

PUBLIC INTEREST STATEMENT

1. Introduction

By the instant application (“Application”), General Dynamics Armament and Technical Products, Inc. (“GDATP”) requests that the Commission grant to GDATP Special Temporary Authority to operate the facilities specified in the instant application.

2. Purpose and Nature of the Operation

The testing specified in this Application will be conducted by GDATP, a business unit of General Dynamics at the North Carolina National Guard facility, located at Stanly County Airport, NC. The purpose of this experiment is to assist in the rapid research, development and testing of state-of-the-art unmanned aerial surveillance technologies in support of Department of Defense activities and applications. The experiment involves two distinct efforts involving 2-way transmissions between ground-based transmitters and unmanned aerial surveillance aircraft, as follows:

**Skylark I LE UAS Data Link
(2362 MHz, 2366 MHz, 2370 MHz, 2374 MHz,
2378 MHz, 2382 MHz, 2386 MHz, 2390 MHz):**

Experiment is required to support demonstrations and theater testing by the U.S. Army 101st Airborne unit. The goal of this testing is to provide persistent, responsive battlefield surveillance at small unit echelons, and thereby provide warfighters the timely information they need to mitigate battlefield threats and reduce American casualties. Having successfully completed preliminary safety assessments and safety reports, the Stanly County, NC National Guard Facility has been identified as an “engineering center” for ongoing evaluation of UAS-based payloads and sensors to support the needs of the Warfighter, as well as long-term training of military personnel operating this technology.

**STUAS Storm UAS Data Link
(Primary: 14.7145-15.1365 GHz; 15.1365-15.35 GHz)
(Back-Up: 340-380 MHz):**

Experiment is required to support the company's proposal for US Navy and USMC Small Tactical UAS requirements. As one four competitors for this competition, and with the award having been delayed at least to the 2nd quarter of 2010, continued IR&D effort is required. As a general matter, such research will facilitate naval surveillance and ship recognizance missions, as well as to provide persistent, responsive battlefield surveillance at small unit echelons, and thereby provide warfighters the timely information they need to mitigate battlefield threats and reduce American casualties. More specifically, during this period, continued research will permit datalink development, as well as maturation of antenna pointing/tracking hardware and software integration.

NOTE: For the UHF 340-380 MHz band, *GDATP requires that only a single discrete frequency be granted* for this experiment.

3. Requested Bands

Transmissions will originate from the ground and the air, as follows:

Ground-to-Air Transmissions:

Ground-based transmissions will originate from a laptop/consul/tripod configuration, on the frequencies listed below, at temporary-fixed locations within a 5 km radius around the centerpoint coordinates of: 35-24-59 N.Lat.; 080-09-16 W.Long. (NAD 83) (Centerpoint Coordinates located at Stanly County Airport, NC, North Carolina National Guard facility):

Frequencies for Skylark I LE UAS Data Link:

2362 MHz, 2366 MHz, 2370 MHz, 2374 MHz, 2378 MHz, 2382 MHz, 2386 MHz, 2390 MHz

Frequencies for STUAS Storm UAS Data Link:

Primary: 15.1365-15.35 GHz

Back-Up: 340-380 MHz (**NOTE:** For the UHF 340-380 MHz band, ***GDATP requires that only a single discrete frequency be granted*** for this experiment.)

Air-to-Ground Transmissions:

Mobile airborne transmissions will originate from an unmanned aerial surveillance aircraft, on the frequencies and within the radii listed below, around the centerpoint coordinates of: 35-24-59 N.Lat.; 080-09-16 W.Long. (NAD 83) ("Centerpoint Coordinates") (Centerpoint Coordinates located at Stanly County Airport, NC, North Carolina National Guard facility). Maximum flight planned is 4572m above ground level. Ground elevation above sea level is 185.6m at the test site. The distance to the nearest aircraft landing area is 15 km NW (Lonesome Field, Gold Hill, North Carolina):

Frequencies and Radius for Skylark I LE UAS Data Link:

2362 MHz, 2366 MHz, 2370 MHz, 2374 MHz, 2378 MHz, 2382 MHz, 2386 MHz, 2390 MHz

Radius of Operations = 8 km

Frequencies and Radius for STUAS Storm UAS Data Link:

Primary: 14.7145-15.1365 GHz

Back-Up: 340-380 MHz (**NOTE:** For the UHF 340-380 MHz band, ***GDATP requires that only a single discrete frequency be granted*** for this experiment.)

