Narrative Description

Pursuant to Sections 5.54(a)(1) of the Federal Communications Commission's (the "FCC" or "Commission") rules,[1] Jacobs Technology, Inc. ("Jacobs") respectfully requests a conventional experimental license for a two (2) year period commencing on October 1, 2023, to test and evaluate a 1.5m tracking earth station antenna at a University of Arizona facility in Tucson, Arizona (the "Tucson Earth Station")[2] to communicate with the Spire Mango Two experimental spacecraft in the 9400 - 9465 MHz (Earth-to-space) band.[3] The Jacobs operations proposed herein will be substantially identical to those performed at the Tucson Earth Station during the Mango One Mission, wherein no reports of interference were received. [4]

I. DISCUSSION

Jacobs provides diverse technology and cyber security solutions for government and commercial customers. The proposed experimental operations will allow Jacobs to evaluate the transmit capabilities of the antenna at the Tucson Earth Station. For purposes of the experiment, Jacobs will operate the Tucson Earth Station at relatively low power, consistent with those authorized during the Mango One Mission. The Tucson Earth Station will operate using theset forth in Table 1, below:

[1] See 47 C.F.R. §§ 5.54(a)(1).
[2] Geographic coordinates: 32° 05' 22.8" N, 110° 48' 33.1" W. The same ground station facilities were used during the Mango One experimental mission to communicate with the spacecraft in the same frequency bands. No interference was reported. *See* ELS File No. 0708-EX-CN-2020 and IBFS File No. SAT-MOD-20200603-00065 (collectively, the "Mango One Mission").
[3] *See* Spire Global, Inc., ELS File No. 0549-EX-CN-2023 (filed Mar. 27, 2023) (pending) ("Mango Two Application").
[4] *See* Mango Two Application, Narrative at 1.

Table 1. Jacobs Experimental Earth Station Characteristics

Characteristics	Description
Antenna Type	Mechanically steered, parabolic tracking antenna
Antenna Size	1.5m (General Dynamics reflector)
Antenna Gain	41.2 dBi (9875 MHz)
Antenna Orientation	Satellite Nadir
Half-Power Beamwidth	1.7° (87(25 MHz), 1.5° (1975 MHz), 1.2° (11950 MHz) (limited roll-off beyond 20˚ off boresite)
Tracking Rate	12° /sec azimuth; 7° /sec elevation (max)

Additional information regarding the Tucson Earth Station is provided in the attached NTIA.

The Tucson Earth Station will communicate with the Mango Two satellites at the 8200 MHz (space-to-Earth), and 9432 MHz and 9450 MHz (Earth-to-space) center frequencies.[5] Tucson Earth Station will track the satellites as they pass overhead, transmitting intermittently and only while the satellites are in view (one pass per day for approximately 6-8 minutes). The Tucson Earth Station will not operate below a minimum elevation angle of 10 degrees or any other minimum elevation angle at azimuth as may be coordinated with Federal users in the band. Operation of the Tucson Earth Station will be on an unprotected, noninterference basis.[6]

II. PUBLIC INTEREST CONSIDERATIONS

In accordance with Section 5.63(c)(1) of the Commission's rules, Jacobs anticipates that its proposed experimental operations will contribute greatly to the radio art and serve the public interest.[7] The proposed experiment seeks to build on the operational success of the Mango One Mission, which evaluated antenna patterns and pointing control algorithms with a single satellite.[8]

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[5] 47 C.F.R. § 5.63(c)(1).
[6] *See generally* Mango One Mission.
[7] *See* Mango Two Application, Narrative at 1.
[8] The LEMUR-2 satellite model has been previously authorized for commercial operation by the Commission. Spire has separately filed an experimental request to support this testing and demonstration mission. See Spire Global, Inc., File No. 0549-EX-CN-2023

The Mango Two mission increases the operational complexity by (1) testing the spacecrafts' ability to establish and maintain communications between a software defined radio and ground station, where the same radios are being used for intersatellite links ("ISLs") and (2) conducting real-world algorithm testing and demonstrations for geolocation, ISLs, and communications utilizing time difference of arrival ("TDOA") and frequency difference of arrival ("FDOA") to measure and compare the arrival time and doppler effect of signals from the Tucson Earth Station and received by the Mango Two payloads.[9] These proposed experimental antenna evaluations will help validate the capabilities of an innovative antenna technology for the benefit of the American public.

III. STOP BUZZER

Jacobs will have the ability to immediately cease operations should any reports of harmful interference be received. The stop buzzer contact is:

Megan Biddlecomb
7736 Old Telegraph Road Severn, MD 21144
megan.biddlecomb@jacobs.com
+1.443.274.1487 (Office)

The backup is:

Zach Baum
7736 Old Telegraph Road Severn, MD 21144
zachary.baum@jacobs.com
+1.443.274.1480 (Office)
+1.318.348.5073 (Mobile)

IV. CONCLUSION

Based on the foregoing, Jacobs respectfully requests that the Commission grant this conventional experimental license application by October 1, 2023, to permit the described operation of the Tucson Earth Station in the 9400-9465 MHz (Earth-to-space) band.

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