Unicorn Blue to Explore Novel SIGINT, Offensive Cyber Solutions

Geon Technologies LLC (Columbia, MD) and North Point Defense (Rome, NY) have each been awarded $49.9 million contracts to investigate advanced techniques and technologies for signals intelligence (SIGINT) and cyber exploitation under the Air Force Research Laboratory's (AFRL's) Unicorn Blue program.

According to the AFRL, the Unicorn Blue program is intended to enhance and upgrade capabilities for intelligence, surveillance and reconnaissance (ISR) missions and Offensive Cyber Operations (OCO). The 60-month contracts, placed by the AFRL's Information Directorate (Rome, NY) in July, will see Geon Technologies and North Point Defense work to develop and mature digital signal processing capabilities able to scan through the RF spectrum to detect high priority emissions. The companies will also perform research, development and integration of technologies that will provide collection, detection, exploitation and geo-location capabilities of emerging signals of interest for various collection platforms.

Unicorn Blue has been established in response to the emergence of adversary/threat systems embodying techniques and technologies simultaneously using multiple portions of the electromagnetic spectrum and cyberspace. "As such, novel processing techniques are required to provide decision-makers with relevant information in near real-time," according to the Statement of Work. "New technologies will enable edge processing against emerging communications targets. Software Defined Radio development will be heavily leveraged to promote modularity in distribution of the newly developed capabilities. New algorithms will be developed for implementing machine learning (ML) and artificial intelligence

(AI) methodology to add greater autonomy to unmanned sensors."

In its original Unicorn Blue solicitation, the AFRL noted the increased challenge posed for SIGINT operations against uncooperative, denied targets in environments characterized by noise, channel conditions and obfuscation efforts. It further identified the need to alleviate the high workload of mission analysts through increased automation, aided by AI/ML, to perform modulation identification, internal data structures and overall signal classification.

Against this backdrop, Unicorn Blue is intended to focus on providing real-time processing solutions – while expanding the unique knowledge and experience base – to automatically extract the contents of transmissions and provide time-critical alerts and information on the signals collected. Additionally, this effort will develop prototype systems that can be rapidly fielded, upgraded and transitioned to the frontline community to meet current and emerging requirements. The Unicorn Blue program is focused on two general lines of effort: ISR capabilities for tactical and strategic forces, and capabilities for cyberspace operations. "Work undertaken will intrinsically develop, improve, and/or advance capabilities for both ISR and OCO," said the Statement of Work. "Unique signal processing methods will be explored to expand multi-access techniques OCO opportunities. Innovative Cyberspace applications will create capabilities for network awareness and effects while exposing new ISR opportunities."

SIGINT research and development for ISR will be grouped into three broad technology areas: Information Extraction, Signal Processing, and Automation Enhancements. Information Extraction mines information from broadband signals to identify and catalog Signals of Interest. Signal Processing distinguishes the signal communication layers for the information extraction capabilities. This area represents research and reverse engineering of complex RF waveforms to recover channel or multiple channels data. Automation

Enhancements uses AI/ML to automate the manual signal processing techniques currently in practice which are insufficient against the emerging electromagnetic spectrum. — *R. Scott*