Technical Description for Lockheed Martin Request for Experimental License and Experimental Special Temporary Authority

Overview:

Lockheed Martin wishes to evaluate emerging Ku-band satellite technology for high data rate communication to rotary wing platforms. Specifically, Lockheed Martin wishes to evaluate the ViaSat VMT1220 terminal.

Rotary wing platforms present challenges due to the rotors periodic blockage of the transmission path to the satellite. ViaSat has proprietary methods to mitigate the consequence of lost data during these periodic blockages.

The (relatively) small antennas required for aeronautical applications have wide beam-widths. This poses interference concerns to adjacent satellites. ViaSat utilizes spread spectrum techniques to lower the power spectral density to acceptable interference levels. The spread spectrum modulation combined with tracking antennas and transmission suppression techniques for off pointed conditions are key to interference mitigation.

Lockheed wishes to evaluate the present state of the art and work with commercial vendors to advance the state of the art as it relates to broadband satellite transmission to rotary wing platforms.

Power Spectral Density and Interference Mitigation strategy:

During testing, PSD shall not exceed limits specified in 25.222. Testing shall be coordinated with the satellite operator and notification will be provided to adjacent satellite operators. A control point operator will establish telephone communications with the satellite operator prior to any illumination of the satellite. The control point operator will maintain positive control of all transmissions and will cease transmission immediately upon request of the satellite operator or on request of the adjacent satellite operators.

Testing Objective:

Lockheed Martin wishes to evaluate ViaSat proprietary technology which maintains the flow of data transmission in the presence of momentary path blockage due to the aircraft's rotor blades. During testing, remote terminal antennas, or commercially available fixed VSAT antennas will be mounted on test stands underneath the rotor blades. For commercial VSAT antennas that are utilized in testing,

their sidelobe performance will exceed that of the ViaSat aero terminal antenna and further limit the PSD of interference energy.

Geographic Location:

42 05 48.6 N 76 13 28.5 W

The antennas are located on the roof of Building 80 on the Lockheed Martin Owego campus. This building is at 250 meters (822 feet) above msl. The building is 9 meters (30 feet) tall. The antennas are mounted on a lower portion of the roof and do not exceed the overall height of the building. There is a higher wall behind the antennas and a "blockhouse" providing roof access off to the side/front of the antennas. The height of these structures is 12 meters (40 feet). The height from ground to the tip of the antenna is approximately 12 meters (39 feet).

Distance to Nearest Aircraft Landing Area

The building on which the antennas are mounted includes helicopter hangars (although the antennas are not mounted on top of the hangar areas). The distance to the nearest flight pad is approximately 150 meters (492 feet). The hazard of collision is minimal since there are nearby building structures that exceed the height of the antennas.

The emissions should not present a radiation hazard to aircraft pilots or passengers.

Natural Formations and Man Made Structures

There are no natural formations and man made structures in the vicinity that would increase collision hazard by shielding the antennas from pilot vision.

Physical Address and Points of Contact:

1801 State Route 17C

Owego, NY 13827

Points of Contact:

David Lunder 607 751 5768

Rob Eckstrom 607 751 4284

Frequencies:

14,000 – 14,500 MHZ uplink (transmit)

11,700 – 12,200 MHz downlink (receive)

Desired Satellite:

Allsat, Primary operations are expected to occur on Intelsat Horizons 2 boomerang beam at 74 degrees west longitude.

Emission:

36M0G1W (return link)

18M0G1W (forward link)

Direction of Emission

In the Horizontal Plane: Azimuth 177.1 degrees

In the vertical Plane: Elevation 41.4 degrees

Feed Power and off-axis emission

Feed Powers will be limited to comply with criteria per 25.222.

Fixed Antennas:

1. Skyware Global Model 244 (type approved)
    a. TX Gain 49.3 dB
    b. 3 dB beam width 0.6 degrees
2. Skyware Global Type 960 (type approved)
    a. TX Gain 41.2 dB
    b. 3dB beamwidth 1.5 degrees
3. General Dynamics Satcom Series 1600 (experimental)
    a. TX Gain 37.3
    b. 3dB beamwidth 2.0 degrees

Aeronautical Antennas

1. General Dynamics Model 17-17A Airborne Terminal (remote terminal)
    a. TX Gain 32.1 dB
    b. 3dB beamwidth 3.4 degrees
2. DRS antenna, TBD Alternate vendor