-new-memorandum-understanding-spectrum-coordination> (“A spectrum coordination agreement that pre-dates the smartphone is not sufficient to meet the challenges facing our agencies today. This updated MOU between NTIA and the FCC will deepen our collaboration and improve our ability to anticipate and mitigate serious spectrum issues.”).

¹³ See Letter from FCC Chair Jessica Rosenworcel to Sen. Thune, (Mar. 30, 2022), <https://docs.fcc.gov/public/attachments/DOC-382219A3.pdf> (“Greenfield spectrum—open and cleared for use—is no longer simple or easy to find. In addition, repurposing spectrum for burgeoning new services often requires lengthy and complex bureaucratic processes.”).

from their licensed spectrum.¹⁴ Similar forces have long been lacking among government spectrum users, leading FCC Chair Jessica Rosenworcel to conclude:

In many parts of the spectrum chart, existing receivers may constrain what is possible in adjacent or nearby spectrum. Moreover, we often do not know with accuracy how federal spectrum is being used or about future needs.¹⁵

Yet spectrum efficiency is not directly addressed in the RSC. This should be job one for NTIA in this process.

A. Pillar 3's Call for "Technology Development" Should Be More Direct

It is not until the third Pillar that the RFC specifically addresses the core question that is slowing down the advance of future communications systems in the United States: How efficient are government users of spectrum? Pillar 3 dances around the issue. It buries the efficiency question in a single paragraph, where it is relegated to a discussion of a single approach to spectrum sharing, incumbent informing capability (IIC).¹⁶

What are some recommendations for developing an enduring, scalable mechanism for managing shared spectrum access using the IIC or other similar mechanism, with the goal of increasing the efficiency of spectrum use? What challenges do non-federal users foresee with potentially having limited access to classified or other sensitive data on federal spectrum uses and operations as part of the IIC or similar capabilities, and what recommendations do users have for ways to mitigate these challenges?¹⁷

Unless and until NTIA studies current government systems from an efficiency standpoint, and becomes more transparent with those data, progress in freeing up spectrum for commercial use will continue to be a "lengthy and complex bureaucratic process[]." ¹⁸ So long as government agencies can hide behind "national security," they wield a silent veto on having to relinquish any spectrum, and America stands vulnerable to losing its technological

¹⁴ See Coleman Bazelon & Giulia McHenry, *Substantial Licensed Spectrum Deficit (2015-2019): Updating the FCC's Mobile Data Demand Projections* at 20, Table 5, line 10, CTIA — THE WIRELESS ASSOCIATION (June 23, 2015), https://www.brattle.com/wp-content/uploads/2017/10/5927_substantial_licensed_spectrum_deficit_2015-2019_-_updating_the_fccs_mobile_data_demand_projections-3.pdf (the private sector is getting approximately 30 percent more efficient in its spectrum use every year.).

¹⁵ Rosenworcel Letter, *supra* note 13, at 3-4.

¹⁶ Other references in the RFC to "efficient" relate more to whether NTIA is being "efficient" in its processes, rather than whether government users are being efficient in their spectrum use. *See, e.g.*, Request for Comment, *supra* note 3, at 16245 ("Spectrum access, however, must be managed responsibly and efficiently.").

¹⁷ Request for Comment, *supra* note 3, at 16247.

¹⁸ Rosenworcel Letter, *supra* note 13, at 10.

edge when it comes to future telecommunications systems.¹⁹ The RSC admits this risk: “Access to more spectrum, in short, will help the United States continue to lead the world in advanced technology and enhance our national and economic security.”²⁰

B. Receiver Performance Is a Key Component to Spectral Efficiency and Is Not Addressed in the RFC

If the C-Band debacle taught us anything, it is that interference (especially out-of-band interference) is a multi-variable problem—both transmitter performance *and* receiver performance are key to determining real-world interference issues.²¹ Yet the RFC does not even mention receiver performance as an issue. This oversight is glaring, especially given the large number of older legacy receivers that exist for government users.²² Unlike NTIA, the FCC has begun to address this critical issue, and this month will vote on a Policy Statement, “Principles for Promoting Efficient Use of Spectrum and Opportunities for New Services.”²³ The Draft Policy Statement provides a comprehensive roadmap on how to approach the issue of receiver performance in determining future frequency allocations.

