Before the
NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION
Department of Commerce

In the Matter of Development of a National Spectrum Strategy

Docket Number NTIA-2023-0003
[Docket No. 230308-0068]

COMMENTS OF AEROSPACE AND FLIGHT TEST RADIO COORDINATING COUNCIL, INC.

Aerospace and Flight Test Radio Coordinating Council, Inc. ("AFTRCC"), appreciates this opportunity to provide comments to the National Telecommunications and Information Administration ("NTIA") on the development and implementation of a National Spectrum Strategy ("National Strategy").[1] AFTRCC believes that the Request and the development of a National Strategy is timely and necessary. The need for spectrum throughout our nation's economy is more critical than ever, and ensuring that each industry, and the sectors of the government, the American economy, and the public that depend on that industry, is supported with the spectrum it requires now and in the future must be a national objective. While some industries and companies have grabbed the common imagination through public relations campaigns and advertising to support their insatiable appetite for spectrum, it is incumbent on the U.S. Government generally, and NTIA and the Federal Communications Commission ("FCC") working together in particular, to ensure that all industries, companies, and organizations that depend on radio frequency spectrum are fueled by any spectrum pipeline, rather than have vital spectrum access diverted

[1] AFTRCC is responding to the NTIA Request for Comments published in the Federal Register on March 16, 2023. *See* Federal Register, Vol. 88, No. 51, 16244-16247 (Mar. 16, 2023)("Request").

disproportionately to one or a small number of industries, no matter their perceived importance. Implementing a National Strategy that feeds all aspects of the country's activity will be a monumental task, will require broad multi-stakeholder and government participation, and is an effort that AFTRCC is eager to support.

1. Background: Flight Testing and Its Significance to American Productivity

AFTRCC is an association of the nation's principal aerospace manufacturers. *See* Exhibit A hereto, reflecting AFTRCC's current membership. AFTRCC was founded in 1954 to serve as an advocate for the aerospace industry on matters affecting spectrum policy, in particular flight testing of both military and commercial aircraft, including the new generation of sophisticated fixed wing, rotorcraft, uncrewed aircraft ("UAs") serving a growing host of functions. AFTRCC is pleased to respond to NTIA's call for input from interested stakeholders, including original equipment manufacturers and contractors for federal missions.[2]

AFTRCC serves as the recognized non-Federal Government coordinator for the shared Government/Non-Government spectrum allocated on a primary, safety-of-life basis for flight testing of manned aircraft, missiles, and UAs in both the 1435-1525 MHz and 2360-2395 MHz aeronautical mobile telemetry ("AMT") bands.[3] AFTRCC coordinates multiple spectrum uses in and adjacent to these two bands that have long been vital for flight testing such as, for example, *ad hoc* and typically time-limited requests for site-

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2 *See* Request at 16245.

3 AFTRCC also coordinates flight test radio frequency communications in the HF Band (2851.0-21931.0 kHz), VHF Band (123.125-123.575 MHz), C-Band (5091-5150 MHz).

specific, Part 5 experimental special temporary authority by broadcasters and others. AFTRCC is the FCC-designated AMT coordinator for secondary medical body area network use of the aeronautical mobile telemetry ("AMT") spectrum at 2360-2390 MHz.[4] AFTRCC is also responsible under the FCC's Rules for coordination with the Wireless Communications Services ("WCS") licensee – AT&T – in the subjacent, 2345-2360 MHz band.[5] In the past several years, AFTRCC has successfully coordinated thousands of WCS cell sites with an even larger number of antenna sectors to ensure protection of flight test operations in the 2360-2395 MHz band. Additionally, AFTRCC has been designated to coordinate secondary, licensed wireless microphone use of the 1435-1525 MHz AMT band.[6]

In conducting the coordination activity described above, AFTRCC has worked in close collaboration with Government Area Frequency Coordinators ("AFCs"), who are responsible for Department of Defense use of radio frequency spectrum.[7] This collaboration is critical to ensuring that both Federal and non-Federal flight test

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4 *In the Matter of Amendment of the Commission's Rules to Provide Spectrum for the Operation of Medical Body Area Networks*, First Report and Order, FCC 12-54, 27 FCC Rcd 6422 at para. 74 (2012). AFTRCC also currently coordinates space launch operations with AMT operations for the frequencies 2364.5 MHz, 2370.5 MHz, and 2382.5 MHz when any of these three frequencies are used for commercial space launches.

