



12112 115TH AVE NE, KIRKLAND, WA 98034

October 10, 2018

Marlene H. Dortch  
Secretary  
Federal Communications Commission  
445 12th Street, SW  
Washington, DC 20554

**Re: Echodyne Waiver Request (WT Docket No. 17-352)**

Dear Ms. Dortch:

Pursuant to Section 1.1206 of the FCC's Rules, Echodyne Corp. (Echodyne) wishes to supplement the record relating to its request for limited waiver of the U.S. Table of Allocations and the rules applicable to Aviation Services under Part 87 of the Commission's Rules to deploy ground-based radars in the 24.45-24.65 GHz band for various radiolocation applications.

### **Background**

Echodyne has developed an electronically scanning radar that operates in the 24.45-24.65 GHz aeronautical radionavigation band. Echodyne originally intended the radar to operate as an airborne detect and avoid (DAA) radar, which comports with the service allocation for that band, and the airborne radar has received FCC equipment certification. However, both government (Federal and non-Federal) and commercial companies have expressed overwhelming interest in using the device for ground-based activities, including both ground-based DAA and ground-based security and surveillance (SSR). This interest has been so strong that Echodyne has created a version of the radar optimized for ground-based use, the EchoGuard (MESA-SSR). This ground-based SSR radar can scan for drones in the air and vehicles and people on the ground. Because the FCC's rules had very limited options for frequency bands near 24 GHz suitable for radiolocation applications, Echodyne filed a request for waiver of the table of allocations and attendant rules to allow the MESA-SSR to be used for radiolocation (*i.e.* security) applications in the 24.45-24.65 GHz band.<sup>1</sup>

### **Use of the 24.45-24.65 GHz Band**

Technologically, MESA-SSR continues to function very similarly to the original radar intended for detect-and-avoid. When used for security purposes, however, the MESA-SSR functions to detect-and-alert rather than detect-and-avoid. The detect-and-alert function is complementary to the existing service allocation in the band and will not interfere with Echodyne's use of the band for radionavigation. In fact, the radar itself performs exactly the same whether it is configured for a radionavigation purpose or a radiolocation purpose. A

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<sup>1</sup> See Request for Limited Waiver, Echodyne Corp., WT Docket No. 17-352, submitted October 27, 2018.



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review of the FCC’s Universal Licensing System indicates that there are no active non-government licenses issued for the band. In addition, it is Echodyne’s understanding that there are few, if any, Federal assignments in the band other than experimental operations.

While there is a band allocated for radiolocation services at 24.05-24.25 GHz frequencies, Echodyne determined after extensive discussions with Commission staff that re-tuning its existing DAA radar to those frequencies would create more issues than operating in the 24.45-24.65 GHz band. The 24.05-24.25 GHz band already has a plethora of licensed users – including public safety agencies, where potential interference could have significant impact beyond interrupted communications. In addition, the technical standards for the 24.05-24.25 GHz band are very restrictive and would have required Echodyne to file a request for a waiver of the technical specifications in that band.<sup>2</sup> Finally, creating multiple radar products for different bands increases the costs of producing the radars, which undermines one of the very significant benefits of the MESA-SSR, *i.e.*, the relatively low cost. In concert, these factors indicated that Echodyne should request a waiver of the service allocation rules for the 24.45-24.65 GHz band in order to provide a complementary service – detect-and-alert, which is becoming more necessary day by day.

### **Critical Public Safety Need**

Since Echodyne filed its waiver request in October of 2017, the need for effective drone detection and security systems has only increased. For example, the Head of Security for the National Football League testified last month to Congress, “In the two years that I have been at the NFL, we have observed a dramatic increase in the number of threats, incidents, and incursions by drones.”<sup>3</sup> The FAA and other Government agencies recognize that they cannot integrate UAVs into the national airspace until they have a way to protect the public from improper use of drones. To that end, the FAA Reauthorization Act of 2018 signed by the President on October 5 gives the Department of Homeland Security and the Department of Justice authority to detect, track, and disable drones that pose a credible threat to the safety and security of certain agency assets and operations.<sup>4</sup>

As a result of these developments, Echodyne continues to receive tremendous interest from customers who want to use the MESA-SSR for these crucial drone detection and security purposes. This includes multiple Government customers and approximately a dozen security system integrators who sell to both Government and commercial customers.<sup>5</sup> These customers

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<sup>2</sup> See 47 CFR §90.103(c)(22).

<sup>3</sup> See Cathy Lanier’s testimony to the Senate Committee on Homeland Security and Governmental Affairs, September 13, 2018:  
<https://www.hsgac.senate.gov/imo/media/doc/Testimony-Lanier-2018-09-13.pdf>

<sup>4</sup> FAA Reauthorization Act of 2018 (H.R. 302, Pub.L. 115–254) §§ 1601, *et seq.*

<sup>5</sup> See Comments of the U.S. Border Patrol, WT Docket No. 17-352, filed December 13, 2017. See also, Comments of In-Q-Tel, WT Docket No. 17-352, filed January 9, 2018.



