72 MHz Controller Link Upgrade for Unmanned Air Vehicle (UAV)

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Table of Contents

A. Purpose of Operation and Need for License

The primary objective of this experimental project is to enhance the 72 MHz controller link for the Meridian Uninhabited Aircraft System (UAS). The Meridian UAS is designed to provide an aerial platform for ice-penetrating radar systems developed at The Center for Remote Sensing of Ice Sheets (CReSIS), a Science and Technology Center of the National Science Foundation, at The University of Kansas. The data derived from these radars will allow scientists to better model and predict the flow of ice sheets in Greenland and Antarctica.

The 72 MHz controller link is used to remotely control takeoff and landing of the UAS with a human operator. The current Futaba T14MZHP transmitter outputs 600 mW (27.8 dBm) with a standard, unity gain (0 dBi), 72 MHz monopole antenna. The Futaba transmitter provides a maximum controller range of 4 km in ideal conditions and a typical range of about 2 km. CReSIS would like to increase the typical range of the 72 MHz controller link to at least 5 km in order to allow longer human control during take-off and landing of the UAS. A 5 km link would require an effective radiated power (ERP) of at least 4 W. Since the UAS is mainly operated in areas outside of the United States, primarily Greenland and Antarctica, these areas permit radiating greater than 600 mW at 72 MHz. However, testing of the UAS 72 MHz controller link is performed within the United States at various locations detailed in this document. Therefore, an experimental license is necessary for both development and testing of the amplified 72 MHz controller link within the United States.

Project goals include the development of a 'boost' amplifier which will amplify the 72 MHz, 600 mW signal up to an ERP of 10W (37 dBm) to allow a typical range of approximately 8 km.

B. Locations of Proposed Operation

A 2-year experimental license is requested for four site locations to allow development and testing of a 10W, 72 MHz controller link.

Table 1 – Summary of Proposed Operation Locations

Proposed Location	Address	Coordinates (NAD83)
1. Nichols Hall	The University of Kansas, 2335 Irving Hill Rd, Lawrence, KS	38° 57'8" North Latitude 95°15'51" West Latitude
2. Lawrence, KS Airport	Lawrence Municipal Airport, Lawrence, KS	39° 0'22.4" North Latitude 95° 13'18.5" West Latitude
3. Fort Riley Airfield	Near 4400 Rd N on 17200 Rd W, Fort Riley, KS	39° 15'10" North Latitude 96° 56'23" West Latitude
4. Dugway Proving Ground	Michael Army Airfield, Dugway, UT	40° 12'21" North Latitude 112° 56'37" West Latitude

The first proposed site is located at Nichols Hall, 2335 Irving Hill Rd, Lawrence, Kansas as shown in Figure 1. This site will be used for developing and measuring the output power of the 72 MHz 'boost' amplifier.

Figure 1 - Proposed Site 1 (Nichols Hall, University of Kansas, Lawrence, KS)

The second proposed site is located at The University of Kansas Aerospace Engineering Hangar at the Lawrence Municipal Airport, Lawrence, Kansas as shown in Figure 2. This site will be used for testing the 72 MHz 'boost' amplifier during UAV ground tests.

