

Before the  
**FEDERAL COMMUNICATIONS COMMISSION**  
Washington, D.C 20554

In the Matter of	)	
Facilitating Opportunities for Advanced Air	)	WT Docket No. 24-629
Mobility	)	
	)	
Petition for Rulemaking to Permit the	)	RM-11912 (terminated)
Transmission of Data in Air-Ground Radio	)	
Telephone Automated Service Channels Between	)	
454.675-454.975 MHz & 459.675-459.975 MHz	)	
	)	
Secondary Use of the 24.25-24.65 GHz Band for	)	RM-11819 (terminated)
Radiolocation Services	)	
	)	
Gogo Business Aviation, LLC Petition for	)	RM- 11985 (terminated)
Rulemaking to Modernize Air-Ground	)	
Radiotelephone Service Rules	)	

**COMMENTS  
OF THE NATIONAL TELECOMMUNICATIONS  
AND INFORMATION ADMINISTRATION**

As the President’s principal adviser on communications policies, the National Telecommunications and Information Administration (NTIA) respectfully submits these comments on behalf of the Executive Branch.<sup>1</sup> NTIA supports updating the rules of the Federal Communications Commission (FCC or Commission) in order to boost the development of new aviation sectors such as Advanced Air Mobility (AAM), including piloted and remotely piloted aircraft systems.<sup>2</sup> In doing so, safety of all aviation systems, including emerging ones, must top

---

<sup>1</sup> NTIA is the Executive Branch agency principally responsible for the development of communications policies pertaining to the Nation’s economic and technological advancement and to the regulation of the communications industry, for the coordination of the communications activities of the Executive Branch, and for the effective presentation of the views of the Executive Branch to the Commission. *See* 47 U.S.C. § 902(b)(2).

<sup>2</sup> The Commission uses several terms within the Advanced Air Mobility system definition, including the terms “Crewed” and “Uncrewed” Aircraft Systems (UAS). *Facilitating Opportunities for Advanced Air Mobility*, WT Docket 24-629, Notice of Proposed Rulemaking, FCC 25-7 (rel. Jan. 17, 2025), para. 2, 90 Fed. Reg. 12243 (*AAM NPRM*). The Federal Aviation Administration (FAA) and the Department of Transportation (DOT) use the term “unmanned” aircraft to refer to UAS. 49 U.S.C. §44801 (12). However, “remotely piloted” as used in this pleading includes an autonomous aircraft carrying passengers. For a definition of AAM, *see AAM NPRM*, n. 1.

all concerns. In addition, the rules must ensure that new services, particularly secondary ones, respect the rights of existing primary and adjacent spectrum users.<sup>3</sup> NTIA thus endorses a Federal/non-Federal secondary allocation for ground-based radiolocation service in the 24.45-24.65 GHz band, subject to appropriate limitations safeguarding critical aviation, existing Federal radiolocation incumbents and satellite-based passive services.<sup>4</sup> This comment addresses the 24.45-24.65 GHz band. NTIA plans to file supplemental comments addressing the 454.675-545.975 and 459.675-459.975 MHz band. This band raises important issues requiring additional interagency consultation. NTIA intends to address these thoroughly in the supplemental filing.

**I. With Proper Limits, Secondary Radiolocation Supports Existing National and Border Security and Public Safety**

Federal agencies -- as well as non-Federal operations pursuant to waivers -- now hold secondary radiolocation assignments in the 24.5-24.65 GHz band. Federal agencies often use the band for critical security purposes.

DHS maintains most of these assignments. It harnesses them to detect and identify UAS used by drug traffickers and other bad actors seeking to harm the United States infrastructure and its residents.<sup>5</sup>

DOE uses the band at its Savannah River Site, an “industrial complex responsible for national security and nonproliferation missions, disposition of nuclear materials, waste

---

<sup>3</sup> See ITU RR 5.28 (2024 ed.), stating that a secondary service “shall not cause harmful interference to stations of primary services to which frequencies are already assigned or to which frequencies may be assigned at a later date.”