5 47 C.F.R. § 27.73(a) ("The coordinator for the assignment of flight test frequencies in the 2360-2390 MHz band, Aerospace and Flight Test Radio Coordination [sic] Council (AFTRCC), will facilitate a mutually satisfactory coordination agreement between the WCS licensee(s) and AMT entity(ies) for existing AMT receiver sites."). *See also Amendment of Part 27 of the Commission's Rules to Govern the Operation of Wireless Communications Services in the 2.3 GHz Band, Establishment of Rules and Policies for the Digital Audio Satellite Service in the 2310-2360 MHz Frequency Band*, WT Docket No. 07-23, IB Docket No. 95-91, GEN Docket No. 90-357, Report and Order and Second Report and Order, 25 FCC Rcd 11710, 11785 (2010).

6 47 C.F.R. § 74.803(d)(2).

7 The DOD AFCs also coordinate with NASA with regard to NASA's use of certain frequencies.

operations are protected from harmful interference and flight safety and operational efficiency are maximized for both military and civil flight tests.[8]

The contributions of the U.S. aerospace and defense industry are vital to the national economy. In 2021, the latest year for which data is available, the aerospace and defense industry supported over 2.1 million U.S. jobs – approximately 1.4% of total national employment – many of them highly-compensated and highly-skilled jobs with an average salary of over $106,700, about 40% above the national average.[9] The aerospace and defense industry generated $892 billion in economic output in 2021 and produced $391 billion in economic value – 1.7% of total nominal U.S. GDP. The aerospace and defense industry contributed a trade surplus of approximately $51.5 billion (based on exports of $100.4 billion minus imports).[10]

Flight testing using dedicated AMT spectrum is in the critical path for the success of the United States military defense and the civil aviation industry. In the Request, NTIA notes that "[s]ufficient access to spectrum is vital to national security, critical infrastructure, transportation, emergency response, . . . [and] economic growth," among other things.[11] The Request could just as easily have been underscoring that "sufficient access to spectrum *for*

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8 More information regarding AFTRCC may be found at https://aftrcc.org.

9 Like access to spectrum generally, the introduction of upgraded and new aircraft made possible by flight testing will "advance U.S. innovation, connectivity, and competition, create high-paying and highly skilled jobs, [] produce improvements to the overall quality of life [, and] help the United States to continue to lead the world in advanced technology and enhance our national and economic security." Request at 16245.

10 Source for the figures in this paragraph: Aerospace Industries Association Releases 2022 Facts & Figures Data Highlighting the Aerospace & Defense Industry's Economic Impact (Nov. 7, 2022) *available at* https://www.aia-aerospace.org/news/2022-facts-and-figures-data. *See also* 2022 Facts & Figures: U.S. Aerospace & Defense *available at* https://www.aia-aerospace.org/industry-impact.

11 Request at 16245.

flight testing is vital" for those purposes. Flight testing is essential not only for introduction of new conventional aircraft that are safe and operationally efficient in the movement of persons and cargo, but equally so for the next generation of aircraft using green, sustainable fuels or powered by electricity, as well as increasingly sophisticated uncrewed aircraft systems, from smaller drones to, eventually, passenger-carrying aircraft. Aircraft that are subject to flight testing are key to the country's national security, critical infrastructure, transportation, emergency response and public safety, and, generally, its economic growth.

Successful and comprehensive flight testing precedes delivery of aircraft to customers, and government customers often conduct additional flight tests of these aircraft once they are delivered. While some systems can be tested, to some degree, when aircraft are on the ground,[12] only rigorous flight tests in the air can ensure an aircraft is truly ready for operations. Flight test ranges are large, with sensitive AMT ground stations receiving telemetry sent from test aircraft, often hundreds of kilometers away. Many civil and government flight tests require the coordinated, concurrent activity of scores of test and support personnel, a wide variety of range equipment (including AMT ground stations), search and rescue aircraft, and chase planes, to name only some of the principal elements. According to AFTRCC's members, flight test costs for advanced aircraft can exceed $1 million per flight, and flight testing can represent as much as 15-20% of cost of developing new aircraft. The more data that can be collected per test flight, fewer test flights are required to ensure aircraft and missile performance, efficiency, and safety, and the lower the total cost of the aircraft. Conversely, flight test delays due to spectrum shortages are becoming more frequent, and these can

[12] Examples of some tests that can be conducted on the ground, to a degree, are brake testing, aborted takeoff testing, and equipment calibration.

impose heavy logistical costs on both manufacturers and their customers – and ultimately the country's national interests. When the customer is the Department of Defense, delays can blunt our nation's competitive edge against foreign adversaries. When the customer is the commercial aviation industry or private customers, delays impact the flying public and the movement of goods, in other words, the efficiency of the economy.