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have an immediate need for a drone detection system that includes an affordable, high-performance radar.

### **Lack of Affordable Alternatives for Drone Detection and Security**

MESA-SSR offers a unique combination of high-performance beam-steering technology and low cost, size, weight and power (C-SWaP), making it an attractive solution for drone detection and security. There are few, if any, competing technologies that can provide highly reliable drone detection in the same cost-effective manner as the MESA-SSR.

**Performance:** MESA-SSR electronically steers a narrow radar beam in azimuth and elevation over a wide field of view. This allows the radar to pinpoint the location of objects on the ground and in the air and track them with a high degree of accuracy. The radar provides three-dimensional information on the location of objects (azimuth, elevation and range) as well as their velocity. The radar can detect a drone at more than a kilometer and people at 2.5 km, and it operates in all types of weather and conditions.

**C-SWaP:** The MESA-SSR radar is 20 cm x 16 cm x 4 cm, about the same size as an electronic tablet. It weighs 1.25 kg and is priced in the low tens of thousands of dollars. This makes it a flexible and cost-effective solution for protecting critical infrastructure, correctional facilities, government buildings, public spaces and other sensitive sites.

**Lack of Affordable Alternatives:** MESA-SSR offers solid state, true beam-steering technology comparable to a phased array radar, but with C-SWaP that is an order of magnitude lower. The least expensive phased array radars cost hundreds of thousands of dollars, making them cost-prohibitive for non-military uses (and even many lower value military uses).<sup>6</sup> Conversely, there are radars that are priced similarly to the MESA-SSR radar, but they lack the true beam-steering capability that provides the high-performance combination of long range, 3D accuracy, wide field of view and search-while-track capability.

In a recent counter-UAS competition sponsored by U.S. Special Operations Command, MESA-SSR was the primary sensor in the winning counter-UAS solution.<sup>7</sup> The competition was decided solely on performance – meaning the system with the MESA-SSR radar performed better than all other systems in the competition, including systems with phased array radars. At

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<sup>6</sup> See, e.g., “Northrop Grumman (NOC) Wins \$244M Deal to Offer AESA Radars,” NASDAQ (Jun. 1, 2017) at <https://www.nasdaq.com/article/northrop-grumman-noc-wins-244m-deal-to-offer-aesa-radars-cm797645> (citing \$243.9 million as the price tag for 72 phased-array radars with technical support (approximately \$3.3 million per radar)); “Navy awards \$41 million contract to Raytheon to provide 15 AN/APG-79 AESA aircraft radar systems,” Aerospace & Defense (Oct. 6, 2014) at <https://www.militaryaerospace.com/articles/2014/10/raytheon-aesa-radar.html> (reporting on a \$41 million contract for 15 military phased-array radars and related RF and microwave equipment for a Navy fighter-bombers (approximately \$2.73 million per radar)).

<sup>7</sup> See, Letter from Michael A. Lewis, DLA Piper LLP to Marlene H. Dortch, WT Docket No 17-352, filed July 18, 2018, for a press release announcing the results of this counter-UAS competition.



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the same time, the MESA-SSR is approximately 10 percent of the price of the phased array radar in the system that came in second in performance.

Because of the lack of affordable, high-performance radar options, some security system integrators have tried to rely on sensors other than radar – for example, cameras, radio frequency detectors and acoustic sensors. Each of these other sensors has weaknesses. Cameras and acoustic sensors have limited range, and cameras do not work well in bad weather. RF detectors cannot detect a drone that is flying by pre-programmed waypoints rather than by a command and control link. Radar, on the other hand, can detect drones at long ranges, in all weather, and even when the drone is flying by waypoint. As a result, integrators prefer to use radar as the primary sensor in multi-layered security solutions with these other sensors supplementing the radar.

### **Conclusion**

Grant of the limited waiver relief requested by Echodyne would serve the public interest by enhancing public safety and security across the country without increasing the potential for harmful interference to other radio services. Echodyne proposed a number of limitations for its waiver relief to reduce concerns over long-term spectrum squatting by waiver. To that end, Echodyne expects to submit for Commission consideration a petition for rulemaking to develop final rules for secondary use of the 24.45-24.65 GHz band. Given those safeguards, Echodyne urges the Commission, in coordination with other affected Federal Agencies, to expeditiously review and approve Echodyne's request for waiver. Grant of this request will serve the public interest by allowing deployment of high-performance, low-cost radars that will enhance the safety and security of the American public.

Respectfully Submitted,

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