AKELA, Inc.
0472EXPL2014

NARRATIVE

This application is submitted by the Applicant for research and development conducted with the Department of Homeland Security, Customs and Border Patrol (DHS reference number: HSHQDC14C00020).

AKELA, Inc. seeks experimental authority to conduct testing and demonstrations of a prototype vehicle mounted forward looking radar that can be used for footprint trail detection on dirt roads. Several key technologies to be used in this radar have been developed over a period of 10 years. These include wideband swept and stepped frequency radar systems. Prior government interest in the radar technology has been for configurations and frequencies optimized for through the wall imaging and improvised explosive device detection.

The Department of Homeland Security, Customs and Border Patrol is evaluating the use of radar equipment to detect footprint trails of individuals crossing the U. S. border at points other than legal ports of entry. The Applicant has designed a short range, forward-looking, high frequency radar that that can detect such targets when used in conjunction with a vehicle patrolling border roads. The Applicant seeks authority to research and develop its design. With approval of this application, AKELA will conduct data collection and experimental testing to help optimize radar operating parameters for footprint trail detection, and conduct feasibility demonstrations and evaluations of prototype configurations for government users.

Description of Device

The prototype system will operate as a swept frequency modulated radar device in a bistatic configuration. Operating parameters of the radar can be bounded based upon characteristics of the footprint trails. The Applicant anticipates that operating between 33.4GHz and 35.5GHz with 2.1GHz of bandwidth will result in the spatial resolution required to detect 2cm deep footprints. Selection of the optimal frequency bandwidth between 33.4GHz and 35.5GHz will be based on investigation of the operating bands of other equipment currently in use by the government for border security. Sweep repetition rate and sweep rate will be determined during the course of experimentation with a notional sweep repetition rate of 50Hz and a sweep rate of 2.1GHz in 1ms. The swept signal has an occupied bandwidth of 2 kHz. The radar prototype's EIRP will be 37dBm.

Description of Experimentation

The experiments will support the phenomenology investigations, signal processing development and configuration options for the bistatic radar system. The testing will be performed to verify that AKELA's radar technology is suitable for use in detecting the presence of footprint trails from a moving vehicle, to verify it will meet the operational requirements of government users, and to identify possible improvements to radar system capability.