DEPARTMENT OF COMMERCE

National Telecommunications and Information Administration

[Docket Number: 230308-0068]

Development of a National Spectrum Strategy

AGENCY: National Telecommunications and Information Administration, U.S. Department of

Commerce.

ACTION: Request for Comments

SUMMARY: The National Telecommunications and Information Administration (NTIA), U.S.

Department of Commerce, seeks public comment on the development and implementation of a

National Spectrum Strategy for the United States. Through this Request for Comments, NTIA

seeks broad input from interested stakeholders, including private industry (specifically including

developers and end-users of spectrum-based technologies and services, and contractors for

federal missions), academia, civil society, the public sector, and others on three proposed pillars

of the National Spectrum Strategy set forth below.

DATES: Parties should file their comments no later than [30 DAYS AFTER THE DATE OF

PUBLICATION IN THE *FEDERAL REGISTER*].

ADDRESSES: All electronic comments on this action, identified by *Regulations.gov* docket

number NTIA-2023-0003, may be submitted through the Federal e-Rulemaking Portal at

https://www.regulations.gov. The docket established for this proceeding can be found at

www.Regulations.gov, NTIA-2023-0003. Click the "Comment Now!" icon, complete the

required fields, and enter or attach your comments.

Responders should include a page number on each page of their submissions. Please do not include in your comments information of a confidential nature, such as sensitive personal information. All comments received are part of the public record and generally will be posted to Regulations.gov and the NTIA website without change. All personally identifiable information (e.g., name, address) voluntarily submitted by the commenter may be publicly accessible. For more detailed directions regarding the content of comment submissions, please see the "Request for Comments" section below.

Those encountering any difficulties with the prescribed formatting and uploading directions should notify Mr. Alden at the contact information listed below at least ten (10) business days before the filing deadline.

NTIA welcomes views on the NSS pillars as detailed in this notice, and these views may be reflected, at the agency's discretion, in the ensuing development of the NSS and implementation plan.

These public comments are being gathered in conjunction with a series of public listening sessions, which will be held concurrently with the comment period of this RFC. Schedules and instructions for attending and speaking at the public listening sessions will be available on NTIA's website at https://www.ntia.gov.

FOR FURTHER INFORMATION CONTACT: Please direct questions regarding this Notice to John Alden, Telecommunications Specialist, Office of Spectrum Management, NTIA, at (202) 482-8046 or spectrum-strategy-comments@ntia.gov. Please direct media inquiries to NTIA's Office of Public Affairs, at (202) 482-7002 or press@ntia.gov.

SUPPLEMENTARY INFORMATION: NTIA serves as the President's principal advisor on telecommunications policies and manages the use of the radio-frequency spectrum by federal agencies. See 47 U.S.C. 902(b)(2). NTIA is seeking public input on the scope and content of a National Spectrum Strategy. These inputs will allow NTIA and other federal agencies to benefit from expertise and viewpoints outside the federal government. These views will be considered and may be reflected in the development of a National Spectrum Strategy document and ensuing implementation plan, which are needed to accelerate U.S. leadership in wireless communications and other spectrum-based technologies and to unlock innovations that benefit the American people.

Background

America is increasingly dependent on secure and reliable access to radio frequency spectrum. 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. 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.

Spectrum access, however, must be managed responsibly and efficiently. NTIA jointly manages the nation's spectrum resources with the Federal Communications Commission. NTIA is requesting comments from interested parties to help inform the development of a national spectrum strategy, which is needed for the U.S. to plan effectively for its current and future spectrum needs. As part of this effort, and to support the need for greater spectrum access,

NTIA—in collaboration with the Federal Communications Commission and in coordination with its other federal partners—endeavors 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. The Department of Commerce is committed to developing a national spectrum strategy based upon collaboration with both federal and non-federal stakeholders, including Tribes, and on data-driven decision-making, to fully address the needs of spectrum reliant services and missions, including but not limited to:

- Fixed and mobile wireless broadband services;

- Next-generation satellite communications and other space-based systems;

- Advanced transportation technologies;

- Industrial and commercial applications, (*i.e.*, manufacturing, agriculture, and utilities);

- Wireless medical devices and telemedicine;

- Internet of things (IoT) and smart cities;

- National defense and homeland security;

- Safeguarding the national airspace and ports;

- Securing the Nation's critical infrastructure;

- Earth and space exploration and research; and

- Climate monitoring and forecasting, and other scientific endeavors.

