

FCC Mission Statement

The Aerospace Corporation is a SOCRATES mission partner with the University of Minnesota. The University has filed an application (0385-EX-CN-2019) for their satellite. The Aerospace Corporation is filing this application for the ground network that will communicate with them.

The University of Minnesota has been provided an AdvRadio to install in their satellite and it will communicate with The Aerospace Corporation ground network. The AdvRadio is built by The Aerospace Corporation around a Texas Instruments CC1151 transceiver chip. It operates at a fixed 914.7 MHz frequency (see "**AdvRadio bandwidth**" Exhibit) and outputs 1.3 W. The AdvRadio attaches to an omnidirectional patch antenna on the satellite body with a 0 dBi gain.

When the University of Minnesota satellite is ejected, it will power on. However, the radio will be in receive mode only. As the satellite flies over a ground station, the station will continuously beacon towards the satellite. When the satellite radio hears the beacon, along with the proper serial number code, it will respond, and a link will be established. At that point, the ground station will ask the satellite for information, typically payload data or onboard telemetry. The satellite will respond by downlinking the requested information. When the link is lost due to the satellite passing out of view and the satellite was transmitting, the satellite will try up to 3 seconds to complete the last packet transmitted. The satellite will then revert to a passive receive mode and wait for the next beacon from a ground station.

We would like to use two types of ground stations to communicate with the satellites. The first is a 5-meter diameter dish antenna at The Aerospace Corporation in El Segundo, CA. At 914.7 MHz, it has 30 dB gain, 5 deg beamwidth and uses a complementary radio with a 9W amplifier. The second ground station is a portable 2-meter diameter dish. This has 22 dB gain, a 15 deg beamwidth and uses a complementary radio with a 9W amplifier. This portable station would be located in an RF quiet area that improves the ground footprint of the ground station network. A typical satellite pass is 8 minutes long, twice per day - so the system spends a lot of time not in use. The antenna parameters and ground station locations are shown in the exhibit "**FAA sketch and antenna figures.**"

This license is being requested under 47 CFR Part 5.3 (c) for "experiments under contractual agreement with the United States Government." The experimental radio service as requested is defined under 47 CFR Part 5.5 as "for purposes of providing essential communications for research projects that could not be conducted without the benefit of such communications." Aerospace will operate the ground network, passing through commands provided by the University of Minnesota up to the satellite and downloading data and telemetry from the satellite, as requested by the University of Minnesota.