The Ohio State University
Department of Civil and Environmental Engineering and Geodetic Science
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Re: FCC license application #0106-EX-PL-2004
FRN Number 0010950897

EXHIBIT

Explanation of the Project

Technical Characteristics:

The IN200, manufactured by Integrinautics Coproration, is a terrestrial GPS pseudolite (PL) operating at the standard GPS L1 frequency, 1575.42 MHz, as described in the system's manual. The three pseudolites purchased by The Ohio State University (OSU) will be used to transmit pulsed signal with a format defined by the RTCA SC–159 committee. Emissions will be confined to the bands previously allocated for GPS signals (bands 24 MHz wide, centered on the L1 frequency). In general, the pseudolite signals will be transmitted in pulses less than fifteen percent duty cycle, to minimize interference with existing GPS receivers. The peak transmitted power (EIRP) will be 2 Watts or less. To the best of our assessment, we will not use the signal power close to 2 Watts, as our planned test area is the OSU Campus, where distances to the receivers will be close to 1-2 km.

Program Description/Objectives:

A set of three experimental GPS pseudolites, IN200, were purchased for the OSU GPS/Inertial Navigation Laboratory, established and supervised by Profs. Dorota Brzezinska and Christopher Jekeli of the Department of Civil and Environmental Engineering and Geodetic Science. The funds for this equipment (and other related GPS and inertial systems) were provided by the grant sponsored by the Air Force Office for Scientific Research (AFOSR) DURIP program (Defense University Research Instrumentation Program). The major objective of this award was to strengthen the OSU capabilities in conducting defense-oriented cutting edge research primarily in the areas of precision navigation, georeferencing, targeting and gravimetry. Brzezinska and Jekeli currently conduct research supported by the Department of Defense, thus the availability of GPS pseudolites for their work is crucial.

In this application, OSU is seeking a permission to initiate experiments with pseudolites by obtaining a license to operate pseudolites. Operations at the locations specified in the license applications will take place during the period immediately following grant of this application, and will last for approximately 3-5 years.

The applicant's experimental program responds to an invitation from the federal agencies, DOD in particular, responsible for developing new algorithms and applications for the combined use of GPS, pseudolites and inertial navigation for precision navigation and targeting. If the tests prove successful, many new applications could be discovered for this new technology. The preliminary tests of this technology, as reported by the manufacturer, have led to additional experiments in the fields of remote mining and intelligent transportation systems, as well as advanced navigational experiments that may have applicability for remote navigation of the surface of Mars. The

experiments at OSU campus are expected to lead to applications that will enhance the safety of life for aircraft as well as for enhancements of highway safety technologies.

Currently, we carry a number of land-based experiments for NGS (National Geodetic Survey), NGA (National Geospatial-Intelligence Agency), NASA (National Aeronautics and Space Administration) and FDOT (Federal Department of Transportation), where use of pseudolites could be crucial. Also, a new project, where pseudolites may prove particularly useful, has been proposed to NGA in collaboration with the Air Force Institute of Technology (AFIT), where we plan to experiment with GPS and pseudolites to navigate Low Earth Orbiters (LOEs). Even though the IN200 cannot be used directly for that purpose, a number of simulations that will support the algorithmic development and testing can be performed. Precise real-time (PRT) positioning of LEO spacecraft and aircraft is crucial to a wide range of emerging and established applications in science, commerce and national security. For example, PRT positioning of spacecraft supports activities such as satellite communications, occultation profiling for weather prediction, repeat pass satellite altimetry and radar interferometry. Our approach will improve the quality and continuity of real-time kinematic orbit determination through the use of pseudolite transceivers tightly integrated with GPS at the ground tracking stations and onboard LEO spacecraft and airborne platforms.

Contribution to the Development, Extension, Expansion or Utilization of the Radio Art:

The experimental program is based upon the precept that the use of pseudolites is an augmentation of GPS that will lead to an improvement of GPS services. Pseudolites clearly have the ability to support aviation, particularly aviation safety in low visibility conditions. The objective of this experiment is to determine whether and to what extent pseudolites can improve the operation capabilities of mobile mapping systems in the urban environment.