<sup>4</sup> The Radiolocation Service accommodates the use of radio methods for determination of direction, distance, speed, or position for purposes other than navigation. 47 C.F.R. §90.101. The definition of “radiolocation” (tracking and surveillance) activities does not include “mitigation” or counter-UAS activities, either through physical or some other form (such as jamming) of incapacitation. Four agencies, Department of Homeland Security (DHS), Department of Justice (DOJ), Department of Defense (DOD) and Department of Energy (DOE) have express statutory authority to conduct counter-drone/UAS operations. This authority provides exemption from potentially applicable criminal statutes. U.S. Gov’t Accountability Office, GAO 24-107195, “Aviation Safety: Federal Efforts to Address Unauthorized Drone Flights Near Airports,” at 7 (2024).

<sup>5</sup> See *AAM NPRM*, n. 144 (DHS reports on border law enforcement using, *inter alia*, radars including against small aircraft.) DHS has over 100 assignments in this band.

management, and environmental cleanup and stewardship.”<sup>6</sup> At Savannah River, DOE uses the band to monitor unmanned aircraft activities and in support of research and development missions for safety purposes.

Allowing radiolocation in the band could potentially further the public safety missions described in the *AAM NPRM*. The FCC states that permitting this use would facilitate counter UAS detection at sensitive sites such as “stadiums, prisons, the U.S. border, and critical infrastructure (e.g., utilities).”<sup>7</sup> NTIA agrees with a secondary Federal/non-Federal radiolocation allocation in the 24.45-24.65 GHz band, provided these operations adhere to the processes and limitations described below.

## **II. The Commission Should, as Proposed, Examine Applications for 24.45-24.65 GHz Radiolocation Licenses on a Case-by-Case Basis, Subject to Appropriate Conditions**

### **A. The Commission Wisely Proposes Case-by-Case Licensing, Which Will Allow Proper Coordination**

In addition to the proposed Federal/non-Federal shared secondary radiolocation allocation in the 24.45-24.65 GHz band,<sup>8</sup> the Commission proposes to evaluate power levels and emission-type limitations for radiolocation on a case-by-case basis.<sup>9</sup> NTIA supports this proposal.

As 24.45-24.65 GHz radiolocation will be a shared service, IRAC coordination will apply to these individual determinations.<sup>10</sup> Required coordination will enable applicants and affected incumbents to proceed safely with due regard to important co-channel and nearby-channel

---

<sup>6</sup> DOE, “Facts from the Savannah River Site,” *available at* [https://www.srs.gov/general/news/factsheets/srs\\_overview.pdf](https://www.srs.gov/general/news/factsheets/srs_overview.pdf).

<sup>7</sup> *AAM NPRM*, ¶ 4.

<sup>8</sup> *Id.*, proposed 47 C.F.R. §2.106 Table of Frequency Allocations.

<sup>9</sup> *Id.*, ¶ 70.

<sup>10</sup> NTIA Manual, § 8.1.1.2 *available at* [https://www.ntia.gov/sites/default/files/2023-11/8\\_2021\\_ed\\_rev\\_2023.pdf](https://www.ntia.gov/sites/default/files/2023-11/8_2021_ed_rev_2023.pdf)

Federal services. To the extent 24.45-24.65 GHz radars serve as ground-based security and surveillance radars, IRAC coordination will allow Federal agencies to analyze these locations carefully to avoid interference with 24.45-24.65 GHz Detect-and-Avoid (DAA) in UAS.<sup>11</sup> For example, Echodyne's waiver request states that that its orthogonal Frequency Modulated Continuous Wave (FMCW) waveform has properties that prevent airborne and ground-based radars from conflicting. IRAC coordination will allow DOE to ensure that any new radiolocation applicants (which may include parties other than Echodyne) in the vicinity of DOE's Savannah River installation will not cause harmful interference.<sup>12</sup> IRAC coordination will remain crucial as FCC rules do not prevent another applicant from proposing to use a different radar technology from Echodyne. Thus, careful coordination is essential on a case-by-case basis.

Adherence to some key conditions described below will help make processing through the IRAC as swift as possible.

