

Supplemental Statement to STA Applications

File 0698-ST-2016 and File 0699-ST-2016

INTRODUCTION

The Johns Hopkins University Applied Physics Laboratory (APL), FRN: 0004954970, is applying for these special temporary authorizations (STA) pursuant to Part 5 of the Commission's Rules for work under a military contract. Attachment 1 is a letter confirming to FCC that this work is part of such a contract. This program is the Defense Advanced Research Projects Agency's (DARPA) "Advanced RF Mapping (RadioMap)". This test is the next phase of earlier testing that was done in 2014 under experimental licenses WH9XOU (File 0509-EX-ST-20140 and WH9XRP (File 0480-EX-ST-2014)

The reason for 2 separate applications is to speed processing:

- **0698-ST-2016** deals with frequencies that only have non-federal government (NG) allocations and thus appear to be subject solely to FCC review. We request quick turnaround, if possible, so we can commence the many coordinations that are needed with NG licensees to seek their consent. This test will be Marine Corps Base Quantico VA
- **0699-ST-2016** also deals with only NG allocations and will be in Arlington Virginia.

We expect that a separate application will be made through Marine Corps channels to NTIA for G spectrum for the Quantico test, but not for the Arlington test

We intend to only use a small fraction of this spectrum and ALL USE WILL BE COORDINATED IN ADVANCE WITH LICENSEES in any case where the power and geometry raises THE SLIGHTEST concern about interference. We are fully aware of

the requirements of §5.84 of the Commission's Rules and our obligation to avoid all interference to other licensees as well as federal users.

Thus we are seeking very limited access to 470 – 928 MHz, as described below, for a test of a new passive system that is being developed – RadioMap.

WHAT IS RADIOMAP?

Three problems facing different user communities motivate this research:

- Spectrum managers, and Dynamic Spectrum Access systems that perform automatic spectrum management functions, lack real-time awareness of spectrum usage variations across frequency, geography, and time. This reduces the efficiency of spectrum allocation and sharing, and thus reduces the total achieved mission benefit from the RF spectrum.
- Small tactical units such as platoons or companies rarely have Electronic Warfare/Intelligence, Surveillance and Reconnaissance (EW/ISR) capability. A system that provides RF situational awareness and the ability to control the immediate RF environment as needed will offer significant benefits for mission effectiveness and force protection.
- EW and ISR coverage is limited in some operational contexts by the high cost of current EW/ISR systems and platforms. An affordable system that provides broad coverage to cue and support the more focused high-capability EW/ISR systems would offer significant value.

The vision of the Advanced RF Mapping program (RadioMap) is that these problems can be solved if deployed RF devices support RF situational awareness and other EW/ISR functions in addition to and without harm to their primary mission. In particular, flexible and tunable devices such as software-defined tactical radios can offer high benefits through their ability to perform a range of scanning, monitoring, and transmission functions. Employing existing RF devices will reduce the cost and delay of deploying new networked EW/ISR functions while making EW/ISR functions more widely available on the battlefield.

The primary goal of the present funding opportunity is research on RF situational awareness oriented towards addressing the problems of the three user communities described above. ¹

Johns Hopkins University Applied Physics Laboratory (JHU/APL) is supporting DARPA in this program. They will be conducting testing of RadioMap systems developed by two contractors. A STA is needed to produce test signals that will be used to assess the performance of the two system implementations. This testing is planned to take place in Arlington County, Virginia during the month of July 2016 and at MCB Quantico during June 27 - July 1, 2016 (dry run) and July 4 - 8, 2016 (demo). During this test periods a variety of short transmissions are needed to verify the capability of the prototype systems to detect selected signal types.

UNUSUAL NATURE OF EXPERIMENT LIMITS INTERFERENCE RISK

The Radiomap technology is a purely passive system. The testing of this technology requires controlled testing which incorporates a set of brief test signals in the operating area over the operating frequency range that are known to the evaluators but unknown to the prototype operators. This STA deals with the authorization to transmit those brief test signals. There is no intention of the applicant or its sponsor to seek long term access to this spectrum for this program.

