

Statement that Authorization is Essential for Research Project

Question 6: Is this authorization to be used for providing communications essential to a research project? (The radio communication is not the objective of the research project)? If "YES", include as an exhibit the following information:

- a. A description of the nature of the research project being conducted.
- b. A showing that the communications facilities requested are necessary for the research project.
- c. A showing that existing communications facilities are inadequate.

Deleted: .

Deleted: .

Answer: Yes, the authorization is essential the research project.

a- Nature of Research: KySat is a CubeSat project which will immerse students in systems level design, particularly in space systems development. KySat will design, construct and fly a CubeSat composed of a student-designed satellite bus and a significant scientific payload. Data and telemetry from the satellite may be downloaded from a website by students, including those at a pre-college level. The satellite is being constructed at universities located in Kentucky. It will be integrated at the California Polytechnic University and possibly launched from Kazakhstan on a Dnepr (SS 18) rocket or alternately included on a NASA mission. KySat will be controlled by students utilizing the MSU 21 Meter Space Tracking Antenna operating under the requested Authorization.

The research goals for KySat One Orbital (for which this request is being made) are the development of an effective satellite bus for the cubesat standard, the development of a modular payload interface module, a system support module, and to test the S-band Microhard MHX 2400 frequency hopping spread spectrum radio in the space environment.

b - Necessary for Project: The communications facility being requested for this project is essential to mission success. The spacecraft being developed is very small (~5 kilograms and only 1/9th of a cubic foot) and has a very limited ability to generate power to support communications with the ground. As a result, we require a very large, high-precision, parabolic dish to support 2-way communications.

c – Existing Facilities Inadequate: Given the size and special capabilities required for the ground station, very few facilities exist which are capable of providing such performance; those that do exist (e.g., within the NASA Deep Space Network, the Air Force Satellite Control Network, etc.) are significantly oversubscribed and very high-cost. For the proposed station, we have implemented a very low-cost solution through refurbishment of a radio astronomy antenna and the installation of our own custom communications and command and data handling equipment.