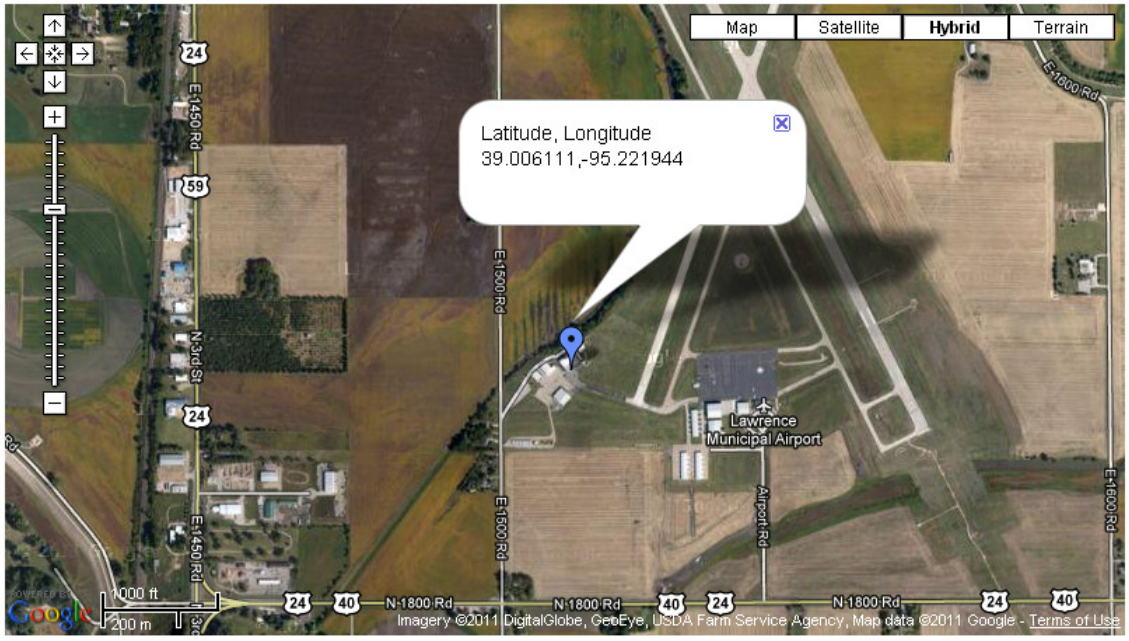

Figure 2 - Proposed Site 2 (University of Kansas Aerospace Engineering Hangar, Lawrence, KS)

The third proposed site is located at the airfield near 4400 Rd N on 17200 Rd W in Fort Riley, Kansas as shown in Figure 3. This site will possibly be used for testing the 72 MHz 'boost' amplifier during UAV aerial test flights.

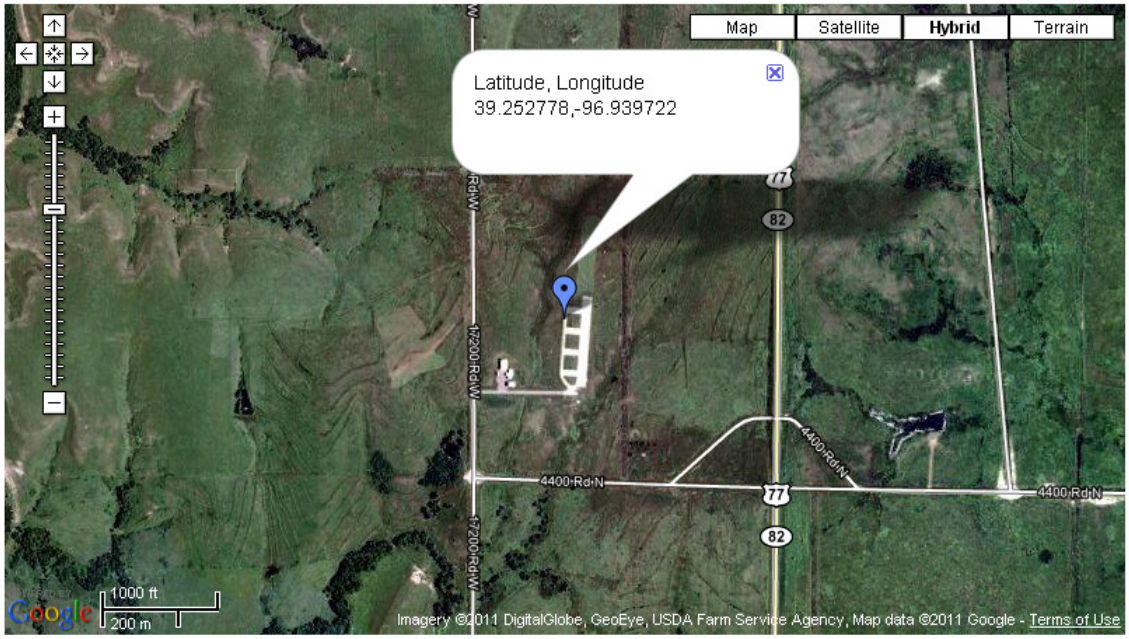

Figure 3 – Proposed Site 3 (Airfield at Fort Riley, Fort Riley, KS)

The fourth proposed site is located at Michael Army Airfield (Dugway Proving Ground), Dugway, Utah as shown in Figure 4. This site will possibly be used for testing the 72 MHz 'boost' amplifier during UAV aerial test flights.

