

PUBLIC INTEREST STATEMENT

1. Introduction

General Atomics (GA) requests that the Commission grant to Special Temporary Authority ("STA") to operate in the areas specified in the application. STA is requested for a 6 month period.

2. Nature of the Operation/Necessity of Research/Inadequacy of Existing Technology

A. Description of the Nature of the Research Project Being Conducted

GA with partners in the mining community seeks to develop an accurate, consistent and effective ranging technology for tracking mine personnel and moving equipment not only for collision avoidance, but also to help achieve compliance with the "Mine Improvement and New Emergency Response Act of 2006" ("MINER Act") (PL 109-236). Such technology is intended to assist in safe operations of enormous haul trucks in the vicinity of ground personnel, as well as providing collision detection assistance for all haul truck operations. The goal of such equipment development is to provide truck operators the ability to detect persons and vehicles within the vicinity of the entire truck and to so notify truck operators so collisions can be avoided.

The experiment will involve the integration of GA existing Ultra-Wideband (UWB) technology for communication, ranging and location with technologies developed by our partners. The current UWB device is based on GA commercially available low-cost wireless modem providing Universal Serial Bus (USB), high definition (HD) video and data pump connectivity in both the commercial and defense space.

In this experiment for which STA is requested, GA requests authority to operate experiments in its facilities and in remote desert area for testing purposes. The nature of tests will be experimental and of short duration. Separate applications are filed for the mining facility.

In the experiment, GA and partners intend to adapt and implement the UWB technology for use in open pit mining scenarios, including asset tracking, obstacle/collision detection/avoidance and data transmission. This is intended to permit a sub-second update rate, providing accurate location reports instantaneously

B. Necessity of Communications Facilities for the Research

Presently, there is no technology that commercially exists that will determine/provide close tolerance solution for direction/positioning of mining equipment and personnel that are actively moving at speeds up to 35 mph. The ability to address this time and space requirement is intended to prevent catastrophic accidents between large mining trucks and support vehicles by providing early warning of approaching machine or potential collisions between machines. The technology for which STA is requested will enable the development of positioning technology

that will enable surface personnel to work safely around these machines also. The individual tracking product will also be utilized in underground mines, in furtherance of the requirements set forth in the MINER Act.

C. Inadequacy of Existing Communications Facilities

With respect to the operation of huge haul trucks at open pit mines, large blind spots inhibit the operator's ability to safely operate. Using the experimental positioning system (for which STA is requested in this application) in conjunction with other technologies developed by mining partners would allow full coverage around the truck ensuring the safety of ground personnel. There is no one system to guarantee the complete safety of personnel. Having said that, the use of multiple systems decreases the chance of injuries and/or fatalities within the mine significantly. This technology will also provide added safety for mines that have additional operational difficulties due to decreased visibility caused by fog or dusty environments.

While commercially available technologies provide geo-location capabilities, they are not without their disadvantages. Global Positioning System (GPS) over an FM communications network and RFID are two popular systems. Unfortunately, neither system is sufficiently accurate or timely in providing location coordinates and updates. Global Positioning System ("GPS") technologies are updated every 3 seconds with poor accuracies/multiple meter level.¹ RFID technologies also provide multiple meter level accuracy with extensive infrastructure.²

Present communications technologies utilized in the mines provide only voice and production data information only, and will not provide the radio location functionality that will allow real time peer to peer location, and probability of an impending accident. The technology to be utilized in this experiment, however, has these functionalities, and this information – when presented to the operators and surface miners - will provide a warning system that will, it is hoped, save lives.

Given the dynamic mining environment and vehicle speeds, it is preferred that location accuracy be in the centimeter range. The ultra-short pulses of UWB technology allow for highly

¹ The GPS system using the C/A signal has a location accuracy of 3-15 m; with a military only P(Y) signal the accuracy can be improved to about 30 cm, neither of which is sufficient. GPS system using real time kinematic (RTK) technique can improve the location accuracy to centimeters; but the update rate of GPS with RTK over the FM link is too slow -- once every three seconds. An example best illustrates the problem. For a haul truck moving at a speed of 35 mph, the truck travels 150 ft in between location updates (at once every three seconds), which is too slow to prevent a collision with either a person or another vehicle. In addition, the location accuracy of GPS heavily relies on clear view of multiple satellites. In inclement weather or with a partial obstruction due to terrain, while the number of visible satellite signals can be reduced to two, this causes much higher triangulation error.

² RFID can provide only 3-5 m accuracy for location. Not only does RFID fail the centimeter requirement, it also requires fixed infrastructure. The ever changing mining environment will require installation of additional RFID infrastructure on a regular basis, making the technology cost-prohibitive.

improved accuracy in locating assets, such as vehicles and personnel, and enable location accuracy within centimeters in contrast to the existing GPS and RFID technologies. Further, UWB technology does not require being able to see multiple GPS satellites at all times; nor does it need fixed infrastructure to provide excellent ranging precision. It provides robustness against passive interference from rain, mist, aerosols and metallic objects, and active interference from narrow band sources. The UWB transceiver, using a multiband approach, gives added robustness against multipath-induced fading. Due to the nature of the UWB waveform, the low power consumption allows extended battery lifetime of the tracker, ensuring uninterrupted monitoring and tracking of the assets.

3. Directional Antenna Data.

The Antenna Registration specifies “Yes” in response to the questions: “Is a directional antenna used?” Although in a majority of cases an omni antenna (with 3 dB gain) is intended to be employed, in certain situations a directional antenna (with 6 dB gain) will be employed. With respect to the directional antennas to be used in this experiment, the following information is provided.

Width of Beam at Half-Power Point	Orientation in Horizontal Plane	Orientation in Vertical Plane
90°	0-90° Azimuthal	-45-45° Elevation

4. Note Regarding Mean Power Designation

Due to the low duty cycle of the data transmission, only 100 symbols are transmitted in 1 ms (in the worse case scenario). A total averaged output power of 20 mW is radiated over 1.5 GHz of bandwidth. The 80mW mean ERP figure relates to the intended usage of the directional antenna (with 6 dB gain). When an omni antenna (with 3 dB gain) is employed, the anticipated mean ERP figure is 40 mW.

The output power is the minimum needed to allow for high reliability collision avoidance detection for a vehicle travelling at 35 mph.

5. Stop Buzzer

GA hereby advises that Gerald Rogerson will be available by wireless telephone at (858) 945-6783 and will act as a “stop buzzer” if any issues regarding interference arise during testing.

For the foregoing reasons, approval of this STA Request is in the public interest, convenience and necessity.