Before the
NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION
Washington, DC 20230

In the Matter of Development of a National Spectrum Strategy	Docket No. NTIA-2023-003

COMMENTS OF CISCO SYSTEMS, INC.

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I. INTRODUCTION

Cisco Systems, Inc. ("Cisco") thanks the National Telecommunications and Information Administration ("NTIA") for initiating this important proceeding to ensure that the U.S. can meet the growing demand for wireless connectivity. Cisco is a global provider of IP-based networking equipment, solutions, and services based in San Jose, California. As a Fortune 100 company with annual revenues of more than $51 billion, our customer base spans enterprise customers of all sizes and types, governments, and service providers. In the wireless sector, Cisco is a market leader in Wi-Fi and Private 5G solutions, and our service provider engineering teams build core 5G networking and transport solutions used by mobile network operators around the world.

Because spectrum is vital to all our customers, Cisco has a broad perspective on spectrum policy. While we defer to other commenters on the specific additional bands that might be highest priority for NTIA to open up to non-federal uses, we agree with NTIA that a strategy that provides a wide-ranging portfolio of spectrum resources to a diverse set of actors is the best way to maintain U.S. technological leadership. NTIA's inquiry into how to update U.S. wireless policy is particularly timely, because technological and regulatory change has rendered earlier

conceptions of "available" spectrum no longer accurate. To account for a changed wireless landscape and meet America's spectrum needs, the National Spectrum Strategy should reflect two fundamental principles.

First, spectrum policy must evolve from a model that makes isolated determinations regarding specific bands into a long-term approach that embraces coexistence across bands, technologies, and stakeholders. Technologies such as Wi-Fi, commercial 5G networks, satellite, Private 5G—and even Unmanned Aircraft Systems ("UAS") and High-altitude Platform Stations ("HAPS")—are converging in various ways to provide ubiquitous connectivity, and each contributes to U.S. economic and societal success. Accordingly, spectrum policy must fundamentally be a collaborative process among all stakeholders.

Second, spectrum policy must recognize that both incumbents and new entrants bear responsibility for coexistence. Spectrum utilization must play a larger part in spectrum policy, which can no longer afford the luxury of an "assign it and forget it" approach. In addition, as the Federal Communications Commission ("FCC" or the "Commission") recognizes in its draft *Principles for Promoting Efficient Use of Spectrum and Opportunities for New Services*,[1] policymaking must consider not only transmitters but also receivers. This means that policymakers must use new tools to better assess the likelihood of harmful interference, must establish new expectations for incumbents, and must support industry-led collaboration and standards efforts.

[1] *See generally Principles for Promoting Efficient Use of Spectrum and Opportunities for New Services et al.*, Public Draft, Policy Statement, FCC-CIRC2304-01, ET Docket Nos. 23-122, 22-137 (rel. Mar. 30, 2023).

II. THE NATIONAL SPECTRUM STRATEGY MUST TAKE AN HOLISTIC VIEW OF SPECTRUM POLICY

A. Spectrum Policy Must Evolve to Reflect Market Changes and Growing Spectrum Demands

NTIA seeks comment on which spectrum access models the National Spectrum Strategy should consider, including exclusive-use licensing and various sharing approaches.[2] NTIA's assessment should begin by acknowledging the reality that most consumers and business do not know or particularly care about the underlying frequencies their services utilize—or even what technologies that they are using. Rather, they want wireless connectivity that enables them to accomplish their goals as quickly, efficiently, and cost effectively as possible.

To account for this fact and focus on functionality, policymakers should not make each spectrum band allocation decision in isolation and should not place too much emphasis on any one technology or assignment mechanism. Rather, they should consider the full span of available frequencies by taking an "all of the above" approach that considers low, medium, and high spectrum bands and exclusive-licensed, shared-licensed, locally licensed, and unlicensed governance models. And policymakers should do this with the Nation's long-term goals in mind.

Spectrum policy decisions should also focus on improving flexibility so wireless networks can continuously evolve over time. Technological advancements and innovation are creating new access capabilities to solve connectivity needs at an increasingly fast pace. Twenty years ago, a HAPS architecture for broadband would have seemed like science fiction, but it is becoming a reality today. Service providers, enterprises, and consumers are increasingly deploying several different technologies to meet their wireless needs. For example, enterprises rely on 5G networks for large coverage areas (which are often outdoors) where high-speed

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[2] *Development of a National Spectrum Strategy*, Request for Comment, NTIA Docket No. 230308-0068, 88 Fed. Reg. 16244, 16246 (rel. Mar. 16, 2023) ("*RFC*").

mobile handoffs must take place without any latency impacts, and for applications and data requiring highly secure connections. 5G is also having some success delivering fixed broadband services.