**B. Existing Rules Allocate the 24.45-24.65 GHz Band Primarily to Aviation Safety<sup>13</sup> and Nearby Channels to Sensitive Satellite-Based Passive Services**

1. The Commission must prioritize radionavigation, a safety of life service

---

<sup>11</sup> Detect and avoid radars allow operators to sense and avoid other aircraft and obstacles autonomously. Flytbase, "So What Is a Detect and Avoid DAA System?" available at [Detect and Avoid: Safe BVLOS Drone Ops Guide - FlytBase](#).

<sup>12</sup> Cf. *Echodyne Request for Limited Waiver*, 10-11 & App. B (filed Dec. 14, 2017) (Echodyne 2017 Request) granted; *Echodyne Corporation, Request for Waiver of Part 2 and Part 87 of the Commission's Rules*, WT Docket No. 17352, Order, 34 FCC Rcd 4830 (WTB-MD June 12, 2019) (Echodyne Mesa radars' ability to prevent interference with each other at various distances). While existing use may not be presenting issues, applicants other than Echodyne, with different system specifications, or existing licensees with changed system characteristics, may seek licenses. For this reason, DOE intends to use the IRAC coordination process to scrutinize closely applicants proposing radars within 1 kilometer of its Savannah River site.

<sup>13</sup> The FCC Table of Frequency Allocations lists radionavigation, an aviation safety-of-life service, and inter-satellite service, as primary services in the band. See FCC Online Table of Frequency Allocations, 2 CFR § 2.106 available at .

Radionavigation service uses radio frequencies to determine the position of piloted and remotely-piloted aircraft, including AAM aircraft.<sup>14</sup> The 24.45-24.65 GHz band is used for the purpose of detect-and-avoid radar both in airborne and ground-based configurations. Two of the three ITU Regions make radionavigation a primary service in this band.<sup>15</sup> As air traffic numbers continue to climb, the integrity of the safety service overrides all other concerns.<sup>16</sup> One estimate projects a \$115 billion AAM annual market by 2035, employing more than 280,000.<sup>17</sup> This docket itself attests to AAM's proliferation.

Radiolocation systems when used for detection of UAS or for situational purposes may complement existing AAM. Radiolocation can locate and track non-cooperative aircraft that could present a threat to AAM aircraft or ground communities. Communities thus get additional information and added security regarding these new aircraft. Community acceptance is key to

---

<sup>14</sup> "Radionavigation" is "[r]adiodetermination used for the purposes of navigation, including obstruction warning." "Radiodetermination" is the "determination of the position, velocity and/or other characteristics of an object, or the obtaining of information relating to these parameters, by means of the propagation properties of radio waves." 47 C.F.R. §2.1

<sup>15</sup> FCC Table of Frequency Allocations, 47 CFR § 2.106.

<sup>16</sup> ICAO, "Future of Aviation" *available at* <https://www.icao.int/Meetings/FutureOfAviation/Pages/default.aspx> (commercial aircraft departures now 400 per hour; industry expects near doubling of passenger and cargo traffic by 2036), Boeing Global Services, "Boeing forecasts global demand for nearly 2.3 million new commercial aviation personnel" (July 25, 2023) *available at* <https://services.boeing.com/news/boeing-forecasts-global-demand-commercial-aviation-personnel>.

Recent accidents provide grim support for this policy. AP, "Collision between helicopter and plane kills 67 in nation's deadliest air disaster since 2001" (Jan. 30, 2025) *available at* <https://apnews.com/live/dc-plane-crash-reagan-updates>; CNN, "Delta plane crashes and flips upside down at Toronto airport" (Feb. 18, 2025) *available at* <https://www.cnn.com/world/live-news/delta-plane-crash-toronto-flips-02-17-25/index.html>.

<sup>17</sup> Deloitte Insights, "Advanced Air Mobility: Can the United States Afford to Lose the Race?" *available at* <https://www2.deloitte.com/us/en/insights/industry/aerospace-defense/advanced-air-mobility.html>.