Request for Comments

The National Telecommunications and Information Administration (NTIA) seeks broad input from interested stakeholders, including private industry (specifically including wireless broadband internet service providers, original equipment manufacturers and network vendors,

developers and end-users of spectrum-based technologies and services, and contractors for federal missions), academia, civil society, the public sector, and others on three proposed pillars of the National Spectrum Strategy. NTIA will also confer with federal agencies with an interest in spectrum access.

Please provide any data you have available and are able to make public to support comments in response to the questions below.

Pillar #1 – A Spectrum Pipeline to Ensure U.S. Leadership in Spectrum-Based Technologies

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. We seek input on what requirements such a pipeline needs to address, and which spectrum bands may be best suited for particular purposes.

1. What are projected future spectrum requirements of the services or missions of concern to you in the short (less than 3 years), medium (3-6 years) and long (7-10 years) term? What are the spectrum requirements for next-generation networks and emerging technologies and standards under development (*e.g.*, 5G Advanced, 6G, Wi-Fi 8)? Are there additional or different requirements you can identify as needed to support future government capabilities? What are the use cases and anticipated high-level technical specifications (*e.g.,* power, target data rates) that drive these requirements? How much, if at all, should our strategy by informed by work being performed within recognized standards-setting bodies (*e.g.*, 3GPP, IEEE), international agencies (*e.g.*, ITU), and non-

U.S. regulators or policymakers (*e.g.*, the European Union)? What relationship (if any) should our strategy have to the work of these entities? Are there spectrum bands supporting legacy technology (*e.g.*, 3G, GSM, CDMA, etc.) that can be repurposed to support newer technologies for federal or non-federal use?

2. Describe why the amount of spectrum now available will be insufficient to deliver current or future services or capabilities of concern to stakeholders. We are particularly interested in any information on the utilization of existing spectrum resources (including in historically underserved or disconnected communities such as rural areas and Tribal lands) or technical specifications for minimum bandwidths for future services or capabilities.   As discussed in greater detail in Pillar #3, are there options available for increasing spectrum access in addition to or instead of repurposing spectrum (i.e., improving the technological capabilities of deployed systems, increasing or improving infrastructure build outs)?

3. What spectrum bands should be studied for potential repurposing for the services or missions of interest or concern to you over the short, medium, and long term? Why should opening or expanding access to those bands be a national priority. For each band identified, what are some anticipated concerns? Are there spectrum access models (*e.g.*, low-power unlicensed, dynamic sharing) that would either expedite the timeline or streamline the process for repurposing the band?

4. What factors should be considered in identifying spectrum for the pipeline? Should the Strategy promote diverse spectrum access opportunities including widespread, intensive, and low-cost access to spectrum-based services for consumers? Should the Strategy

promote next-generation products and services in historically underserved or
disconnected communities such as rural areas and Tribal lands? Should the Strategy
prioritize for repurposing spectrum bands that are internationally harmonized and that can
lead to economies of scale in network equipment and devices? How should the Strategy
balance these goals with factors such as potential transition costs for a given band or the
availability of alternative spectrum resources for incumbent users? How should the
Strategy balance these goals against critical government missions? How should the
Strategy assess efficient spectrum use and the potential for sharing? What is an ideal
timeline framework suitable for identifying and repurposing spectrum in order to be
responsive to rapid changes in technology, from introduction of a pipeline to actual
deployment of systems?

5. Spectrum access underpins cutting-edge technology that serves important national
purposes and government missions. Are there changes the government should make to
its current spectrum management processes to better promote important national goals in
the short, medium, and long term without jeopardizing current government missions?

6. For purposes of the Strategy, we propose to define "spectrum sharing" as optimized
utilization of a band of spectrum by two or more users that includes shared use in
frequency, time, and/or location domains, which can be static or dynamic. 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. Is this how spectrum sharing would be defined? If not, please provide a

definition or principles that define spectrum sharing. What technologies, innovations or processes are currently available to facilitate spectrum sharing as it should be defined? What additional research and development may be required to advance potential new spectrum sharing models or regimes, who should conduct such research and development, and how should it be funded?

