# EXHIBIT A

## Narrative Statement

By this application, and pursuant to Section 5.61 of the FCC Rules, 47 C.F.R. § 5.61 (2012), Booz Allen Hamilton Inc. ("Booz Allen") respectfully seeks a 6-month experimental special temporary authorization ("STA") beginning May 23, 2014, to develop, test and demonstrate prototype remote sensors with low power communications equipment that will operate on channels centered on 313 MHz and 315 MHz allocated for non-multilateration operations.

A separate request for expedited treatment is being submitted concurrently with this application.

The following information is provided in support of this filing:

1) **Need for a special temporary authorization**
   Booz Allen needs a 6-month STA to accommodate functionality and acceptability evaluations at a remote test site in New Mexico before planned demonstrations scheduled for prospective Federal Government users scheduled for later this year at the test site, at other Booz Allen locations, or at user locations. Booz Allen will seek further authorization as needed to test at other locations.

2) **Purpose of Operation**
   The proposed operation will allow Booz Allen to test and demonstrate a low power communication transceiver module for point-to-point land communications.

   Booz Allen does not seek authority to conduct market studies or provide communications services under the requested experimental authority. The participants in the test will be advised that: (a) the test is being conducted under an experimental authority issued to Booz Allen, (b) Booz Allen is responsible for operations, (c) all operations are conducted on a non-interference basis, and (d) after the test is completed, Booz Allen will retrieve and recover all devices that do not comply with FCC regulations. Booz Allen understands that the FCC may specify these as well as other conditions on its authorization.

**3) Experimental Basis**

a. Prior results and basis

Booz Allen is developing sensor electronics with specialized communications capability and potential application to United States Department of Defense ("DoD") agencies which have interest in advanced communications devices and systems for safety, security, and protection. Under FCC Experimental License Grant, Call Sign: WG2XXV, File No. 0702-EX-PL-2013, Booz Allen is developing the core radio technology with experiments operating in the 915 MHz band. While this work has allowed it to make significant design advances, there is concern that tests in the 915 MHz band do not accurately reflect propagation and system performance in the 300-350 MHz band, an important band for DoD ground, mobile, and satellite communications. To address this concern, Booz Allen requests permission to perform limited tests at a private test range to determine range scaling of its prototype system operating in the 300-350 MHz band. Specifically, to understand system performance of at frequencies and levels that would satisfy DoD requirements, Booz Allen is requesting this experimental license to perform limited ground based testing at 313 and 315 MHz at up to 30 dBm ERP. In sum, the proposed operation is not for the development of a product for the non-federal market.

b. Existing primary licensees

Booz Allen recognizes that operation in this band is primarily authorized for the US military to operate mobile-satellite service and for fixed and mobile services. The US military uses frequencies in the 300-320 MHz band for UHF Follow-On ("UFO") ground to satellite communications and for Mobile User Objective Systems ("MUOS") ground to satellite communications. In addition, under Part 15 of the FCC's Rules, some tire pressure monitors and garage remote controls use 315 MHz transmissions at very low powers.

The UFO system uses a channel based approach to spectrum utilization outlined in Appendix A of "UHF TACSAT/DAMA Multi-service tactics, techniques, and procedures" (FM 6-02.90/ MCRP 3-40.3G /NTTP 6-02.9 / AFTTP(I) 3-2.53 August 2004). However, at 313 and 315 MHz, there is no UFO system utilization. Specifically, MOUS is described as follows:

> "The mobile user objective system (MUOS) is a narrowband military satellite communications (MILSATCOM) system that supports a worldwide, multi-service population of mobile and fixed-site terminal users in the ultra high frequency (UHF) band, providing increased communications capabilities to smaller terminals while still supporting

> interoperability with legacy terminals. MUOS adapts a commercial third generation (3G) wideband code division multiple access (WCDMA) cellular phone network architecture and combines it with geosynchronous satellites (in place of cell towers) to provide a new and more capable UHF MILSATCOM system. The constellation of four operational satellites and ground network control will provide greater than 10 times the system capacity of the current UHF follow-on (UFO) constellation and a unprecedented level of availability and access-on demand to satellite communications."

(Nicholson, J., "Status of the Mobile User Objective System," *Military Communications Conference, 2006. MILCOM 2006. IEEE* , pp. 1,4, 23-25, Oct. 2006)

The MUOS system uses Spectrally Adaptive Wideband Code Division Multiple Access (SA-WCDMA) waveforms in four 5-MHz channels at 300-320 MHz. The SA-WCDMA modulation can coexist with many other users sharing the same bandwidth, enabling MUOS to share the band without serious performance degradation; in addition, adaptive signal processing will notch out interferers further protecting MUOS from interference.

c. <u>Interference mitigation techniques</u>

For this work, Booz Allen has identified several approaches to mitigate or eliminate interference to operations of existing licensees: location isolation, RF propagation control, attentive test frequency selection, low messaging rate. Location isolation seeks to place sufficient physical distance between the test system and any primary licensee operation, such that the test signals are attenuated, by physical obstructions or free-space path loss to levels to cause no interference. RF propagation control uses antenna configurations that reduce test signal radiation in the direction of primary licensee operations; for instance, using antennas that radiate only in the azimuthal plane and significantly attenuate elevated signals will significantly mitigate interference to satellite operations. Attentive test frequency selection mitigates interference by simply not operating on channels used by the primary licensee. Low messaging rate mitigates interference by using the primary licensee frequencies infrequently, e.g., < 2 messages a day, for short durations (<1 second).