2. Meeting the Needs of Flight Testing to Access Additional Spectrum As an Essential Part of the Spectrum Pipeline

Increasingly advanced types of aircraft are being introduced frequently, and all of them have flight testing requirements. A spectrum pipeline, as discussed in Pillar 1 of the Request, must include accommodations for flight testing requirements, in addition to other appropriate needs. AFTRCC Members find that there are so many products in development that there are hardly any lulls between flight test programs. This demand for new aircraft and the integration of updated equipment, and correspondingly tighter development and delivery cycles, puts stress on the existing AMT spectrum resources for non-Federal flight testing, *i.e.,* the 1435-1525 and 2360-2390 MHz Bands. A suitable National Strategy must plan for the needs of all industries, including the needs of the aerospace and defense industry through repurposing[13] compatible bands to support efficient and effective flight testing.

There has been an exponential increase in recent years in the number of measurements – and an increase in the required frequency and precision of such measurements – required during flight testing which has increased dramatically spectrum demand to meet AMT needs for both Federal Government and non-Federal Government flight

[13] *Request* at 16245 (defining repurposing as allowing "new or additional uses" in existing spectrum.

testing. Modern aircraft and missiles are designed to operate closer to the point of maximum efficiency, and they require more telemetry data and more extensive testing. Certification of next generation commercial aircraft is expected to require data rates in the 100 to 200 Mbps range. While flight testing of the Boeing 707 required measurement of a few hundred data points, flight testing for the 787 required more than 100,000.

One AFTRCC Member testing uncrewed vehicles notes that measurements collected during flight testing of this next generation of aircraft have tripled in just the past five years, resulting in more flight tests flown for longer periods. Because of bandwidth constraints, it has been necessary during individual flights to switch between multiple data collection sources to focus on different parts of the system. This demand for measurements is expected to continue as uncrewed vehicles become increasingly complex and autonomous. The increasing common lack of spectrum resources has delayed the completion of flight tests and the delivery of test results to customers.

Digital video cameras represent an increasingly important source of real-time data and monitoring information for both manned and unmanned (*e.g.*, missiles) test flights, adding to flight testing's dependence on spectrum. Multiple video streams showing critical platform components may be required depending on the test. Cameras complement traditional sensors, offering "pictures" that other sensors cannot capture. Video can be synchronized with other instrumentation to record the movements of "tufts," or "strings" glued to the aircraft skin, visibly indicating the direction of air flow over the surface of the aircraft at every instant during flight maneuvers, thereby providing insight for design changes to increase performance and efficiency. Video provides other benefits explaining its increasing use, such as the ability

to closely observe the interaction of water and tires during wet runway testing, monitoring of ice build-up on control surfaces during icing tests, and determining the time lag on cockpit avionics displays. Video is also used for monitoring weapons separation tests and scoring, and for an over-the-shoulder view of the instrument panel during crewed flight-tests as seen by the pilot. The latter is utilized when trying to capture pilot workload so as to inform efficient and ergonomic instrument panel design: high definition video can show flight test engineers on the ground what the pilot sees, and how he or she is reacting to the various gauges, warning lights, and other visual and auditory inputs.

In addition, one AFTRCC Member has observed that, in the case of flight testing of uncrewed high-altitude balloons (which may extend over a long period), multiple video streams are often used showing different components of the balloon structure, parachute, and flight vehicle. Without, or with inadequate levels of, digital video during tests due to spectrum limitations, all safety-critical components cannot be monitored by operators during flight tests of new or upgraded systems. Lack of spectrum in available AMT allocations has limited the incorporation of these multiple video feeds into flight testing, reducing the effectiveness of the test and increasing risk and the need for more tests. Whether testing crewed or uncrewed vehicles, video inputs such as those described above are merged with the rest of the flight test telemetry stream, improving the efficiency and efficacy of the ground operations, but also adding significantly to the spectrum requirement.

While AFTRCC Members have employed various technical methods to at least partially offset lack of adequate spectrum, including adaptive modulation and techniques to focus radio

frequency transmissions, these are only temporary band-aids. They are not long-term solutions.