AAM's success.<sup>18</sup> Thus, radiolocation can facilitate AAM, provided, as the Commission recognizes,<sup>19</sup> it remains secondary to uses protecting air safety.

2. Nearby channels with passive satellite sensors gather data on Earth's atmospheric and other natural phenomena

The National Aeronautics and Space Administration (NASA) and National Oceanic and Atmospheric Administration (NOAA) operate remote sensing satellites in the nearly adjacent 23.6-24.0 GHz band using Earth Exploration-Satellite Service (EESS) (passive) and Space Research Service (SRS) (passive) allocations. These space-borne passive sensors collect information related to the characteristics of the Earth and its naturally occurring phenomena.<sup>20</sup>

The data from these EESS and SRS satellites are used to predict weather and other environmental events, which enable critical lifesaving notifications in cases of extreme weather prediction. These data also aid industries, such as agriculture and transportation, which depend on weather forecast predictions to manage daily operations. Unwanted emissions from radiolocation applications could potentially impact these sensitive passive sensors if no limitations are put in place.

**C. To protect critical Federal services and streamline coordination, the Commission should add density, power, and emission limits**

1. Density

---

<sup>18</sup> US DOJ, COPS & Police Foundation, "Community Policing and Unmanned Aircraft Systems (UAS): Guidelines to Enhance Community Trust" available at <https://www.policinginstitute.org/wp-content/uploads/2016/11/UAS-Report.pdf> (effective police use of UAS requires community acceptance). Public angst over East Coast sightings of anonymous drones attests to that. See ABC National News, "Drone anxiety heightens as officials seek to reassure public there's no threat" (Dec. 16, 2024) available at <https://www.abcactionnews.com/news/national-news/anxiety-heightens-as-officials-seek-to-reassure-public-theres-no-threat>. See also AAM NPRM, Statement of Commissioner Geoffrey Starks (unsanctioned UAS operations causing disruptions demonstrates need for technology to detect such systems).

<sup>19</sup> AAM NPRM, proposed §90.103 (31) ("This frequency band...is on a secondary basis to the ... Government and non-Federal Radionavigation Service (Part 87).")

<sup>20</sup> Such phenomena include the total column vapor of the Earth's atmosphere, *i.e.*, the amount of gaseous H<sub>2</sub>O within a vertical column of the atmosphere.

Dissimilar radar systems (radionavigation/radiolocation, airborne/ground) usually occupy different frequency bands. This separation keeps compatibility complications down. When such same-band operations occur, this case often requires special deconfliction.<sup>21</sup> Such treatment for an airborne radar, however, would severely limit the area of flight of the carrying craft. For example, to protect airborne radars in the 15.7-16.2 GHz band from potential interference from airport surface surveillance ground-based radars,<sup>22</sup> the airborne radars must cease operation within a certain minimum distance.<sup>23</sup> As with AAM operations, NTIA expects private-sector use of ground-based surveillance radars will continue growing. NTIA also expects that, if Echodyne's use of the 24.45-24.65 GHz band increases, the need for airborne mitigation will rise in tandem. NTIA thus recommends that the Commission apply a density limitation based on Echodyne's conclusions in its Request for Limited Waiver: a limitation that would amount to 4 units per square kilometer unless the applicant can demonstrate no harmful interference to radionavigation if that limit is exceeded.<sup>24</sup>

Radars operating in proximity in the same band can interfere with each other. If multiple radars overlap, they can yield a higher signal strength which can mask potential targets. Without density control, 24.45-24.65 GHz radars could threaten radionavigation transmissions in the same band, and thus safety of life. Recent air traffic disasters and collisions reinforce, sadly, how safety must be first.<sup>25</sup> A density limitation will ensure that Echodyne or other radars in the 24.45-24.65 GHz band do not produce aggregate interference either to primary radionavigation

---

<sup>21</sup> Such techniques include frequency notching, sector blanking against ground radar sites, or significant distance separation from the ground station based upon radio-line-of-sight (RLOS).

<sup>22</sup> Airport surface detection equipment or ASDE.