Importantly, however, even in 5G environments, these same enterprises often rely on Wi-Fi once data enters a building. Wi-Fi is the technology of choice for most local area, low-power broadband networks. It is relied on nearly everywhere—from homes and offices, to universities, hospitals, and sports and entertainment venues, to factories and other industrial settings—for high-speed, inexpensive indoor and outdoor wireless connectivity. And the use of Wi-Fi to offload 5G traffic illustrates how different technologies, spectrum bands, and access models work in parallel to maximize connectivity. Greater coordination and collaboration between Wi-Fi and 5G are supported by standards and industry consortia supporting both technologies.

Even within the 5G ecosystem, there is increasing diversity. For example, 5G technology deployments for private networks are accelerating as enterprises have begun working with existing operators—and often operating their own networks—using the 3.5 GHz Citizens Broadband Radio Service ("CBRS") band and the related Spectrum Access System ("SAS") framework. And the boundaries between previously separate technology families are falling away as Cisco and other industry vendors are announcing products that integrate 5G and Wi-Fi for enterprises using Private 5G.[3] In addition, Private 5G is gaining strong support for industrial

[3] *See* James Blackman, *Just-In-Time Cisco Warns Against Private 5G Silos*, RCR Wireless News (Mar. 23, 2023), https://www.rcrwireless.com/20230323/private-networks/just-in-time-cisco-talks-wi-fi-style-5g-and-danger-of-another-network-silo; James Blackman, *HPE Takes a Seat in the Private 5G Dining Car – And Sees No Telcos Aboard*, RCR Wireless News (Mar. 14, 2023), https://www.rcrwireless.com/20230314/private-networks/hpe-takes-a-seat-in-the-private-5g-dining-car-and-finds-no-telcos-aboard.

uses, including consortia such as the 5G Alliance for Connected Industries and Automation, which is specifically focused on Industry 4.0 related applications.[4] Significantly, it has been Cisco's experience that "[e]very opportunity, and every problem we've solved [using Private 5G], has required Wi-Fi and 5G to work hand-in-hand."[5]

This trend is expanding beyond traditional terrestrial network operations, as regulators are beginning to integrate satellite into terrestrial wireless policymaking, as evidenced by the FCC's recent "Single Network Future" proposal. This proposal would augment terrestrial network service with supplemental coverage provided by satellite constellations.[6] Non-terrestrial networking ("NTN") is now also part of 3GPP standards setting, reflecting the role that satellites can play in enhancing terrestrial connectivity.[7] Finally, policymaking related to Unmanned Aircraft Systems ("UAS") is also showing progress, with the Commission recently issuing a Notice of Proposed Rulemaking seeking comment on the potential for existing terrestrial network use as a platform for UAS.[8]

Spectrum policy should reflect the widening diversity of wireless technologies, the emergence of assignment mechanisms that produce better sharing, and the increasing integration

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4 *See* 5G Alliance for Connected Industries and Automation, https://5g-acia.org (last visited Apr. 4, 2023).

5 James Blackman, *Just-In-Time Cisco Warns Against Private 5G Silos*, RCR Wireless News (Mar. 23, 2023), https://www.rcrwireless.com/20230323/private-networks/just-in-time-cisco-talks-wi-fi-style-5g-and-danger-of-another-network-silo.

6 *See generally Single Network Future: Supplement Coverage from Space*; *Space Innovation*, Notice of Proposed Rulemaking, FCC No. 23-22, GN Docket No. 23-65, IB Docket No. 22-271 (rel. Mar. 17, 2023).

7 *Id*. ¶ 5.

8 *Spectrum Rules and Policies for the Operation of Unmanned Aircraft Systems*, Notice of Proposed Rulemaking, FCC No. 22-101, WT Docket No. 22-232, ¶ 111–13 (rel. Jan. 4, 2023).

of these technologies and mechanisms into more powerful networks. It should do so by considering not only how each policy decision addresses a particular network need, but also how it fits into the Nation's larger need for an overall spectrum plan that support stronger, more heterogeneous, and interlinked wireless networks.