Moreover, AFTRCC notes that increasingly other users seek to access the 1435-1525 and 2360-2390 MHz bands, putting further pressure on the use of these bands for flight testing, and creating the potential for even further delays to complete flight test requirements. As noted above, AFTRCC has been coordinating requests to use these bands to support commercial space launches, which are occurring with ever greater frequency. Once notifications of these launches have been entered into the Integrated Frequency Deconfliction System ("IFDS"), the frequencies become unavailable for flight testing over an extended area. In AFTRCC's experience, such users often ask for access to a large portion of the affected band.

As the FCC's records reflect, because of the increase in the data demands from flight testing and an increasing difficulty in gaining access to existing flight test spectrum, the AMT community has sought access to additional spectrum resources to supplement the existing safety-of-life spectrum allocated for AMT at 1435-1525 and 2360-2390 MHz and shared on a co-primary basis with the Federal Government. AFTRCC Members report that access to these two bands for flight testing has become increasingly difficult in a number of areas due to testing demands by other users, government and non-government. The need to meet customer requirements and conduct tests on government customer ranges has led to scheduling constraints. For these reasons, on an experimental basis, some AFTRCC Members have been using the 4400-4940 MHz band for flight tests. Other Members note that, increasingly, government contracts require use of the 4400-4940 MHz for flight tests, sometimes to the

exclusion of the 1435-1525 and 2360-2390 MHz bands.[14] AFTRCC Members understand that substantial Federal aeronautical telemetry is occurring in the 4400-4940 MHz band, resulting in more government contracts requiring aerospace contractors, before delivery, to complete testing in the same band. In the absence of a non-Federal AMT allocation, manufacturers have had to rely on Part 5 experimental licenses and operate on a non-interference basis with licensed users, an untenable situation for flight testing operations in the long run, especially as use of the band increases for flight testing as well as other uses.

As the foregoing suggests, and in response to NTIA's inquiry what spectrum bands should be identified for repurposing,[15] the key candidate band to meet the additional near-term, medium term, and long term spectrum needs for non-Federal flight testing is the Federal Government band 4400-4940 MHz currently used for Government flight testing, among a number of other government mission types. In keeping with NTIA's goals for a National Strategy to meet needs such as supporting "[a]dvanced transportation technologies, "[i]ndustrial and commercial applications," "[n]ational defense and homeland security," and "[s]safeguarding the national airspace,"[16] this spectrum can be repurposed for more intensive use by introducing non-federal flight testing on a co-primary basis within the band on a

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14 The FCC in recent years adopted an allocation supporting non-Federal aeronautical telemetry at 5091-5150 MHz. Unfortunately, while AFTRCC Members would welcome the ability to access this band to support flight testing, the use of the 5091-5150 MHz band for non-Federal aeronautical mobile telemetry operations has, by FCC rule, a lower priority status relative to Aeronautical Mobile Airport Communication System operations ("AeroMACS") – a wireless broadband technology designed to support fixed and mobile communications at airport locations. This regulatory provision has severely curtailed the practical availability of this band for non-Federal flight testing. As a result, the 5091-5150 MHz band has, to date, shown only limited prospects for meeting some of the increased spectrum needs of the aerospace and defense industry for flight tests.

15 *See* Request at 16246 ¶ 3.

16 *See* Request at 16245 (NTIA in collaboration with the FCC endeavors to identify spectrum that can be repurposed to allow more intensive use).

coexistence basis with incumbent Federal uses of the band. The FCC confirmed in 2017, in ET Docket No. 15-99, when implementing decisions of the 2012 World Radiocommunication Conference, that it planned to address the issue of the 4400 MHz band for non-Federal AMT in a further order.[17] The comments filed in ET Docket No. 15-99 fully and consistently support more intensive use of the 4400-4940 MHz band. This can be accomplished through shared Federal/non-Federal AMT use of the band (in addition to other existing Federal uses within these frequencies) *without significant transition costs and preserving incumbent, critical Federal missions* which would parallel what already occurs so successfully in the 1435-1525 and 2360-2395 MHz bands.[18] Significantly, AFTRCC members are unaware of other candidate spectrum bands that could meet the need for more flight testing spectrum.[19]

At the same time that AFTRCC Members underscore the need for more flight test spectrum, they wish to emphasize that they have been open to spectrum sharing where technically feasible. AFTRCC has experience developing appropriate and sophisticated

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17 *Amendment of Parts 2, 15, 80, 90, 87, and 101 of the Commission's Rules Regarding Implementation of the Final Acts of the World Radiocommunication Conference (Geneva, 2012) (WRC-12), Other Allocation Issues, and Related Rule Updates*, Report and Order, 32 FCC Rcd 2703 (2017)

18 *See also* Request at 16246 ¶ 4 (requesting comment on potential transition costs to introduce new services and impacts on critical government missions).