Radius of Operations = 20 km

4. Directionality and Gain of Antennas for Ground-Based Antennas

Skylark I LE UAS Data Link (2362 MHz, 2366 MHz, 2370 MHz, 2374 MHz, 2378 MHz, 2382 MHz, 2386 MHz, 2390 MHz) For the ground station, three possible antennas may be used, namely, either a 2 dBi Omni, 9 dBi Omni, or the 18 dBi directional antenna addressed below. At any given time, only one will be actively transmitting, based on range requirements at that time. The 18 dBi directional antenna is characterized by the following:

Gain (Nominal)	Width of Beam in Degrees at half-power point	Orientation in Vertical Plane	Orientation in Horizontal Plane
+18dBi	16° in Horizontal Plane 15° in Vertical Plane	0-90°	360°

STUAS Storm UAS Data Link (15.1365-15.35 GHz) For the ground station on 15.1365-15.35 GHz, three possible antennas may be used, namely, either a 4 dBi Omni, a 15 dBi directional, or the 42 dBi directional. At any given time, only one of these three will be actively transmitting, based on range requirements at that time (the UHF back up 2 dBi Omni will also be operational at the same time.) The 15 dBi directional and the 42 dBi directional. Antenna is characterized by the following:

Gain (Nominal)	Width of Beam in Degrees at half-power point	Orientation in Vertical Plane	Orientation in Horizontal Plane
42.2 dBi	1.15° in Horizontal Plane 1.15° in Vertical Plane	-5° to 95°	0° to 360°
15 dBi	20° in Horizontal Plane 20° in Vertical Plane	-5° to 95°	0° to 360°

5. Note Regarding Maximum ERP for Ground-Based Data Link at 15.1365-15.35 GHz

For Ground-Based transmissions on the 15.1365-15.35 GHz band, there are three possible antennas which may be used, depending on UAV range requirements during the experiment. Although three possible antennas may be used, only one would be operational at any given time. For each of the three possible antennas, the transmit output power may be either 5W or 20W.

Taking into account gain and system losses for each scenario, the ERP values for the antennas would be as follows:

Ground-Based Antenna 1 (5W transmit output power + 4dBi gain) = 6.08W ERP
Ground-Based Antenna 1 (20W transmit output power + 4dBi gain) = 24.32W ERP
Ground-Based Antenna 2 (5W transmit output power + 15dBi gain) = 76.55W ERP
Ground-Based Antenna 2 (20W transmit output power + 15dBi gain) = 306.22W ERP
Ground-Based Antenna 3 (5W transmit output power + 42dBi gain) = 38,368.07W ERP
Ground-Based Antenna 3 (20W transmit output power + 42dBi gain) = 153,472.30W ERP **

**The ERP for the Ku band high gain antenna is 153 KW when using a 20 watt transmitter. However this power is contained within a 3 dB beam width of only 1.2 degrees and therefore potential for interference is significantly decreased. Propagation losses will significantly reduce this signal when it reaches the boundaries of the base. Additionally, the antenna is pointed skyward to track a UAV in controlled airspace. The likelihood of the signal causing interference is minimal. To accommodate link budget experiments, this STA Request seeks grant based on a maximum potential output power of 20W with the highest potential gain of 42 dBi. However, based on the results, GDATP will likely operate at the 5 watt level or lower for most times. This lowers the ERP to 38 KW or less, as shown above.

6. AFTRCC Coordination for 2362 MHz, 2366 MHz, 2370 MHz, 2374 MHz, 2378 MHz, 2382 MHz, 2386 MHz, 2390 MHz Frequencies

AFTRCC coordination of this application has been commenced by the applicant for the for the frequencies 2362 MHz, 2366 MHz, 2370 MHz, 2374 MHz, 2378 MHz, 2382 MHz, 2386 MHz, 2390 MHz, and the results of such coordination will be forwarded to the Commission upon completion.

7. Interference Mitigation/Stop Buzzer

All airborne operations would be closely coordinated with the North Carolina National Guard, with respect to frequency usage and air space. Although the precise flight path has not yet been identified, GDATP is willing to consider any reasonable proposed "no fly zones" within the radius, as well as reasonable proposed "time of day" restrictions. During testing, operation will be sporadic, not continuous. Training flights are envisioned to be only approximately 2 hours each.

Stop Buzzer – GDATP hereby advises that Mr. Richard Scheps will be available by wireless telephone at (802) 318-6561 and will act as a "stop buzzer" if any issues regarding interference arise during testing

Accordingly, approval of this STA Request is in the public interest, convenience and necessity.