

QUESTION 7: PURPOSE OF EXPERIMENT

General Dynamics AIS (“Applicant”) intends to conduct propagation studies and specialized collection and analysis of data to be used in the development of potential enhancements to customer radio equipment and procedures for operation in the high frequency (“HF”) band. Applicant will use commercially available radios and antennas, configured in different operating modes, in its research and experimentation. The hardware will consist of multiple radio sets for both transmit and receive, and will include radios produced by foreign manufacturers. The transmit power of these radios will be no more than 125W PEP or 21 dBW ERP.

Applicant’s experimentation program will involve establishment of a Near Vertical Incident Skywave (“NVIS”) closed network, and operation of various standard, non-NVIS mobile units operating in the HF band, which will attempt to communicate with the NVIS network. The NVIS network will consist of two fixed antenna sites – one at Moffett Federal Airfield and the other at Applicant’s headquarters building. Both fixed antenna sites are located in Santa Clara County, California. Each fixed antenna site will utilize a 90 ft. multi-wire broadband Folded Dipole Antenna installed in a reconfigurable inverted Vee configuration.

The research network will also consist of four mobile units. For development of the foundation for the research, these four mobile units initially will be located within 200 miles or less of each other and the fixed base stations. Following the development of the research baseline, the mobile units will operate within a ten (10) mile radius of four separate sets of center-point coordinates of various distances and locations from the fixed NVIS network. All four center-point coordinates will be located at military testing ranges in Nevada, Utah, Idaho and California. Each mobile unit will utilize a typical long wire antenna for bidirectional capability.

Applicant’s experiments will use standard signaling protocols, such as MIL-STD-188-110B, and transmissions of voice and low bandwidth data (less than 3kbps). Because ionosphere conditions vary based on time of day and season of the year and other factors, Applicant is seeking authorization to conduct its experiments using two limited frequency bands. Research will be conducted in the 3-7 MHz frequency band and the 15-21 MHz frequency band. The fixed stations will operate in the 3-7 MHz band and the mobiles will operate in both the 3-7 MHz and 15-21 MHz bands. While NVIS operations restrict the transmit frequency to less than 12

MHz, the non-NVIS operations are not so restricted. Also, the requested frequency bands will allow Applicant the freedom to select the optimal transmit frequency for a given experiment based on time of day and year and other relevant factors, including obtaining clearance from the NASA/Ames Research Center Amateur Club located at Moffett Field, to ensure that Applicant's experiments do not cause interference to their operations.

Theoretically, the signal/noise ratio of a non-NVIS transmission is too low to be received by a NVIS system. Applicant will conduct multiple experiments over a period of eighteen months to two years, whereby the non-NVIS mobile units will attempt to communicate with the NVIS network, and vice versa, and Applicant will study the interaction of non-NVIS transmissions from various distances and locations with its NVIS network. The objective of the experimentation program is to evaluate the performance of the various non-NVIS communications to determine if such communications can be made to better interact or communicate with a NVIS system. If successful in establishing viable communications between non-NVIS users and NVIS users, Applicant intends to develop a product that enhances its customers' NVIS systems to increase reception of non-NVIS communications. NVIS systems are unique and preferred by Applicant's HF customers, and such a product would be of significant benefit to them.