

Department of the Navy SBIR/STTR Transition Program

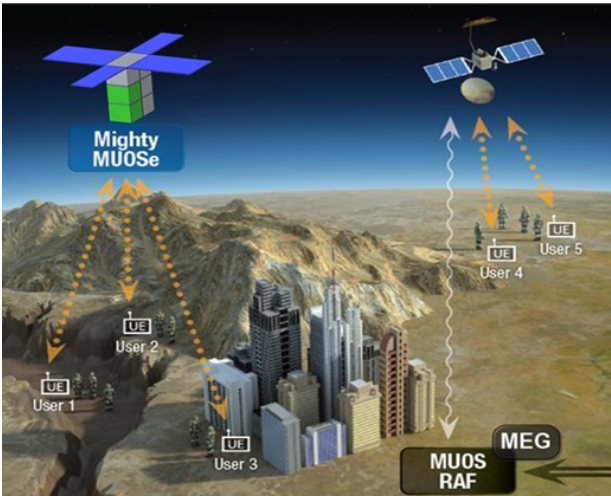
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NAVWAR PAO: 29 Jan 2020

Topic # N171-098  
Cellular Base Station for Low Earth Orbit Space Missions  
W5 Technologies, Inc.

WHO

**SYSCOM:** NAVWAR  
**Sponsoring Program:** Program Executive Office Space Systems (PEO Space)  
**Transition Target:** Mobile User Objective System (MUOS)  
**TPOC:**  
619-553-1020  
**Other transition opportunities:** Global Beyond Line of Sight (BLOS) Satellite Communication (SATCOM) coverage is used by all services. In addition to the increase in reliable communications links, the reduced voice delay and increased battery life will make this technology very attractive to ground soldiers.



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WHAT

**Operational Need and Improvement:** The Mobile User Objective System (MUOS) is a military communications satellite system designed to improve and expand ground communications for the disadvantaged user. The Wideband Code Division Multiple Access (WCDMA) waveform is an air interface standard found in 3G mobile telecommunications networks, including a modified military waveform designed for MUOS. Currently, the four MUOS satellites in geosynchronous orbit leave a gap in coverage beyond 65 degrees latitude. Deploying a miniaturized MUOS call processing payload on a CubeSat constellation will expand the MUOS coverage area, as well as offer the warfighter multiple beams of communication.

**Specifications Required:** The high-level requirements for this effort are:

- Create a MUOS Call Processing Payload capable of flight at low earth orbit (LEO)
- Meet the CubeSat Design Specifications
- Fit within approximately 10X10X30 cm and have a mass of 5 kg or less
- Inter-operate with existing MUOS terminals

**Technology Developed:** W5's Mighty MUOS Extender (MUOSe) is a 2U CubeSat payload capable of providing MUOS coverage to MUOS terminals from Low Earth Orbit. The MUOSe can locally connect MUOS terminals within it's beam to share voice or data. With the low SWAP of the MUOSe, an optional backhaul link can be added to the satellite to provide reach back capabilities to users outside of the MUOSe's coverage beam.

**Warfighter Value:** A constellation of MUOSes is cost effective. It can provide persistent coverage of the polar regions for less than the price of a traditional geosynchronous equatorial orbit (GEO) Satellite launch. The MUOSe's advanced algorithms allow access to the MUOSe LEO constellation using the MUOS terminals already installed in ships, no need to upgrade or install a second terminal.

WHEN

Contract Number: N68335-18-C-0262 Ending on: July 26, 2019

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Environmental Testing	Med	Meet Thermal, Shock & Vibe requirement	4	April 2020
Revised Prototype Gen 2	Low	Prototype Gen 2 is produced	4	July 2020
Final Lab Validation	Low	MUOSe passes system test cases for orbital operation	5	July 2021
Initial On-Orbit Test	High	MUOSe processes MUOS call while on-orbit	6	July 2022

HOW

**Projected Business Model:** W5 Technologies, Inc. will produce the MUOSe, MUOS call processing payload, for initial on-orbit testing and low rate production. W5 has the manufacturing capability to produce one MUOSe every 4 months with the initial delivery of 12 months after order. For full scale production, W5 will partner with a Defense prime or space payload manufacturer to increase the production rate to fulfill an order for a full constellation.

**Company Objectives:** W5's business strategy is to look for opportunities to incrementally build upon our product portfolio to solve the needs of the warfighter. W5 currently sells the Mighty MUOOS, the world's first and only MUOS System Simulator. The Mighty MUOOS is an off-satellite MUOS system emulator capable of supporting MUOS terminal development, regression, terminal integration, interoperability testing, and application development. W5 is currently building the prototype of the MUOS Extension Gateway (MEG), which will increase external access to the MUOS system.

**Potential Commercial Applications:** The Mighty MUOSe is based on commercial cellular technology. With a software update and re-tuning the RF front-end, the MUOSe can provide 3G WCDMA or 4G LTE coverage from low earth orbit. W5 is assessing if this technology could play a role in providing affordable global internet access or temporary cellular coverage during a natural disaster.