B. Spectrum Policy Must Be a Collaborative Process Among All Stakeholders

The NTIA Request for Comment observes that "[t]he 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."[9] Cisco agrees. Fostering a climate of trust and improving knowledge of other technologies and needs will be a critical component of the Nation's spectrum strategy. The country must increasingly rely on spectrum-sharing technologies to satisfy growing spectrum demand and must continue to pack adjacent systems more tightly together. More trust and better knowledge will improve outcomes. With continuing increases in demand, guard bands are becoming a thing of the past.

Without better collaboration amongst spectrum stakeholders, we may continue to see arguments by new entrants that some incumbents' national security or public safety concerns are unsubstantiated or overstated. And, in response, we may continue to see back-channel or belated attempts to undermine expert agency decisions. This contentious process has significant negative consequences: it degrades public confidence in spectrum policymaking, reduces incentives for investment and innovation, delays important policy decisions and deployments, and threatens U.S. technological leadership and economic growth.[10]

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[9] *RFC* at 16246.

[10] *See, e.g.,* Ling Zhu, *National Spectrum Policy: Interference Issues in the 5G Context*, Congressional Research Service (Feb. 14, 2022), https://crsreports.congress.gov/product/pdf/IF/IF12046 (describing opposition to new FCC

It is tempting simply to blame recalcitrant agencies and other incumbent interests for their apparent refusal to accept adverse spectrum policy decisions, and for waiting until the last minute to meaningfully engage in policy debates. But the reality is that these outcomes reflect a dissatisfaction in the spectrum policymaking process itself. Therefore, to try to break this cycle, NTIA appropriately asks how government can "foster trust among spectrum stakeholders and help drive consensus among all parties regarding spectrum allocation decisions[.]"[11] Fundamentally, to have collaboration rather than contention, the National Spectrum Strategy must promote engagement—early and often—with all relevant stakeholders.

First, Congress and the White House must make clear to NTIA and Executive Branch agencies that NTIA is the lead agency on federal spectrum decisions. This means that agencies must allow NTIA to advance their concerns early in spectrum policy decision-making processes and must accept NTIA's judgment when it presents the federal government's position. Importantly, however, this also means that NTIA must have the resources and the processes to be more responsive both to federal agencies and commercial spectrum users. It also must reliably engage with federal agencies and the private sector through a transparent and time-limited decision-making process.

Second, the National Spectrum Strategy should recognize that both federal agencies and commercial spectrum users must have trust in and knowledge of NTIA's processes to produce better outcomes. Improving collaboration does not exclusively relate to NTIA/agency interactions and should extend to efforts by NTIA and the FCC to reach out to and work with an expanding group of entities with an interest in spectrum policy. Finding spectrum to address

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spectrum authorizations, including the in the C-band (radar altimeters); L-band (GPS), and 24 GHz band (weather satellites)).

[11] *RFC* at 16247.

expanding demand for commercial 5G networks, Private 5G, and Wi-Fi, and other wireless systems will increasingly impact existing users beyond those who are familiar with wireless spectrum policymaking, and these parties may not have experience with NTIA or FCC processes. Therefore, the National Spectrum Plan should consider increasing non-traditional methods of engagement by NTIA and the FCC early in the decision-making process. These could include, for example, greater use of town halls and listening sessions, appearances at industry events, and targeted outreach to potential stakeholders at the Notice of Inquiry stage.

Finally, the National Spectrum Strategy should account for ways in which neutral and authoritative voices can promote collaboration. Incorporating these voices in policymaking can help instill confidence among stakeholders that their concerns will be heard and assessed. There are already organizations and resources that could help fill this role.

For example, SpectrumX is an organization consisting of a "diverse and interdisciplinary group of scientists, engineers, and educators" that conducts research on a wide array of issues relevant to spectrum management.[12] As evidenced by its participation in NTIA's "listening sessions" for this proceeding, SpectrumX can provide a valuable convening and consultation function for spectrum policymaking through its research and industry members, which include many key former FCC and NTIA officials.

In addition, the U.S. National Science Foundation supports initiatives, including Platforms for Advanced Wireless Research ("PAWR"), to promote wireless network innovation.[13] PAWR is a public/private partnership that consists of four programs exploring topics focusing on 5G, millimeter-wave, UAS, and other technologies to promote rural and

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[12] SpectrumX, https://www.spectrumx.org (last visited Apr. 4, 2023).