To maximize spectrum access and promote coexistence among different services, the Commission has traditionally regulated transmitters and their operations. Our transmitter rules are designed to enable a multitude of diverse services in spectral proximity without the risk of undue impairment. Technological advances in receiver resiliency, however, can also unleash new services without unnecessarily restricting transmitters in neighboring bands. As such, the properties of receivers, and their immunity to out-of-band interference in particular, offer an increasingly promising pathway to manage spectrum needs in a balanced and comprehensive way.²⁴

NTIA should adopt a similar approach to government spectrum and consider receiver performance in determining the efficiency of government systems. This will be no simple task. The FCC noted that fully understanding receiver performance issues for commercial

¹⁹ TechFreedom does not downplay the import role national security plays for our telecommunications infrastructure or our society in general. Disclosing too many specifics of some federal spectrum users could expose vulnerabilities in our systems. Nonetheless, the NTIA cannot abandon its core function of overseeing efficient use of government spectrum every time a government user waves the “national security” flag.

²⁰ Request for Comment, *supra* note 3, at 16245.

²¹ See Benzacar, *supra* note 5.

²² See TechFreedom, Comments on Promoting Efficient Use of Spectrum Through Improved Receiver Interference Immunity Performance, FCC 22-29 (June 27, 2022), <https://techfreedom.org/wp-content/uploads/2022/06/TechFreedom-Receiver-Performance-Comments-6-27-22.pdf>.

²³ See FED. COMM’N COMM’N, FCC ANNOUNCES TENTATIVE AGENDA FOR APRIL OPEN MEETING (Mar. 30, 2023), <https://docs.fcc.gov/public/attachments/DOC-392196A1.pdf>.

²⁴ FED. COMM’N COMM’N, POLICY STATEMENT ¶ 2, ET DOCKET NO. 23-122 (Mar. 30, 2023), <https://docs.fcc.gov/public/attachments/DOC-392197A1.pdf>.

operations might require entities to divulge engineering information that they may deem confidential and may require the adoption of Protective Orders.²⁵ Making similar information available for government systems, especially those involving national security and public safety, may be even more problematic, as this disclosure could reveal vulnerabilities that could be used to disrupt these vital systems. NTIA thus will play a critical role in collecting this information and determining how, and in what level of detail, disclosure of receiver performance is necessary to allow it to properly interface with the FCC in future frequency allocation proceedings. It will not be enough merely to ignore this vital issue in the name of national security.

III. What Spectrum Is “Studied” Is Critical—the “Where” Matters

The RFC indicates that NTIA, in conjunction with the FCC, is looking to identify “at least 1,500 megahertz of spectrum for in-depth study to determine whether that spectrum can be repurposed to allow more intensive use.”²⁶ Presumably this is for the “spectrum pipeline” that Pillar 1 contemplates.²⁷ The RFC fails to identify, however, even the regions of the spectrum from which these 1,500 megahertz is to be plucked. The “where” matters here. As a matter of physics, 1,500 megahertz of spectrum is a huge amount of spectrum if it is in the lower part of the spectrum. For example, the entire AM, FM, and TV bands of spectrum occupy just 322 megahertz of spectrum.²⁸ Conversely, the ITU allocation for the radio astronomy service in the 275-323 GHz band occupies 48,000 megahertz of spectrum, 32 times the spectrum NTIA says it and the FCC will identify. Industry reporting on the instant

²⁵ *Id.* ¶ 44 (“The Commission will encourage, if necessary, cross-industry information sharing and collaboration. While fundamental radio physics is common across many radio services, Commission guidance may be needed to align cross-industry engineering analyses where terminology, methods, metrics and norms may be different, and conflicts of interest may inhibit information sharing. Where necessary, confidential data may be shared with the Commission under protective order, which can protect the confidentiality of stakeholder proprietary information while allowing data analysis results to be disclosed at granular categorical levels of transmitter output and receiver input power levels.”). TechFreedom has some reservations about the potential misuse of protective orders by industry players as a way of curtailing robust public participation in spectrum allocation proceedings by making pertinent information unavailable to all but “insiders” willing to sign on to highly proscriptive protective orders.

²⁶ Request for Comment, *supra* note 3, at 16245.

²⁷ *Id.* (“A spectrum pipeline is essential to continue our nation’s economic growth, to improve our global competitiveness, and to support critical federal services and missions. For purposes of the Strategy, we define “spectrum pipeline” to mean a process for identifying spectrum bands, regardless of allocation (i.e., both federal and non-federal) that should be studied for repurposing (i.e., allowing new or additional uses) to meet future requirements for non-federal and federal use alike.”).

²⁸ The AM band occupies the spectrum between 540-1700 kHz (or 1.2 MHz total). The FM band occupies 88.0-108 MHz (or 20 MHz total). The VHF television band occupies between 30-299 MHz (or 169 MHz total). The UHF television band occupies between 380-512 MHz (or 132 MHz total). These mainstays of the broadcast industry combined occupy only 322 megahertz of spectrum.