19 *See* Request at 16246 ¶ 4 (requesting comment on whether alternative spectrum resources are available for incumbents and for new uses). Notably, the Federal government began using 4400-4940 MHz for flight testing only after WRC-12, at which time a Region 2 allocation was made to support aeronautical mobile telemetry in this spectrum after comprehensively considering other spectrum. The other two bands identified at that time, the lower 6 GHz band and 5091-5150 MHz are effectively unavailable for non-Federal flight testing, although the degree to which the spectrum potentially available in the lower 5 GHz band depends upon the roll out of AeroMACS, a ground surface communications application at airports, which has been given priority over non-Federal flight testing in those frequencies. *See* note 14, *supra*. In any event, the limited amount of spectrum in the 5091-5150 MHz band, even if freely available, would be insufficient by itself to meet the growing need for more flight test spectrum to supplement what is available in the 1435-1525 and 2360-2395 MHz bands.

coordination regimes that ensure that different services can coexist with flight testing operations in the same or adjacent spectrum – professional broadcast engineering outfits operating on an experimental basis in both the 1435-1525 MHz and 2360-2390 MHz AMT bands, wireless microphones in 1435-1525 MHz, adjacent band WCS base station deployments on a coordinated basis in the 2345-2360 MHz band adjacent to the S-Band flight test spectrum, and medical telemetry devices in the 2360-2395 MHz band. These regimes efficiently maximize spectrum use.[20]

Similarly, in the 4400-4940 MHz band, spectrum sharing by non-Federal flight testing is possible. First, non-federal flight testing has for years successfully shared the safety-of-life 1435-1525 and 2360-2395 MHz bands with Federal flight testing through the concerted efforts of Government Area Frequency Coordinators and AFTRCC. There is every reason to expect they could do the same in the 4400-4940 MHz band, where AFTRCC and Government AFCs have already discussed accommodation of non-Federal AMT subject to prior coordination. The successful efforts to date to coordinate non-Federal flight testing on a Part 5 experimental basis provides further support for this view.

Second, just as Federal flight testing operations have successfully shared the band with other co-band Federal missions, AFTRCC's Members expect that non-Federal AMT operations

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[20] Services which have need to access spectrum only for limited and discrete periods of time in discrete locations (such as broadcasting events, entertainment or news events requiring large numbers of wireless microphones, or commercial space launches) or services that can be confined to indoor operation (such as wireless medical telemetry) can coexist with sensitive AMT ground stations receiving telemetry from test aircraft, often hundreds of kilometers away. While services that require continuous access to spectrum on an encumbered basis generally may not make good neighbors *in the same band* as AMT, there is more flexibility for sharing with such services in adjacent bands through control of power limits and out-of-band interference from fixed base stations to avoid in-band interference to AMT.

would be able to do the same using similar coordination techniques which are well-tested and long-proved as being successful. Federal flight testing has proven the ability to share this band with a number of other Federal spectrum operations, including air ground air operations (supporting uncrewed aircraft and law enforcement systems), certain land mobile operations (*e.g.,* radio communications for data, voice and video, and support many range systems during tactical training exercises among other mobile applications), mobile surface telemetry point-to-point data links, ship shore ship operations, and research, development, testing, and evaluation ("RDT&E").[21]

Third, there is the prospect for even more intensive spectrum sharing in the band with other non-Federal and Federal uses with characteristics that make them suitable candidates for sharing, just as AFTRCC and the Federal Government have accommodated certain other disparate uses in the 1435-1525 MHz band. In short, in response to the Request,[22] the groundwork has already been laid – backed up by years of spectrum sharing experience – for repurposing the 4400-4940 MHz spectrum band on an expedited basis by introducing non-Federal flight testing into this band and sharing with existing Federal missions.[23]

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21 *See* Federal Government Spectrum Use Reports (updated December 2015) *available at* https://ntia.gov/page/federal-government-spectrum-use-reports-225-mhz-7125-ghz.