[13] National Science Foundation, *Advanced Wireless Research at NSF*, https://www.nsf.gov/cise/advancedwireless/ (last updated Apr. 27, 2021).

agricultural uses.[14] NTIA could leverage PAWR efforts by, for example, having it operate as a test bed, or requesting research on technologies to promote future spectrum sharing. NTIA should also consider leveraging National Institutes of Standards and Technology ("NIST") resources in its Communications and Technology Laboratory, such as its Wireless Systems for Industrial Environments project.[15]

NTIA should also consider expanded use of its own Institute for Telecommunications Sciences ("ITS") lab in Boulder, CO.[16] ITS has served an important role as a builder of engineering consensus on behalf of the federal government. For example, the Boulder lab assessed the FCC's spectrum sharing approach for CBRS, providing the Department of Defense with an effective forum to raise and address potential interference concerns with the FCC and industry before CBRS launched. To be successful, however, the Boulder lab must have sufficient funding and a mandate to develop. Today, it is not able to operate quickly enough to play a central role in many spectrum policy matters. The extended period to evaluate sharing technology in CBRS likely contributed to delays in opening that band to commercial service. Additionally, some view ITS today more as a lab to support federal spectrum users, rather than as a neutral third party. To develop trust as a central resource for U.S. spectrum policy, ITS must have procedures and practices that are transparent and reliable not only for federal users but also for commercial users.

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[14] PAWR, https://advancedwireless.org (last visited Apr. 4, 2023).

[15] *See* NIST, *Wireless Systems for Industrial Environments*, https://www.nist.gov/programs-projects/wireless-systems-industrial-environments (last updated Dec. 17, 2021).

[16] *See* NTIA, *ITS: The Nation's Spectrum and Communications Lab*, https://its.ntia.gov (last visited Apr. 4, 2023).

Beyond leveraging existing resources, FCC and NTIA could also directly fund third-party research. Part of the National Spectrum Plan should be to empower NTIA with authority and resources to hire third-party technical expertise where needed.

C. Spectrum Policy Does Not Stop at the U.S. Border

As NTIA recognizes, it is vital that the U.S. maintain its global leadership in advanced wireless technologies.[17] Therefore, the Request for Comment appropriately asks how the U.S. should take harmonization into account when developing the National Spectrum Strategy.[18] International spectrum harmonization is a powerful economic tool that benefits U.S. companies and consumers, and a critical component of U.S. ability to maintain its leadership.[19]

Wi-Fi in the 6 GHz band is an example of where harmonization will support U.S. technology goals. Following U.S. leadership on this issue, dozens of countries have announced—and in many cases already implemented—rules for 6 GHz Wi-Fi operations.[20] Wi-Fi is a technology where the U.S. has a significant advantage over other countries—Wi-Fi was invented in the U.S., the top Wi-Fi companies are American, and Americans rely on Wi-Fi far more than citizens of many other countries. That reliance is likely to increase as fiber broadband infrastructure reaches many previously unconnected areas. Consequently, it is important for the

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17 *See RFC* at 16244.

18 *Id.* at 16246.

19 Relatedly, Cisco agrees with NTIA's suggestion that a national spectrum plan must consider how the U.S. compares to other international spectrum leaders. *See RFC* at 16246. We urge policymakers to make these comparisons based what is necessary to ensure U.S. leadership in key applications rather than simply assessing how much spectrum has been allocated for a given wireless technology. As observed above, to maintain such leadership, policymakers must assess and address spectrum needs to support existing technology deployments and plan for long-term advancements and next-generation wireless use cases.

20 *See* 6 GHz for Licence-Exempt Access, https://6ghz.info/ (last visited April 17, 2023) (map entitled "Global Progress Towards Licence-Exempt Access to the 6 GHz Band").

National Spectrum Strategy to include a commitment for the U.S. State Department, NTIA, and the FCC to work multilaterally at the International Telecommunication Union ("ITU") and bilaterally with individual countries to open the full 6 GHz band in as much of the world as possible.

However, the U.S. needs additional government support to maintain and build on its spectrum policy successes. The National Spectrum Strategy should include plans for greater assistance for U.S. private sector engagement in standards bodies, in international spectrum policymaking at the ITU, and in individual countries. In addition, the National Spectrum Strategy should expressly acknowledge that delays and uncertainty in spectrum policymaking threaten U.S. leadership. Opponents in international fora have pointed to internal U.S. spectrum disputes and delays to suggest that the international community should adopt spectrum access for bands other than those implemented the U.S. This undermines the development of ecosystems for spectrum bands under access models that U.S. policymakers have implemented.