RFC assume that the 1,500 megahertz will be mid-band spectrum²⁹ (generally defined as spectrum between 1 GHz (1,000 MHz) and 6 GHz (6,000 MHz)) desperately needed for 5G wireless communications.³⁰ The RSC, however, mentions “mid-band” only once,³¹ and not within the context of the 1,500 megahertz that it will “study.” It is critical that NTIA clarify at least the portion of the electromagnetic spectrum it intends to study in hopes of freeing up more spectrum for commercial use. Without that, incumbent government users can argue that the spectrum to be studied should come only from the very top of the usable spectrum, spectrum that engineers are just beginning to learn how to utilize and may not be suitable for current applications in the commercial sector.³² Rather, the 1,500 megahertz should come from a mix including low, mid, and high-band spectrum, where possible.³³ Limiting the study to high band spectrum with limited propagation characteristics will not satisfy NTIA’s desire to identify spectrum capable of “promot[ing] next-generation products and services in historically underserved or disconnected communities such as rural areas and Tribal lands.”³⁴

²⁹ See *5G spectrum bands explained: low, mid and high band*, NOKIA (last visited Apr. 9, 2023), <https://www.nokia.com/thought-leadership/articles/spectrum-bands-5g-world/>.

³⁰ See, e.g., Chris Pearson, *Is There Enough Mid-Band Spectrum?*, 5G AMERICAS (Mar. 2023), <https://www.5gamericas.org/is-there-enough-mid-band-spectrum/> (“the Biden Administration and National Telecommunications and Information Administration (NTIA) are attempting to find ways to release 1,500 MHz of spectrum for study in additional use cases.”); *US looks to free up additional spectrum and introduces regulation for satellite-to-mobile services*, GSMA FUTURE NETWORKS (Mar. 27, 2023), <https://www.gsma.com/futurenetworks/latest-news/us-looks-to-free-up-additional-spectrum-and-introduces-regulation-for-satellite-to-mobile-services/> (“Spectrum availability is key to unlocking a nation’s digital growth – by 2030, 2 GHz of mid-band spectrum and 5 GHz of high-band spectrum will be needed per country, according to the GSMA.”).

³¹ Request for Comment, *supra* note 3, at 16246 (“What incentives or policies may encourage or facilitate the pursuit of more robust federal and non-federal spectrum sharing arrangements, including in mid-band and other high priority/demand spectrum?”).

³² See Spectrum Horizons, First Report and Order, 34 FCC Rcd 1605 (2019), <https://www.fcc.gov/document/fcc-opens-spectrum-horizons-new-services-technologies-0>. (“Innovators continue to push technological boundaries in wireless communications. Frequency bands once thought of as unusable are now well within the range of modern communications systems. With this First Report and Order, we take steps to provide new opportunities for innovators and experimenters to push those boundaries even further, and to develop new equipment and applications for spectrum between 95 GHz and 3 THz. These frequencies—long considered to lie at the outermost horizons of usable radio spectrum—are becoming increasingly well-suited for the development and deployment of new active communications services and applications.”).

³³ Request for Comment, *supra* note 3, at 16245 (“We seek input on what requirements such a pipeline needs to address, and which spectrum bands may be best suited for particular purposes.”).

³⁴ *Id.* at 16246.

IV. Government Users Must Not Be Allowed to Rely on Commercial Users Alone to Pay for Upgrading or Replacing Outdated Legacy Systems

The RFC asks whether the NTIA should study ways to incentivize federal users to either vacate or share spectrum:

What incentives or policies may encourage or facilitate the pursuit of more robust federal and non-federal spectrum sharing arrangements, including in mid-band and other high priority/demand spectrum? For example, does the current process for reimbursement of relocation or sharing costs adequately incentivize the study or analysis of spectrum frequencies for potential repurposing?³⁵

TechFreedom supports a system where *some* of the revenues from future auctions can be used to assist federal users in vacating spectrum, or otherwise upgrading their systems to allow more frequency sharing by making them more interference tolerant. We are greatly concerned, however, that such a system could spur federal users to look to the private sector to pay for their future communications needs rather than seek Congressional funding for upgrades as part of the overall federal appropriations process.³⁶

One alternative to having the commercial sector pay to upgrade federal systems would be for federal users themselves to be charged for their spectrum use, and those fees put into a fund to assist government users in acquiring more spectrally efficient systems. Former FCC Commissioner Michael O’Rielly suggested this in 2015,³⁷ based on a 2012 GAO Report. That report clearly outlined the misalignment between the government and commercial markets for spectrum:

Some spectrum users may lack incentive to share spectrum or otherwise use it efficiently, and federal agencies and private users currently cannot easily identify spectrum available for sharing. Typically, paying the market price for a good or service helps to inform users of the value of the good and provides an incentive for efficient use. Federal agencies, however, pay only a small fee to the NTIA for spectrum assignments and therefore have little incentive to share spectrum. Federal agencies also face concerns that sharing could risk the

³⁵ *Id.*

³⁶ See Monica Allevan, *C-Band Upgrades May Cost Airline Industry \$637M: IATA*, FIERCE WIRELESS (Feb. 10, 2023 5:12 PM), <https://www.fiercewireless.com/5g/altimeter-upgrades-may-cost-airline-industry-637m-iata> (“Last month, the FAA estimated the total price tag to modify radio altimeters was just \$26 million, but the International Air Transport Association (IATA) said it’s more likely to cost \$637.6 million.”).

³⁷ See O’Rielly, *supra* note 4.

success of security or safety missions, or could be costly in terms of upgrades to more spectrally efficient equipment.³⁸

One approach suggested in that study was to charge spectrum fees to government users:

Several advisory groups and industry experts, including those we interviewed, have recommended that fees be assessed based on spectrum usage. As previously mentioned, with the exception of fees for frequency assignments, federal users incur no costs for using spectrum and have few requirements for efficient use. As a result, federal users may have little incentive to share spectrum assigned to them with nonfederal users or identify opportunities to use it more efficiently— except to the extent that sharing or more efficient use helps them achieve their mission requirements.³⁹

Unfortunately, as the conclusion of that report noted, “designing a fee system is fraught with numerous obstacles and challenges, such as how such fees should be incorporated into agency budgets and the appropriations process in order to create the right incentives.”⁴⁰ NTIA has also studied the possible use of spectrum use fees by government users, first in 1991,⁴¹ and then again during the second Bush Administration.⁴²

TechFreedom submits that the combination of government spectrum fees, in conjunction with relocation reimbursement out of commercial spectrum auctions, could provide the right mix of “carrot” and “stick” to incentivize federal users to upgrade their systems and thus free up additional spectrum. As stated above, if federal users know that they can look to commercial users to pay for their upgrades, they will simply sit back and wait until market forces align to make their spectrum valuable enough for commercial users to pay for it. In that scenario, there is zero incentive for them to do anything to upgrade their systems; they will simply wait for the market to come to them. If, however, federal users were required to pay a fee on an annual basis for the spectrum they use, they would be more willing to accelerate that process. Moreover, if the federal spectrum fees paid across all agencies were pooled and awarded only to federal users who are willing to vacate or share spectrum in

³⁸ U.S. GOV'T ACCOUNTABILITY OFF., GAO-13-7, at 1 SPECTRUM MANAGEMENT: INCENTIVES, OPPORTUNITIES, AND TESTING NEED TO ENHANCE SPECTRUM SHARING (2012).

³⁹ *Id.* at 17.

⁴⁰ *Id.* at 28.

⁴¹ See NAT'L TELECOMM. INFO. ADMIN., U.S. SPECTRUM MANAGEMENT POLICY: AGENDA FOR THE FUTURE (1991), <https://ntia.gov/report/1998/us-spectrum-management-policy-agenda-future>.

⁴² See CARLOS M. GUTIERREZ, U.S. DEP'T OF COMMERCE, PLAN TO IDENTIFY AND IMPLEMENT INCENTIVES THAT PROMOTE MORE EFFICIENT AND EFFECTIVE USE OF SPECTRUM (Nov. 19, 2008), https://www.ntia.doc.gov/legacy/osmhome/reports/Incentives_Plan.pdf.

exchange for receiving that funding, then the market case would close that much faster. This is an approach worthy of study by NTIA.

CONCLUSION

The RSC asks critical questions related to spectrum management and NTIA's role in developing a National Spectrum Strategy. If America is to maintain its leadership in communications technology, NTIA and the FCC must come together to design a long-range strategy that benefits both government users and consumers. Given the lack of "greenfield" spectrum, future spectrum management must focus on making all systems, both commercial and governmental, as efficient as possible to encourage the best use of spectrum across all users. No one should get a pass in this debate, and NTIA must come to grips with highly inefficient legacy systems in the government that must be upgraded to make more spectrum available to the commercial sector, which is willing to pay for it.

Respectfully submitted,

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