7. What are the use cases, benefits, and hinderances of each of the following spectrum access approaches: exclusive-use licensing; predefined sharing (static or predefined sharing of locations, frequency, time); and dynamic sharing (real-time or near real-time access, often with secondary use rights)? Are these approaches mutually exclusive (*i.e.*, under what circumstances could a non-federal, exclusive-use licensee in a band share with government users, from a non-federal user point of view)? Have previous efforts to facilitate sharing, whether statically or dynamically, proven successful in promoting more intensive spectrum use while protecting incumbents? Please provide ideas or techniques for how to identify the potential for and protect against interference that incumbents in adjacent bands may experience when repurposing spectrum.

8. 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? Are there market-based, system-performance based or other approaches that would make it easier for federal agencies to share or make spectrum available while maintaining federal missions? At the same time, what mechanisms should be considered to meet some of the current and future federal mission

requirements by enabling new spectrum access opportunities in non-federal bands, including on an "as needed" or opportunistic basis?

9. How do allocations and varying spectrum access and governance models in the U.S. compare with actions in other nations, especially those vying to lead in terrestrial and space-based communications and technologies? How should the U.S. think about international harmonization and allocation disparities in developing the National Spectrum Strategy?

Pillar #2 –Long-Term Spectrum Planning

The key to addressing spectrum needs across sectors is a long-term planning process in which affected stakeholders work together openly and transparently in an ongoing manner. This is how evolving user requirements can be vetted and allocations can be regularly assessed to optimize uses of spectrum to ensure its greatest benefits to the American people. Under the Spectrum Coordination Initiative, NTIA and the FCC are collaborating to develop and implement a long-term strategic spectrum planning process.[1] This process, once adopted, would provide a plan for future spectrum access and compatibility across uses based on projected future national spectrum requirements. We seek input on what a long-term planning process should entail, with whom and at what cadence should NTIA coordinate as part of such process, and how best to execute it.

1. Who are the groups or categories of affected stakeholders with interests in the development of the National Spectrum Strategy and participating in a long-term spectrum-planning process? How do we best ensure that all stakeholders can participate

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[1] *See* News Release, National Telecommunications and Information Administration, FCC, NTIA Establish Spectrum Coordination Initiative (Feb. 15, 2022).

in a long-term spectrum planning process in order to facilitate transparency to the greatest extent possible, ensure efficient and effective use of the nation's spectrum resources?

2. What type of timeline would be defined as a "long-term" process? What are key factors to consider and what are the key inputs to a long-term planning process? What data are required for planning purposes? Do we need data on spectrum utilization by incumbent users, including adjacent band users, and, if so, how should we collect such data and what metrics should we use in assessing utilization? Do we need information from standards-setting bodies and, if so, what information would be helpful and how should we obtain such information? What is the appropriate time horizon for long-term spectrum planning and how often should we revisit or reassess our prior findings and determinations? How do we balance periodic review and reassessment of our spectrum priorities with providing regulatory certainty to protect investment-backed expectations of existing spectrum users? How can federal and non-federal stakeholders best work together?

3. How can federal and non-federal stakeholders best engage in productive and ongoing dialogue regarding spectrum allocation and authorization, repurposing, sharing, and coordination? Learning from prior experiences, what can be done to improve federal/non-federal spectrum coordination, compatibility, and interference protection assessments to avoid unnecessary delays resulting from non-consensus?

4. What technical and policy-focused activities can the U.S. Government implement that will foster trust among spectrum stakeholders and help drive consensus among all parties regarding spectrum allocation decisions?

5. Are additional spectrum-focused engagements beyond those already established today (e.g., FCC's Technical Advisory Committee (TAC),[2] NTIA's Commerce Spectrum Management Advisory Committee (CSMAC),[3] and NTIA's annual Spectrum Policy Symposium) needed to improve trust, transparency, and communication among the federal government, industry, and other stakeholders (including Tribal Nations) and why? What would be the scope of such engagements, how would they be structured, and why would establishing new engagements be preferable to expanding the use of existing models? If existing models are sufficient, how (if needed) should FCC and NTIA maximize their usefulness or leverage their contributions to enhance and improve coordination?