III. INCUMBENTS AND NEW ENTRANTS EACH BEAR RESPONSIBILITY FOR COEXISTENCE AND EFFICIENT SPECTRUM USE

A. Spectrum Policy Must Actively Account for Utilization and Efficiency

NTIA asks how the National Spectrum Strategy should take spectrum utilization into account.[21] In the past, spectrum utilization policy for many commercial bands was limited to requiring licensees to meet substantial service or build-out requirements to maintain their licenses. But this limited consideration of spectrum utilization is inconsistent with the demands of today's wireless landscape and the capabilities of today's technologies. In an age of spectrum

[21] *See RFC* at 16246–47.

scarcity, policymakers should reevaluate traditional expectations about utilization requirements for existing and potential future spectrum users.

The National Spectrum Strategy should include a recommendation that policymakers make better utilization and efficiency a core part of spectrum policy, expressly incorporating utilization and efficiency expectations in allocation, allotment, and assignment decisions. For example, spectrum policy should strongly favor the use of dynamic, real-time sharing models that maximize intensive use and utilization.[22] While sharing in certain bands can pose challenges due to the incumbents' sensitivities and need for secrecy, the CBRS experience has been instructive. CBRS has led to successful mass scale deployments in spectrum that was otherwise largely fallow and provides a sound basis to build upon to help meet greater spectrum demands.

Spectrum efficiency should also be a key factor in spectrum decision making. Policymakers will need to define efficient utilization differently for different types of licensing models, services, power levels, and technologies—indeed, possibly for each band. Thus, when considering the future of a given spectrum band, policymakers should consider convening a stakeholder group to recommend quantifiable parameters that would enable objective measurements of spectrum efficiency. Spectrum policy should also incentivize technologies that can more readily accommodate new entrants over those that cannot.[23] And these spectrum efficiency requirements should be spelled out expressly when issuing authorizations.

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[22] *See id.* at 16247 ("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?").

[23] *See, e.g.,* Geoffrey Starks, Commissioner, FCC, Remarks at the Open Technology Institute Event, "LEO Satellite Constellations: Why Smart Sharing Rules Matter in Space," 3 (Oct. 25, 2023), https://www.fcc.gov/document/starks-remarks-open-technology-institute-ngso-satellite-event ("When a system must coordinate around another system that isn't built to tolerate interference—or around protection criteria that overestimates when service impacts occur—the result could be less service, slower service, or no service in key areas.").

Finally, NTIA and the FCC could play a more active role in reviewing actual utilization. Due to improvements in technology, policymakers should reasonably expect that incumbents will invest to provide the same level of service over time without using as much spectrum—either through better in-band efficiency, or by eliminating the need for large guard bands that are effectively "dead spectrum." Spectrum decisions should encourage federal and non-federal users to innovate continuously to maximize their spectrum utilization and consume as little spectrum as possible for a given use. For example, NTIA and FCC could conduct periodic independent quantitative utilization analyses of both federal and non-federal spectrum to assess use and recommend improvements. These analyses could be funded using a small percentage of auction proceeds.

B. Spectrum Policy Must Establish Clear Expectations for Harmful Interference Assessments

NTIA asks how policymakers can improve interference protection assessments, including technologies that can help ensure interference protection.[24] Examination of this question should start with the recognition that Congress established the protection threshold to be *harmful* interference.[25] Authorized users are not entitled to operate in an environment that never experiences interference.

With respect to technologies to facilitate interference protection, policymakers would benefit from the use of better tools to model the statistical likelihood of actual harmful

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[24] *RFC* at 16247.

[25] *See, e.g.,* 47 U.S.C. § 302a(a) ("The Commission may, consistent with the public interest, convenience, and necessity, make reasonable regulations … governing the interference potential of devices which in their operation are capable of emitting radio frequency energy … in sufficient degree to cause harmful interference to radio communications[.]"); *id.* § 303(y)(2)(C) ("Have authority to allocate electromagnetic spectrum so as to provide flexibility of use, if … such use would not result in harmful interference among users.").

interference, rather than relying on theoretical or speculative interference assertions—or contrived and subjective field tests of improbable edge case scenarios. In the FCC's 6 GHz proceeding, for example, the Commission correctly relied on Monte Carlo analyses to assess the likelihood that unlicensed devices would cause harmful interference to incumbent operations. On appeal, the D.C. Circuit upheld the Commission's decision, endorsing the Commission's use of this approach.[26] U.S. spectrum policy should continue to build confidence in the use of Monte Carlo analyses, and potentially develop and make available software tools to facilitate Monte Carlo simulations.[27] As the Request for Comment notes, moreover, artificial intelligence and machine learning could also inform harmful interference assessments.[28] NTIA should explore the use of these technologies for the National Spectrum Strategy as well. Other technologies such as beamforming and MIMO can increase efficiency as well as decrease interference.

