Raytheon Missile Systems
Experimental STA Application
File No: 1750-EX-ST-2016

Explanation of Experiment and Need for STA

Background:

Raytheon Missile Systems (Raytheon) is a US defense contractor that develops sophisticated technologies for the US government and governments around the world. Some of the development of new technologies is conducted under contracts with federal agencies; however other technology development is done for independent research and development (IRAD) which leads to innovation and new products.

The Advanced Security and Directed Energy Systems product line at Raytheon is focused on developing security solutions for critical infrastructure protection, homeland security, high value target security, etc. The system projecting a narrow energy beam towards a target. This Experimental STA application is being submitted to allow for testing on inanimate targets to advance the development of the technology.

This proposed testing is being conducted under a US Army Contract: H94003-04-D-0006.

New Testing is required to meet contractual requirements of the US Army

Raytheon has been working on the development of its active denial technology for years. The US Army customer is now requesting that Raytheon test the system. The relevant contract number is: H94003-04-D-0006.

The application being filed here is a request for authorization to conduct temporary testing, with parameters that focus on developing test data that the Army has requested. The testing will strictly adhere to RF safety standards.

The currently proposed testing will use infrared imaging of patterns on a target. There will be NO HUMAN TESTING conducted under the requested license.

The purpose of the currently proposed testing is to develop additional data on how the directed RF energy affects the targets, how to build safety controls into the directed energy device while giving the device the flexibility to work in ways that might be useful, and to learn more about the characteristics of directed radio waves and how they propagate and perform under a variety of circumstances.

Need for an STA

In this instance an STA is appropriate because of the short-term nature of the proposed testing. Raytheon's contract calls for testing until delivery of the system. The system delivery is scheduled for early March 2017. In an abundance of caution, Raytheon is seeking this STA for 3 months, from January 15 to April 15, 2017, so that it can properly conduct all the required testing and be able to finish its work even if the delivery date slips. Because of the short-term nature of the testing, an STA is the proper licensing mechanism for the testing.

Technical Synopsis:

In the development of this unit, the energy will be highly directed.

- Frequencies: 91.0 to 96.0 GHz, primary use is on 92.75 GHz
- ERP: 7 kW
- Azimuth: limited at each location
- Beamwidth: Variable

Operations are similar to those authorized under Raytheon's experimental license WG2XHU

The proposed testing is an adaptation of testing that is currently authorized under WG2XHU. The key differences from the existing authorization include:

- Spectrum: this application requests use of 5 GHz of spectrum from 91-96 GHz
- Lower power: the previous ERP is 50 MW, the current request is for an ERP of *only* 7 kW
- Two additional locations: This application requests the ability to test at another location on the Raytheon plant site and at a location near Florence, AZ.

The operations are otherwise consistent with those that are currently authorized.

Time of Use:

The unit would be used at location 1 from 5pm to 5am.
The unit would be used at location 2 and 3 from 5am to 5pm after all testing at location 1 was complete.

Location of Experimentation:

Raytheon is requesting authorization to test at three locations.

Location 1: a Raytheon facility at 3292 E. Hemisphere Loop, Tucson, AZ. At this location, all operations will be conducted indoors. The operations will be in a 20-degree arc from azimuth 170 to azimuth 190. This testing would be inside an industrial building with metal exterior walls.

Location 2: Raytheon plant site test area, this is the current site of testing for this device under WG2XHU. The testing is outdoors, between buildings, across a 15-degree arc from azimuth 225 to azimuth 240. The energy is directed across unpopulated desert.

Location 3: Area adjacent to the Florence Military Range. The operations will be outdoors, directed across unpopulated desert. Operations will be across an arc between azimuth 0 and azimuth 90. In this instance, the operations will be directed across a range of elevation from 0 to 60 degrees. This will test the tracking of the system to see if it can acquire and target flying unmanned objects.

The experiments will only be conducted in a very limited area which will be cordoned off with signs posted in advance of testing.

Raytheon is seeking authorization to transmit across an arc at each location because the program needs to explore the tracking ability of the technology. The ability to track a target is an important component to the developed product, but it is impossible to determine how to use the tracking, and effectively test the focus and defocus of the device when it is tracking a moving target.