**4) Technical Specifications**

a. Power Levels

i. Transmitter Power Output ("TPO"): 1W peak
ii. Effective Radiated Power ("ERP"): 3W peak
iii. Necessary bandwidth:
1. 5 kHz for low data rate operations
2. 25 kHz for high data rate operations
iv. Modulation: BFSK, QFSK, QAM
v. Emissions: F1D, F2D
vi. Center Frequencies: 313 MHz and 315 MHz
vii. Antenna: Antennas will be selected to direct radiated power into the horizontal direction, and significantly reduce power radiated in a vertical direction. Examples are single dipoles with <3dB gain in horizon/azimuthal direction and <-20 gain directly overhead/vertical; simple dipole arrays including directors will increase the directivity and further reduce interference to existing licensees.
viii. Notes: Other emission modes may be utilized, but in no event will the emissions extend beyond the center frequencies and bandwidths requested. Consistent with the experimental power levels requested in this application, all power levels will comply with the limits set forth in the FCC's rules, including those relating to human exposure to radiation.

b. Antenna Information

The antennas that would be deployed under this license will not extend more than 3 meters above the ground.

Omnidirectional antennas will be used in experiments that produce azimuthal coverage and significantly limit emissions above the horizontal plane.

c. Proposed Location

Booz Allen seeks authority to operate, evaluate and demonstrate products at the premises of entities working under Booz Allen's authorization during the design and development of the devices and related products. Specifically, Booz Allen seeks authority to conduct its experimental operations at a privately owned, isolated test range specified in the FCC Form 442. These operations would be consistent with the requirements set forth in Section 2.805 of the Commission's marketing rules, 47 C.F.R. § 2.805 (2012). The operations would also be consistent with the requirements set forth in 47 C.F.R. § 15.231(a) in terms of duty cycle, but not with respect to radiated power.

d. Equipment To Be used

Booz Allen proposes to deploy only a limited number of devices which, as noted above, would operate at low power levels. It expects to be able to complete its experimentation and demonstration with a maximum of 4 devices. During the experimentation, Booz Allen will also limit the power, area of operation, and transmitting times of these units to the minimum necessary to evaluate the equipment.

e. Primary Licensee Interference Mitigation Plan

As described in Section 3, Booz Allen is requesting an experimental STA to perform limited testing on channels centered on 313 and 315 MHz at up to 30 dBm ERP, frequencies and power levels that would satisfy DoD requirements.

Booz Allen understands that the primary licensee in this band is the DoD. To mitigate interference, it will use the techniques outlined in section 3.c.

Testing will be performed at Flying H ranch, http://felixcanyon.com/index.html, a private test range occupying 150,000 acres in New Mexico. Testing areas on the ranch are over 100 miles from other public or private lands; free space path loss over 100 miles reduces RF levels by >126 dB. The range is surrounded by mountains, providing additional significant RF isolation at the ranch.

Testing will use antennas that radiate preferentially in the azimuthal plane and attenuate signals above ground elevations. A typical dipole will produce 2-3 dB of gain uniformly about the azimuth, however, into the direct overhead elevation attenuation will be >20 dB.

Booz Allen is requesting test frequencies, 313 and 315 MHz, chosen at spectrum locations away from existing licensee UFO channels and at the boundary of MUOS channels. Simply avoiding existing service frequencies will mitigate or eliminate interference to primary licensee services.

Finally, Booz Allen will configure its electronics to produce a low rate of RF messages, and those messages will be less than one second in duration. Booz Allen anticipates that the operation will generate 2-4 messages a day, and these messages will occur at random times. Its analysis predicts that the test will use the RF spectrum less than 0.005% of time.

Based on this mitigation plan, Booz Allen submits that its experimental operations and demonstrations are highly unlikely to cause interference to existing frequency licensees.

**5) Restrictions on Operation**

Booz Allen does not propose to market, sell, or lease any prototype equipment to end users. After the experimentation and demonstrations cease, Booz Allen will recall and recover all devices. If any different treatment becomes necessary during the course of its experimentation and demonstrations, Booz Allen will seek separate and additional authority from the agency.

Booz Allen also recognizes that the operation of any unapproved or unlicensed devices under experimentation must not cause harmful interference to authorized facilities. Should interference occur, Booz Allen will immediately take reasonable steps to resolve the interference, including if necessary discontinuing operation. To that end, Booz Allen would advise entities using the equipment that permission to operate the equipment has been granted under experimental authority issued to Booz Allen, is strictly temporary and may be canceled at any time. It will also advise entities that operation is subject to the condition that the equipment may not cause harmful interference. Specifically, Booz Allen proposes to label the equipment conspicuously as follows:

**FCC STATEMENT**

Permission to operate this device has been granted under experimental authority issued by the Federal Communications Commission to Booz Allen Hamilton Inc., is strictly temporary, and may be canceled at any time. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received including interference that may cause undesired operation.

This device has not been authorized as required by the rules of the Federal Communications Commission. This device is not, and may not be, offered for sale or sold until the approval of the FCC has been obtained. Thus, the user does not hold a property right in the device and may be required to return the device.

Moreover, Booz Allen submits that its experimental operations and demonstrations are unlikely to cause interference. Booz Allen intends to monitor use of the relevant frequencies before commencing transmissions, and it will not operate if the frequencies are in use.

**6) Public Interest**

Booz Allen submits that issuance of an STA is in the public interest, convenience, and necessity. Grant of an STA will permit Booz Allen to develop innovative equipment that will accommodate the communications needs of the US military.

**7) Contact Information**

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