6. In considering spectrum authorization broadly (i.e., to include both licensed and unlicensed models as well as federal frequency assignments), what approaches (e.g., rationalization of spectrum bands or so-called "neighborhoods") may optimize the effectiveness of U.S. spectrum allocations? Are there any specific spectrum bands or ranges to be looked at that have high potential for expanding and optimizing access? Which, if any, of these spectrum bands or ranges should be prioritized for study and potential repurposing? Conversely, are there any bands or ranges that would not be appropriate for access expansion? What, if any, metrics are ideal for measuring the intensity of spectrum utilization by incumbents in candidate bands?

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[2] *See* FCC | Technological Advisory Council (TAC), https://www.fcc.gov/general/technological-advisory-council (last visited Mar. 4, 2023).
[3] *See* NTIA | Commerce Spectrum Management Advisory Committee (CSMAC), https://www.ntia.gov/category/csmac (last visited Mar. 4, 2023).

7. What is needed to develop, strengthen, and diversify the spectrum workforce to ensure an enduring, capable and inclusive workforce to carry out the long-term plans (including specifically in rural and Tribal communities)?

Pillar #3 – Unprecedented Spectrum Access and Management through Technology Development

A key strategy to ensure sufficient access to spectrum for our nation is to embrace innovation and pursue technologies that expand the overall capacity or usability of the radiofrequency spectrum. Our nation has always been at the forefront of technological advancements across multiple industries and fields, so it should be no different with spectrum-based technologies. We seek input on what categories of new or emerging technologies could best help to ensure the U.S. continues to innovate and maintain its global leadership in spectrum-based services.

1. What innovations and next-generation capabilities for spectrum management models (including both licensed and unlicensed) are being explored today and are expected in the future to expand and improve spectrum access (and what are the anticipated timelines for delivery)?

2. What policies should the National Spectrum Strategy identify to enable development of new and innovative uses of spectrum?

3. What role, if any, should the government play in promoting research into, investment in, and development of technological advancements in spectrum management, spectrum-dependent technologies, and infrastructure? What role, if any, should the government play in participating in standards development, supporting the use of network architectures, and promoting tools such as artificial intelligence and machine learning

for spectrum coordination or interference protections? What technologies are available to ensure appropriate interference protection for incumbents in adjacent bands? What spectrum management capabilities/tools would enable advanced modeling and more robust and quicker implementation of spectrum sharing that satisfies the needs of non-federal interests while maintaining the spectrum access necessary to satisfy current and future mission requirements and operations of federal entities? How can data-collection capabilities or other resources, such as testbeds, be leveraged (including those on Tribal lands and with Tribal governments)?

4. NTIA is pursuing a time-based spectrum sharing solution called the incumbent informing capability (IIC) to support spectrum sharing between federal and non-federal users.[4] 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? What are the costs and complexities associated with automating information on spectrum use?

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[4] MICHAEL DIFRANCISCO ET AL., INCUMBENT INFORMING CAPABILITY (IIC) FOR TIME-BASED SPECTRUM SHARING (2021), https://www.ntia.gov/sites/default/files/publications/iic_for_time-based_spectrum_sharing_0.pdf (last visited Mar. 4, 2023).

5. What other technologies and methodologies are currently being, or should be, researched and pursued that innovate in real-time dynamic spectrum sharing, particularly technologies that may not rely on databases?

Implementation Plan

NTIA also seeks comment on the development of an implementation plan for the National Spectrum Strategy, which NTIA plans to release subsequent to publication of the National Spectrum Strategy. Considering all the foregoing, what specific steps should be included in the Implementation Plan that could be taken in the next 12-24 months to ensure the successful execution of the National Spectrum Strategy? Which of the spectrum bands or ranges should be prioritized for in-depth study, for example, and under what timetable should we work toward to repurpose any identified bands? The Implementation Plan will outline specific objectives and the tasks needed to achieve them.

Dated: _____.

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Stephanie Weiner

Acting Chief Counsel, National Telecommunications and Information Administration.