22 *See* Request at 16246 ¶ 6 (seeking comment on the feasibility of spectrum sharing).

23 *See* Request at 16246 ¶ 7 (seeking comment on whether previous efforts to facilitate sharing have proven successful in promoting more intensive use of spectrum while protecting incumbents). Further, the AMT community has also explored coexistence with adjacent band radar altimeters, with positive results. *See* Letter of Jeffrey L. Sheldon, Levine, Blaszak, Block, & Boothby, Counsel to AFTRCC, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 15-99 (Apr. 26, 2021) and Attachment (describing work within the aerospace and aviation industries "which demonstrates that AMT systems can operate in [the 4400-4940 MHz) band while fully protecting radio altimeters" operating in the 4200-4400 MHz band).

3. Long-Term Spectrum Planning Should Include a Wide Range of Stakeholders, Including Aerospace Manufacturers Supporting Non-Federal and Federal Flight Testing

AFTRCC agrees with NTIA that long-term spectrum planning requires affected stakeholders working openly and transparently in an ongoing manner.[24] AFTRCC has long been involved in such processes with regards to protecting safety-of-life AMT operations in the 1435-1525 and 2360-2395 MHz bands, regularly conferring with government Area Frequency Coordinators, AT&T (as a WCS licensee), medical telemetry device manufacturers, wireless microphone manufacturers, commercial launch operators, broadcasting production companies, satellite operators (above 1525 MHz), and others. This represents a microcosm of the lines of communications and breadth of participation necessary to ensure a successful National Strategy that serves the diverse needs of the American public and economy.

Regular and direct dialogue and meetings between AFTRCC coordinators and their Federal counterparts ensures that flight testing operations are protected for both military and civil purposes. In addition, these open channels for coordination create the foundation for other compatible uses to access AMT bands and maximize spectrum usage without compromising reliable availability of the shared spectrum for flight-testing. In both of the cases of introducing secondary licenses users in the 1435-1525 MHz band and the 2360-2390 MHz band, respectively, there was first an extended conversation among AFTRCC

[24] *See* Request at 16246.

Member Companies, Federal user representatives, the prospective new entrants, and the FCC that eventually made the adoption of a successful sharing arrangement possible. NTIA and the FCC may wish to use the collaboration that has occurred between AFTRCC and the Area Frequency Coordinators as a model for other stakeholder relationships in appropriate situations.

The Request asks for input about a long-term planning process.[25] AFTRCC suggests that all planning, whether short-term spectrum management or longer-term planning regarding the possible evolution of how spectrum may be used, cannot be bifurcated and it must be band-specific, taking into account the present and future needs of the stakeholders within a particular band and examining whether alternative spectrum resources or technologies exist that could be practically implemented, taking into account potential cost, disruption, and compromises to performance.[26]

In a spectrum sharing regime, stakeholders will regularly communicate with each other. AFTRCC agrees that periodically – say once every five years in suitable bands – there should be an updated inquiry into spectrum needs and spectrum use technologies to determine if spectrum use *in the long-term* in given bands can be made even more intense. Even exclusively-licensed entities should be required to undergo this periodic process. Past history

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25 *See* Request at 16246 ¶¶ 1-2.

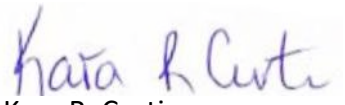
26 AFTRCC respectfully offers the view that while the work of spectrum-focused advisory committees such as the FCC's Technical Advisory Committee and NTIA's Commerce Spectrum Management Advisory Committee is significant, it typically is of a more general nature than is needed for successful spectrum planning in particular bands. *See* Request at 16247 ¶ 5. To build trust, transparency, and communications among interested stakeholders in specific bands, a more open process is required with an increased focus, while coordinating with other groups regarding other bands as appropriate.

has shown that the greatest sources of disruption in spectrum planning have been commercial users that favor exclusive use licenses seeking more spectrum by relocating incumbent users. Such new entrants should have an increased burden to demonstrate a need for additional spectrum -- and any claimed inability to repurpose spectrum they already have for the introduction of new technologies -- than has been the case historically.

4. Conclusion

The NTIA Request envisions an ambitious Spectrum Strategy implemented through a robust spectrum planning policy with short-, medium-, and long-term objectives. Based on the principles described herein, AFTRCC looks forward to engaging in this difficult but important work with the NTIA, relevant Federal Executive Agencies, and the FCC.

Respectfully submitted,



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