<sup>23</sup> NTIA Manual 8.2.46, available at [https://www.ntia.gov/sites/default/files/2023-11/8\\_2021\\_edition\\_rev\\_2023.pdf](https://www.ntia.gov/sites/default/files/2023-11/8_2021_edition_rev_2023.pdf)

<sup>24</sup> *Echodyne Request for Limited Waiver*, App. B (filed Dec. 14, 2017) granted, *Echodyne Corporation, Request for Waiver of Part 2 and Part 87 of the Commission's Rules*, WT Docket No. 17352, Order, 34 FCC Rcd 4830 (WTB-MD June 12, 2019). This is generally the limit that DHS observes in its secondary use of the band.

<sup>25</sup> See *supra*, note 16.

users, or to sensitive passive receivers on EESS or SRS satellites. Moreover, it will help ensure that future versions of Echodyne’s radars or those of a different licensee in this band will avoid harmful interference to primary services.

## 2. Power, bandwidth, and emission

The sensors on EESS and SRS satellites observe signals at great distances from the source. Unwanted or unexpected interference can easily skew their measurements. Case-by-case coordination can ensure no harmful interference to same channel and neighboring channel users, but without some general technical requirements for equipment operating in this new allocation, such coordination may mean time-consuming one-off engineering studies to justify adding or modifying restrictions. NTIA thus recommends that the Commission incorporate technical requirements commensurate with the system representations Echodyne, the initiator of this rulemaking, has made:

Transmit Power: 33dBm  
EIRP: 24 dBW  
Bandwidth: 45 MHz<sup>26</sup>

Such specifications posit small, relatively low-power devices.<sup>27</sup> However, new radars on the market are growing in power, bandwidth, and emissions.<sup>28</sup> Applicants other than Echodyne with different business plans may seek licenses in this new allocation. Echodyne or some other potential licensee may also desire operational flexibility to change device parameters. To ensure that in-band radionavigation services neighboring passive satellite services can operate unimpeded, the Commission should add power, bandwidth, and emission maximums (as an indirect method of limiting unwanted emissions).

---

<sup>26</sup> See *supra* note 24; *AAM NPRM*, ¶¶ 56-58.

<sup>27</sup> *Id.*

<sup>28</sup> See generally M. MacDonald, M. Abouzahara & J. Stambaugh, “Overview of High Power and Wideband Radar Technology Development at MIT Lincoln Laboratory” (2024) available at <https://www.mdpi.com/2072-4292/16/9/1530>.

Alternatively, the Commission should impose an explicit limit on total radiated unwanted emissions power.<sup>29</sup> In such case, NTIA recommends an out-of-band emissions limit of -39 dBW.<sup>30</sup> Any configurations, technical, and operational characteristics deviating from these specifications shall be coordinated with NTIA via established protocols ensuring compatibility with the incumbent services.

### 3. Frequency Stability

The FCC proposes to add radiolocation to the existing allocation for radionavigation and inter-satellite services.<sup>31</sup> This allocation is only 200 MHz wide. Users of this band must protect the fixed and mobile services and inter-satellite and radiolocation-satellite (Earth-to-space) services operating below and above this allocation. Therefore, frequency instability must not allow the Echodyne (or any other future licensee's) signal to "drift" into adjacent bands. NTIA believes that the frequency stability in the proposed rule, 5000 ppm, is excessive in light of the comparatively small bandwidth in issue and other users in the band or nearby. NTIA suggests 10 ppm.

#####

NTIA urges the Commission to codify the procedures and conditions explained above by amending its proposed rules 47 C.F.R. §90.103 and 47 C.F.R. §90.213 as follows:

---

<sup>29</sup> See, e.g., 47 C.F.R. §30.203(d)(2) of the Commission's rules (maximum conducted output power or the total radiated power of emissions in any 200 MHz of the 23.6-24.0 GHz band shall not exceed -39 dBW).

