REQUEST FOR EXPERIMENTAL SPACE STATION PAYLOAD AUTHORIZATION

Lockheed Martin Corporation ("Lockheed Martin") hereby seeks Special Temporary Authority ("STA") under Part 5 of the Federal Communications Commission's rules to conduct payload experimental satellite operations of a CubeSat after being dispensed as part of a D-Orbit S.p.A. ("D-Orbit") InOrbit NOW (ION) launch service. The ION launch service is currently projected for a December 2021 launch from the Cape Canaveral AFS, with the goal of dispensing several CubeSat payloads at a final altitude of 525 km ± 25 km.

Specifically, Lockheed Martin herein seeks authority for the Dodona 3U experimental CubeSat program, which it will conduct in coordination with the University of Southern California ("USC") Space Engineering Research Center. The Dodona CubeSat will transmit payload and bus data from Low Earth Orbit for a period of up to 180 days.

Lockheed Martin has also consulted NOAA and secured separate authority from NOAA to operate the remote sensing capabilities of the subject payload.

Experimental mission overview.

The subject CubeSat will host Lockheed Martin's SmartSat™ capabilities, which will demonstrate complex vision processing algorithms, typically performed on the ground after downlink of raw image data.

Space Station Segment.

Dodona will be one of the CubeSat payloads that is onboard the D-Orbit ION CubeSat Carrier, which is the secondary payload on the SpaceX Falcon-9 launch vehicle. The CubeSat Carrier will dispense customer payloads at an altitude of 525 km ± 25 km.

The Dodona CubeSat will capture visible and IR images of the Earth's surface, perform image processing, and downlink both performance telemetry and partial images to the ground in the UHF frequency band identified in the accompanying FCC STA form. Additionally, a low power UHF beacon will be used as backup to downlink status and health telemetry, in case the primary transmitter experiences an anomaly or catastrophic failure.

There are two primary sensors onboard the spacecraft. The first is a visible camera and lens, and the second is a compact longwave infrared (LWIR) thermal camera.

Orbital Debris Assessment.

At the end of the Dodona mission, the CubeSat disposal will occur via natural orbital decay from LEO within 25 years. The comprehensive Orbital Debris Assessment Report is attached as a separate exhibit, per NASA-STD-8719.14.

Ground Station Segment.

The Lockheed Martin spacecraft will be under control of two earth station facilities – University of Southern California Space Engineering Research Center; and Lockheed Martin's King of Prussia, PA facility.

Lockheed Martin is licensing its own ground facility herein; USC is securing authority under a separate application to participate in this mission. The location details of those receiver facilities follow:

(1) USC Ground Station / FCC File No. 0042-EX-PN-2021
Transmitting and Receiving UHF
34-1-8.364 N / 118-17-11.724 W
(2) Lockheed Martin King of Prussia Station
Transmitting and Receiving UHF
40-5-25.469 N / 75-24-0.583 W

Additional technical details.

Lockheed Martin supplements the details on its FCC Form with these details related to the Dodona mission:

a) Orbital characteristics – Dodona will orbit the earth in a sun-synchronous orbit at 97.5 degrees inclination; Dodona is deployed at 525 km ± 25 km; Dodona is non-propulsive

b) Apogee – spacecraft's farthest distance from the Earth is approximately 525 km ± 25 km

c) Perigee – spacecraft's closest position to Earth occurs at deployment, approximately 525 km ± 25 km

d) Uplink tuning range – 0.044 MHz

e) Satellite receive antenna gain and receive system noise temperature - Antenna Gain: 0 dBic, SNT: 234 deg K

f) Earth station transmit antenna gain and sidelobe characteristics –
USC: 18.9 dBic
Lockheed Martin: 16.2 dBic, -22 dBi

g) Uplink carrier bandwidth, power and power density delivered to the earth station antenna
USC: – 20 kHz necessary bandwidth, 50 W output at power amplifier
Lockheed Martin: 20 kHz necessary bandwidth, 16 W output at power amplifier

h) Earth station receive antenna gain, sidelobe characteristics and receive system noise temperature –
USC: 18.9 dBic, 7.3 dBW EIRP and SNT of 292 deg K
Lockheed Martin: 16.2 dBic, -22 dBi and SNT of 415 deg K

i) Downlink carrier bandwidth and power density delivered to the satellite transmit antenna – 1 W power to satellite antenna, 0.044 MHz downlink bandwidth

j) Downlink polarization used – RHCP