The National Spectrum Strategy should also promote improvements in receiver performance. While there may be no need for the government to mandate express receiver performance standards, it is certainly appropriate for policymakers to encourage innovation in

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26 *AT&T Servs., Inc. v. FCC*, 21 F.4th 841, 847 (D.C. Cir. 2021).

27 For example, the European Communications Office maintains the SEAMCAT Monte Carlo analysis tool, which it distributes free of charge. European Conference of Postal and Telecommunication Administrations, *SEAMCAT - Spectrum Engineering Advanced Monte Carlo Analysis Tool*, https://www.cept.org/eco/eco-tools-and-services/seamcat-spectrum-engineering-advanced-monte-carlo-analysis-tool (last updated Feb. 28, 2023).

28 *RFC* at 16247. While public interest in artificial intelligence has recently increased, the topic is not a new one. Nearly four years ago, the Networking and Information Technology Research and Development Program's Wireless Spectrum R&D Interagency Working Group (IWG) held a workshop to discuss the potential role for artificial intelligence in spectrum management. *See also* "Artificial Intelligence & Wireless Spectrum: Opportunities and Challenges, 2019 Workshop Report" (published November 2020), www.nitrd.gov/pubs/AI-WirelessSpectrum-2019WorkshopReport.pdf.

receiver design to enable more efficient spectrum use.[29] As Cisco explained in the FCC's recent inquiry proceeding regarding receiver performance, spectrum policymaking should include determinations of appropriate protections for incumbents while promoting coexistence of incumbents and new users.[30] Incumbents must express their views before the government adopts policies—not after the fact. Industry standards exist and can be leveraged to solve spectrum coexistence and side-band related issues.

In addition, as the FCC's draft *Principles for Promoting Efficient Use of Spectrum and Opportunities for New Services*[31] recognizes, regulation must consider not only transmitters but also receivers. Regulatory and policy clarity provide the certainty needed to help drive innovation. FCC policy should be informed by the FCC's Technological Advisory Council Spectrum and Receiver Performance Working Group's 2015 recommendations, including that receivers must be responsible for mitigating interference outside of their assigned channels, while transmitters must minimize energy occurring outside their assigned frequencies and license areas.[32] Moreover, radio systems at "at all layers of the stack" should implement techniques to minimize signal degradation.[33] The National Spectrum Strategy should also encourage the FCC

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29 *See generally* Comments of Cisco Systems, Inc., ET Docket No. 22-137 (filed June 27, 2022).

30 *Id*. at 3.

31 *See generally Principles for Promoting Efficient Use of Spectrum and Opportunities for New Services et al.*, Public Draft, Policy Statement, FCC-CIRC2304-01, ET Docket Nos. 23-122, 22-137 (rel. Mar. 30, 2023).

32 Spectrum and Receiver Performance Working Group, FCC Technological Advisory Council, *Basic Principles for Assessing Compatibility of New Spectrum Allocations*, White Paper, 14–15 (Dec. 11, 2015), https://transition.fcc.gov/bureaus/oet/tac/tacdocs/meeting121015/Principles-White-Paper-Release-1.1.pdf.

33 *Id*. at 15.

to leverage the Technology Advisory Council to update its work on receiver performance standards and recommendations consistent with the FCC's draft policy statement.

Finally, the FCC and NTIA should work with stakeholders to identify and address potential interference early in decision-making processes and ensure that all stakeholders' interests are represented. This will reduce the chance that assertions of harmful interference arise late in a proceeding, when they can either unnecessarily delay decisions or leave important concerns unaddressed. Therefore, as discussed in Section II.B. above, NTIA and FCC should take steps to foster active engagement and participation in spectrum proceedings.

IV. CONCLUSION

Cisco appreciates the opportunity to comment on the development of the National Spectrum Strategy. For the reasons stated above, the strategy should take an "all of the above" approach to with respect to spectrum access models to meet the country's growing needs for wireless connectivity and ensure collaboration from all stakeholders when implementing them. As policymakers move to a coexistence-first regulatory model, the National Spectrum Strategy should also make clear that coexistence is the responsibility of both incumbents and new entrants.

Respectfully submitted,

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