<sup>30</sup> Using the Echodyne parameters of 2.0 W and 45 MHz emission bandwidth, the power spectral density (PSD) supplied to the antenna in a 1 MHz reference bandwidth is -13.5 dBW/MHz. 47 C.F.R. §90.210(b) requires 46 dB attenuation, making the resulting PSD at the edge of the 24 GHz band -59.5 dBW/MHz. Adjusting the reference bandwidth to account for the full 200 MHz across the band, this becomes -36.5 dBW per 200 MHz. The ITU Resolution 750 limit for IMT base stations operating in the 24.25-27.5 GHz band is -39 dBW per 200 MHz starting September 2027. ITU Res. 750 (WRC-19), available at [https://www.itu.int/dms\\_pub/itu-r/oth/0C/0A/ROCOA00000F00157PDFE.pdf](https://www.itu.int/dms_pub/itu-r/oth/0C/0A/ROCOA00000F00157PDFE.pdf). Thus, -39dBW is a reasonable approximation in the absence of any limitations on potential new radiolocation deployments or a detailed study to determine a specific limit for the application presented. Deployment scenarios are admittedly very different for IMT base stations as compared to radiolocation systems in terms of antenna geometries. However, this limit already applies to all mobile stations in the 24.25-24.45 GHz and 24.75-27.5 GHz bands. US Footnote 146, FCC Online Table of Allocations, *supra* note 13. Precedent favors applying this limit here.

<sup>31</sup> *AAM NPRM*, proposed Table of Allocations.

§ 90.103 Radiolocation service.

\* \* \* \* \*

(b) \* \* \*

**Radiolocation Service Frequency Table**

Frequency or Band	Class of station(s)	Limitation
* * *		
<b>Megahertz</b>		
* * *		
24,450 to 24,650	Radiolocation land <del>or mobile</del>	31, 32

(c) \*\*\*

(31) This frequency band is shared with and is on a secondary basis to the Government and non-Federal Inter-Satellite service (part 25) and the Government and Non-Federal Radionavigation Service (part 87). Radiolocation units will be licensed on a site-specific basis, subject to coordination through the Interdepartment Radio Advisory Committee. There shall be no more than 4 systems in any one km<sup>2</sup> area unless licensee shows no harmful interference to radionavigation service. Unit transmit power shall be no greater than 33dBm, EIRP no greater than 24 dBW, and bandwidth no greater than 45 MHz.

(32) The maximum conducted output power or the total radiated power of emissions in any 200 MHz of the 23.6-24.0 GHz band shall not exceed -39 dBW.

§ 90.213 Frequency stability.

(a) \* \* \*

Table 1 to § 90.213(a)–Minimum Frequency Stability			
[Parts per million (ppm)]			
Frequency Range (MHz)	Fixed and base stations	Mobile stations	
		Over 2 watts output power	2 watts or less output power
* * *			
24,450–24,650	<del>-5000</del> 10	<del>-5000</del> 10	<del>-5000</del> 10

\*\*\*\*

Such a clear statement of the processes and substantive rules governing this new service will help foster its safe and efficient deployment.

### **III. CONCLUSION**

NTIA applauds this Commission initiative facilitating Advanced Air Mobility. Allowing a secondary radiolocation allocation at 24.34-24.65 GHz can complement this emerging service by enabling authorities to detect AAM and UAS aircraft. NTIA supports this Federal/non-Federal allocation. However, this secondary service must respect the primary rights of radionavigation, and of existing radiolocation incumbents, and structure itself so that nearby satellite-based passive sensing remains unharmed.

In addition, NTIA also plans to file supplemental comments addressing the 454.675-454.975 and 459.675-459.975 MHz band. The Commission raises important issues requiring additional interagency consultation. NTIA intends to address these thoroughly.

Respectfully submitted,

---

David Brodian  
Chief Counsel

Adam Cassady  
Deputy Assistant Secretary for  
Communications and Information

Charles Cooper  
Associate Administrator

Derek Khlopin  
Deputy Associate Administrator

John R. Alden  
Chief  
Spectrum Affairs and Information Division  
Office of Spectrum Management

National Telecommunications and  
Information Administration  
U.S. Department of Commerce  
1401 Constitution Ave, NW  
Washington, DC 20230  
(202) 482-1816