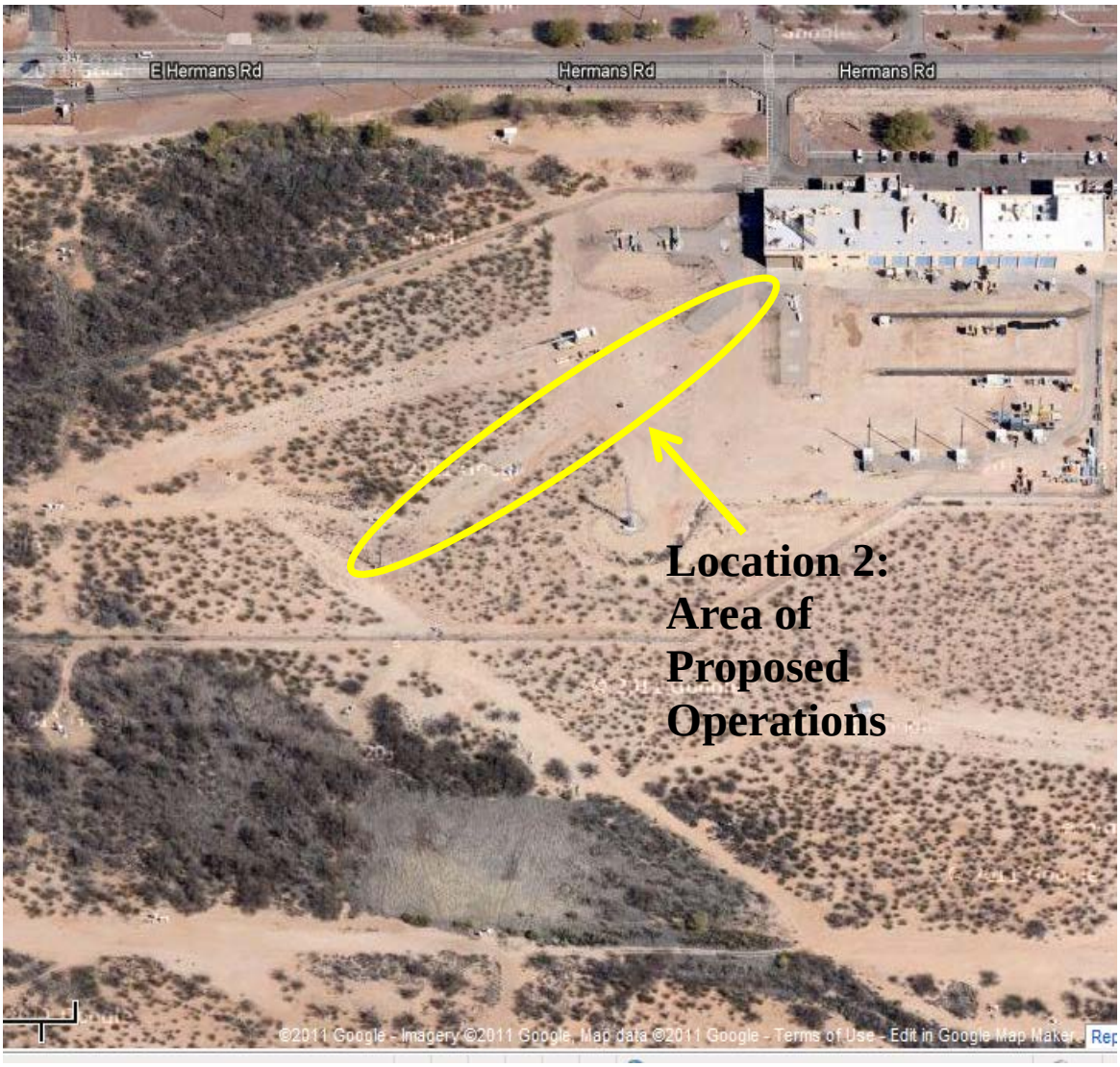

Figure 1: Area of proposed testing on RF test range at Location 2

RF Safety is of paramount importance in moving forward with testing:

Raytheon's RF Safety team has been thoroughly briefed on the proposed experimentation, and they have written a proprietary and confidential plan for the protection of the Raytheon workforce to ensure that Raytheon is in compliance with all RF safety requirements.

The RF Safety plan includes: cordoning off areas from all unauthorized personnel prior to activation of the directed energy device. The cordoned areas have signs posted at the perimeter to ensure that unauthorized personnel stay out of the area. A copy of the warning sign is attached to this exhibit.

The program has designated a RF safety officer who is responsible for ensuring that any and all operations by the program are fully compliant with the RF Safety plan. The safety officer has stop buzzer authority.

Stop Buzzer Point of Contact

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Conclusion:

Raytheon is proposing additional temporary experiments with its directed radio energy technology. The experimentation is being conducted to comply with Raytheon's US Army Contract: H94003-04-D-0006.

The beam must be coherent, discrete, and controllable. Development of such devices requires advanced engineering and extensive testing across a wide set of parameters to ensure the safety of the device.

As Raytheon stated above, the proposed testing is to be on targets only; there will be no human testing under this proposed license.

For further information, please contact Thomas J. Fagan, Spectrum Manager, Raytheon Missile Systems, 520-794-0227 or tjfagan@raytheon.com or Anne Linton-Cortez, WFS, 520-360-0925, alc@conspecinternational.com.

RF Safety Warning Sign