It is anticipated that testing will involve only 5 days over the period of the proposed STA and that about 10 frequencies are needed for short transmissions of

¹ Defense Advanced Research Projects Agency (DARPA), Strategic Technology Office Broad Agency Announcement, "Advanced RF Mapping (RadioMap)", DARPA – BAA- 12-26, February 29, 2012. (<https://www.fbo.gov/utills/view?id=6abd9ba7e59f6aab73a3a963a9822229>)

less than 10 minutes each day. Most frequencies will be only needed for 3 days, one setup day, and a 2 days of testing for a given prototype system. Different frequencies will be used for each prototype to ensure fair testing. A few narrow band channels will be needed for an additional 2 days of demonstrations late in the STA period, thus some narrow band channels will be needed for a total of 5 days although their use will be limited to less than 10 minutes/day.

While we are applying for a 10W transmitter power, we expect to keep most transmission to less than 1W. The higher power is required for signals with bandwidths up to 10MHz. The lower power is required for signals less than or equal to 50 kHz bandwidth.

COORDINATION WITH PRIMARY USERS

The frequency bands of interest in 470-928 MHz and 1710-1910 MHz. We request that the STAs cover that entire bandwidth and expect that the license be conditioned on coordination with any incumbent licensee that might be affected by these transmissions. We agree with such a condition and have already initiated contacts with representatives of primary users.

In our discussions with primary users we will consider the possibility of real time coordination during the tests for frequencies that are part of continuously used systems. That is we will offer to confer with the primary user in real time to confirm the channel is free and is expected to be free for the required 10 minutes.

We will also be willing to stay in contact during the 10 minutes of emissions and vacate immediately if the frequency is needed. No channel will be used that has a licensee's service area is close enough to the proposed transmissions that raises a realistic question of interference without explicit coordination with the licensee or his coordinator.

AREA OF OPERATION

For the Arlington VA request, File 0699-EX-ST-2016, we are requesting a circular license area for our mobile test signals to meet the limits of the application process, we will not be using the whole circular area. All proposed operating sites are within Arlington County and the operating area is shown below in Figure 1:

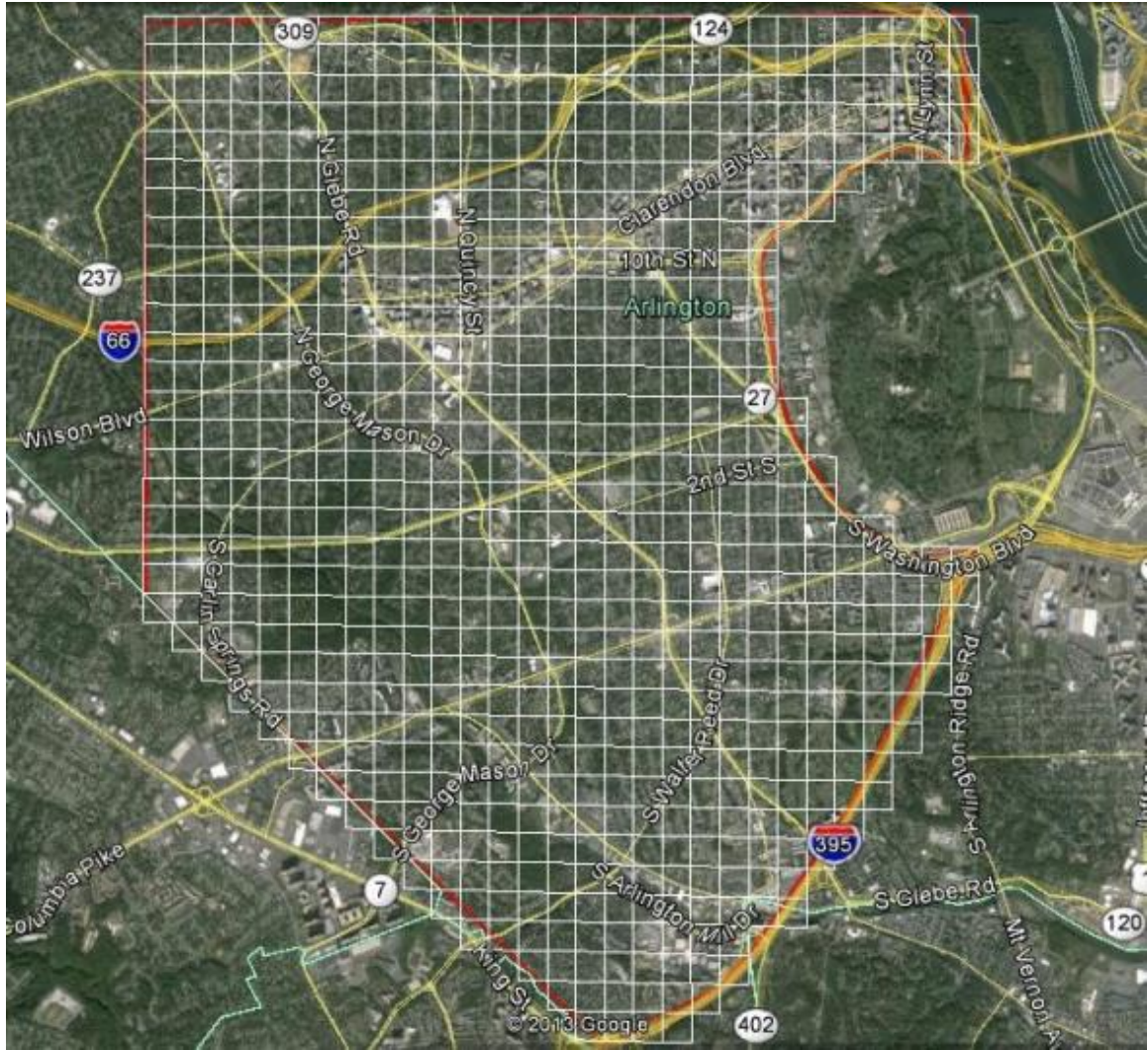


Figure 1: Proposed Operating Area in Arlington County, VA

The MCB Quantico request, 0698-EX-ST-2016, is for a much smaller circle near the base parade ground.

TRANSMITTER

All tests will be done from a vehicle mounted transmitter that will be parked during all transmissions. The equipment used will be the Agilent Signal Studio, combined with an Agilent Vector Signal Generator, followed by a power amplifier and omni antenna.

STOP BUZZER and Contact Information

During the period of operation of these tests, the following phone number can be used as a “STOP BUZZER” in order to order an immediate cessation of transmissions:

443-928-9004

APL contact during test is Steve Jones, Steven.Jones@jhuapl.edu; Office:240-228-6349 Mobile: 443-928-9004

LICENSE CONDITIONS

The previous license we had for similar tests was WH9XOU (File 0509-EX-ST-2014). It had the following special conditions:

- (1) In lieu of frequency tolerance, the occupied bandwidth of the emission shall not extend beyond the band limits set forth above.
- (2) Operation is subject to prior coordination with the Society of Broadcast Engineers, Inc. (SBE); ATTN: Executive Director; 9102 North Meridian Street, Suite 305; Indianapolis, IN 46260; telephone, (866) 632-4222; FAX, (317) 846-9120; e-mail, executivedir@sbe.org; information, www.sbe.org.
- (3) Licensee should be aware that other stations may be licensed on these frequencies and if any interference occurs, the licensee of this authorization will be subject to immediate shut down.

We expect similar conditions for this application and agree to meet them. We are also willing to accept other conditions that the Commission may find appropriate for this unusual request for defense-related research.

Contact for matters concerning STA application and review: Michael Marcus, mjmarcus@marcus-spectrum.com, Office 301-229-7714 Mobile: 301-980-3563



DEPARTMENT OF THE AIR FORCE
AIR FORCE RESEARCH LABORATORY (AFRL)

12 May 2016

Mr. Nnake Nweke
Chief, Experimental Licensing Branch
Office of Engineering and Technology
Federal Communications Commission
445 12th Street, NW
Washington DC 20554

Dear Mr. Nweke,

Johns Hopkins University Applied Physics laboratory (JHU/APL), FRN 004954970, is working under contract HR0011-12-D-0001 on the Defense Advanced Research Projects Agency (DARPA) RF Mapping (RadioMap) program. This program characterizes spectrum usage by determining power spectral density vs frequency in space and time over a specified spectral extent, geographical area and temporal duration.

JHU/APL is applying to your branch for a Special Temporary Authorizations for brief low power radio transmissions in both Arlington County, Virginia (July 1-29, 2016) and Marine Corps Base Quantico, VA (June 27- July 8, 2016). These licenses will be used to support testing RadioMap technology. The FCC file numbers for the applications are 0698-EX-ST-2016 and 0699-EX-ST-2016

I certify that this work is needed in support of this military contract and request your timely consideration. For further information, please contact the DARPA Program Manager, Dr. Joseph Evans, joseph.evans@darpa.mil, (571)-218-4446, DARPA STO.

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