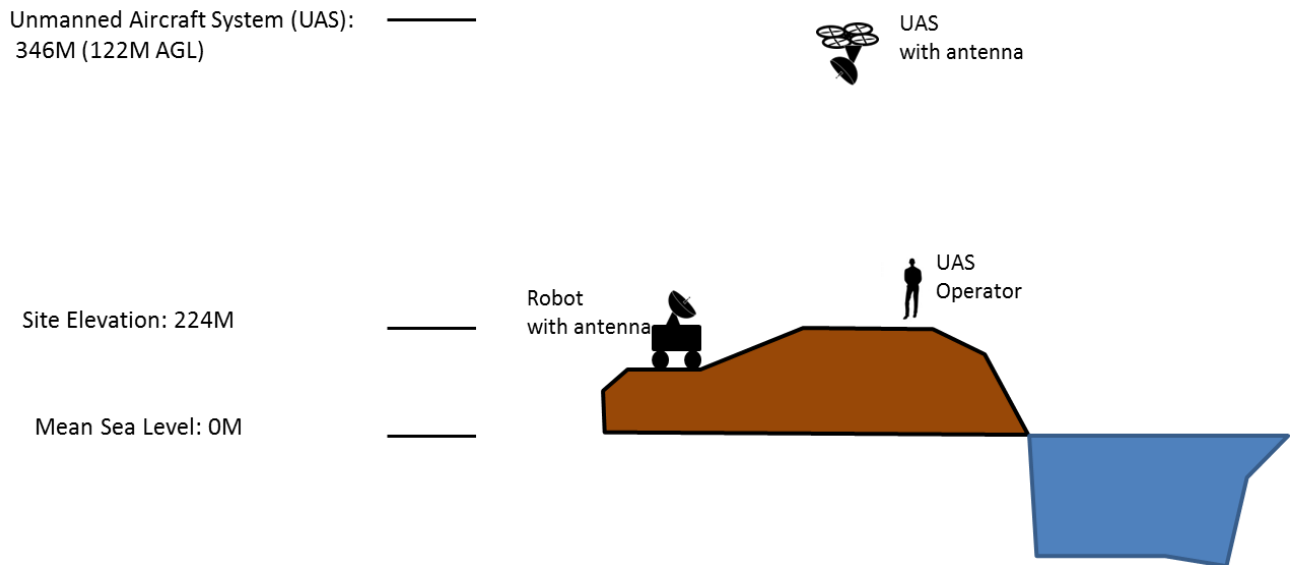


### Antenna Registration Question 5 : FAA Antenna Sketch

The antenna will be mounted to a small Unmanned Aircraft System (UAS) registered with the FAA. The UAS will operate below 400 feet above ground level. There will be additional mobile radios and antennas on the ground communicating with the antenna mounted to the aircraft systems.



### Form 442 Question 4: Government Project Description

**Is this authorization to be used for fulfilling the requirement of a government contract with an agency of the United States Government? If "YES", include as an exhibit a narrative statement describing the government project, agency and contract number.**

The project is conducted under contract number W911NF-15-C-0224 issued by the US Army ACC-APG-RTP for the Tactical Technology Office (TTO) of the Defense Advanced Research Project Agency (DARPA). The experiment is evaluating the ability to determine the location of all Warfighters in a squad without using GPS. Data needs to be transmitted long ranges between squad members in a tactical mobile ad-hoc network. We are in Phase 2 of the project. In Phase 1 we used WiFi communications to emulate the communication over shorter ranges. WiFi was sufficient for Phase 1, but even in the first phase range was limited below what we had desired. In Phase 2 we need much longer ranges and more reliable communications.

### Form 442 Question 6 : Description of Research Project

**Is this authorization to be used for providing communications essential to a research project? (The radio communication is not the objective of the research project)? If "YES", include as an exhibit the following information:**

- a. A description of the nature of the research project being conducted.**
- b. A showing that the communications facilities requested are necessary for the research project.**
- c. A showing that existing communications facilities are inadequate.**

a. The experiment is evaluating the ability to determine the location of all Warfighters in a squad without using GPS. Data needs to be transmitted long ranges between squad members in a tactical mobile ad-hoc network. We are in Phase 2 of the project. In Phase 1 we used WiFi communications to emulate the communication over shorter ranges. WiFi was sufficient for Phase 1, but even in the first phase range was limited below what we had desired. In Phase 2 we need much longer ranges and more reliable communications. The radios are not the subject of the testing, rather they are facilitating the data sharing necessary between Warfighters.

This research project will involve testing at multiple sites. Each test site is listed as a mobile antenna in the application.

b. The experiment is for the Tactical Technology Office (TTO) of the Defense Advanced Research Project Agency (DARPA). DARPA wants to see the experiment progressing towards advanced technology available to the Warfighters in combat. The project requires high data throughput over longer ranges supported by WiFi.

c. We used WiFi communications in the first phase of the project, which suffered in range and ability to regulate an ad-hoc network. We have reached the limit of testing our project with WiFi and need longer range, mesh network capabilities.