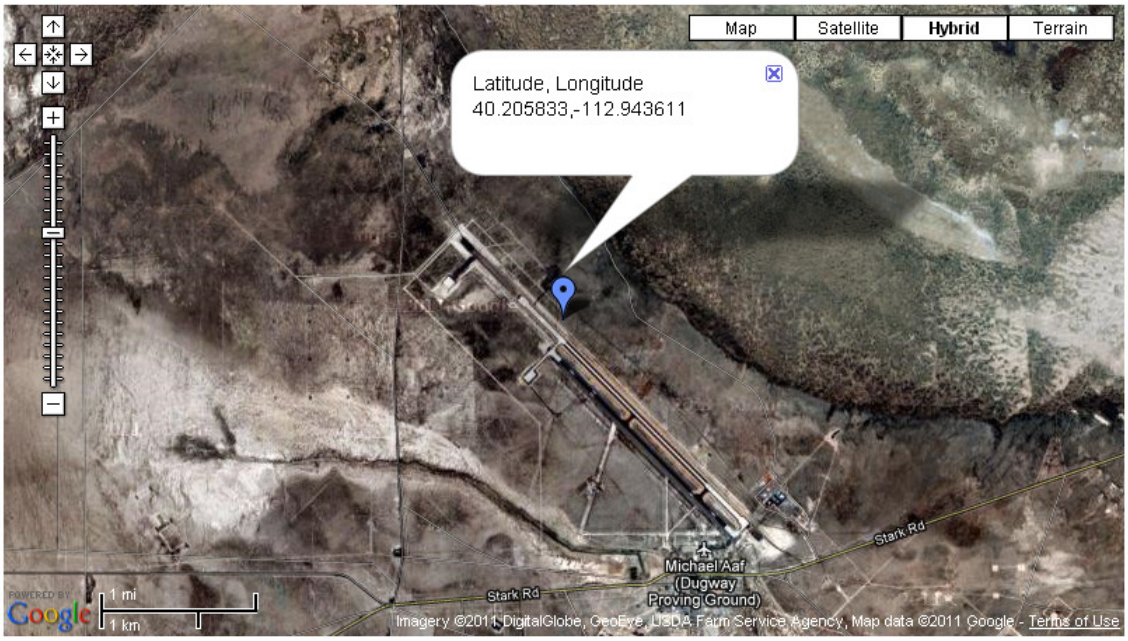

Figure 4 - Proposed Site 4 (Dugway Proving Ground, Dugway, UT)

C. Technical Specifications

1. Frequency of Operation

CReSIS requests authorization to operate in the 72.01 – 72.99 MHz band. The tests will be conducted using a single channel with bandwidth of 5.5 kHz.

2. Effective Radiated Power (ERP)

The effective radiated power (ERP) will not exceed 10 W peak.

3. Modulation and Emissions

The primary emission designator is 5k50F1D.

4. Antenna Information

The primary antenna will be a standard 72 MHz monopole antenna without a ground plane, which has a measured return loss of -2dB. Other antennas may be utilized for increased gain & better return loss; however, 10 W ERP will NOT be exceeded while using these other antennas.

5. Equipment Utilized

CReSIS proposes to conduct its tests using a Futaba T14MZHP Radio Control System with the 72 MHz MZ-FM module (FCC ID: AZPMZ-FM72) as shown in Figure 5.

Figure 5 - Futaba T14MZHP Radio Control System

D. Contact Information

For questions about this application or in the unlikely event interference concerns should arise, please contact:

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