

December 27, 2017

FCC Office of Engineering and Technology
445 12th Street SW
Washington, DC 20554

SUBJECT: CSIM cubesat mission (FCC application # 0867-EX-CN-2017)

Mr. Behnam Ghaffari,

Please find details on the CSIM cubesat mission included below.

Date license is required: **March 1st, 2018**
LV integration date: **May 1st, 2018**
Launch date: **SSO-A July 1st, 2018**
Date for initiation of on-orbit operations: **July 1st, 2018**
Expected mission duration: **24 months**

Principle Investigator for the mission.

Point of Contact Name: Erik Richard
Organization Name: University of Colorado
Address: 1234 Innovation Dr., Boulder, CO
E-Mail: erik.richard@lasp.Colorado.edu
Telephone Number: 303-735-6629

Technical point of contact for the mission.

Point of Contact Name: Rick Kohnert
Organization Name: University of Colorado
Address: 1234 Innovation Dr., Boulder, CO
E-Mail: kohnert@colorado.edu
Telephone Number: 303-492-6804
*please also include Erik Richard on any relevant communications.

Point of contact who can terminate ALL satellite transmissions if interference is detected.

Point of Contact Name: Rick Kohnert
Organization Name: University of Colorado
Address: 1234 Innovation Dr., Boulder, CO
E-Mail: kohnert@colorado.edu
Telephone Number: 303-492-6804
*please also include Erik Richard on any relevant communications.

Point of contact who can terminate ALL Boulder CO ground station transmissions if interference is detected.

Point of Contact Name: Rick Kohnert
Organization Name: University of Colorado
Address: 1234 Innovation Dr., Boulder, CO

E-Mail: kohnert@colorado.edu
Telephone Number: 303-492-6804
*please also include Erik Richard on any relevant communications.

Point of contact who can terminate ALL Fairbanks AK ground station transmissions if interference is detected.

Point of Contact Name: Rick Kohnert
Organization Name: University of Colorado
Address: 1234 Innovation Dr., Boulder, CO
E-Mail: kohnert@colorado.edu
Telephone Number: 303-492-6804
*please also include Erik Richard on any relevant communications.

Point of contact for conjunction alerts.

Point of Contact Name: Rick Kohnert
Organization Name: University of Colorado
Address: 1234 Innovation Dr., Boulder, CO
E-Mail: kohnert@colorado.edu
Telephone Number: 303-492-6804
*please also include Erik Richard on any relevant communications.

Project Description

The primary objective of CSIM (Compact Solar Irradiance Monitor) is to measure the solar spectral irradiance (SSI) from 200 – 2400 nm with an SI-traceable absolute calibration at better than 0.2% uncertainty. The radiative energy from the Sun establishes the basic climate of the Earth's surface and atmosphere. The SSI measurement is fundamental to interpreting how the Earth responds to solar variability, identifying the physical mechanisms of response, and validating climate model sensitivity to spectrally varying solar force. Presently, significant uncertainties in the difference between the SSI observations and model simulation on the solar-cycle timescales precludes our ability to fully establish the impact of long-term spectral variability on wavelength-dependent atmospheric and climate processes. In addition, because of the limited lifespan of sensors, long data sets require the linking of multiple sensor data into a continuous data record. By following the traditional high-cost, long lifetime mission approach to measuring the SSI, the solar data record is at risk of measurement gaps, increasing the historical uncertainty. As a low-cost, rapid turnaround mission, CSIM aims to show that the difficult SSI measurement can be accomplished by a small (30x20x10 cm) instrument. CSIM will operationally prove new technology advancements and is expected to improve upon the accuracy of traditional missions and reduce the risk of data record gaps. Once commissioned CSIM will operate viewing the sun when not in eclipse and downlinking in the S-band (2400-2405MHz) over our Boulder ground station.

License Details

The CSIM mission will utilize a SpaceQuest TRXU UHF radio operating a half-duplex uplink and downlink at 437.250MHz. This frequency has been coordinated with the IARU (see attached coordination letter). CSIM will also include a Blue Canyon Technologies

SDR-S S-band radio that will be used as a data transmitter nominally operating at 2Mbps. We are requesting a 47 CFR Part 5 - EXPERIMENTAL RADIO SERVICE license for our command uplink and telemetry downlink at 437.250MHz. For the science data downlink, we are requesting to operate our data downlink at 2402MHz in the ISM band.

Additional data required for applications requesting use of federal or shared government frequencies.

Spacecraft: CSIM

Non-geostationary satellite
Inclination: 97.7°
Apogee: 575 km
Perigee: 575 km
Orbital period: 1.60h
Number of satellites in the system: 1
Number of transmitting satellites: 1
Number of transmitting satellites: 1

Transmitter #1 (UHF)

Center Frequency: 437.250MHz
Bandwidth: 30kHz
3dB beamwidth: 300°
Maximum Antenna Gain: 1dBi
Polarization: Linear
Maximum transmit power: 5W
Modulation: GMSK
ITU emission designator: 30K0G2DAX

Transmitter #1 (S-band)

Center Frequency: 2402 MHz
Bandwidth: 2MHz
3dB beamwidth: 80°
Maximum Antenna Gain: 6dBi
Polarization: RCP
Maximum transmit power: 3.2W
Modulation: BPSK
ITU emission designator: 2M00G2DAX

Receiver #1 (UHF)

Center Frequency: 437.250MHz
Bandwidth: 30kHz

3dB beamwidth: 300°
Maximum Antenna Gain: 1dBi
Polarization: Linear
Receiver Sensitivity: -110dBm
Modulation: GMSK
ITU emission designator: 30K0G2DAX

Ground Station #1:

Boulder, CO 80309
40°00'31.6"N, 105°14'51.0"W
Altitude above MSL [m]: 1588
Antenna height above ground [m] : 3 above roof top.
Elevation: 5-90° (min V00 for UHF and V10 for S-Band)
Azimuth: 0-360°

Transmitter #1 (UHF)

Center Frequency: 437.250MHz
Bandwidth: 30kHz
3dB beamwidth: 21°
Maximum Antenna Gain: 21dBi
Polarization: RCP
Maximum transmit power: 500W
Modulation: GMSK
ITU emission designator: 30K0G2DAX

Receiver #1 (UHF)

Center Frequency: 437.250MHz
Bandwidth: 30kHz
3dB beamwidth: 21°
Maximum Antenna Gain: 21dBi
Polarization: RCP
Receiver Sensitivity: -110 dBm
Modulation: GMSK
ITU emission designator: 30K0G2DAX

Receiver #2 (S-band)

Center Frequency: 2402MHz
Bandwidth: 2MHz
3dB beamwidth: 2.1°
Maximum Antenna Gain: 38dBi
Polarization: RCP

Receiver Sensitivity: -110dBm
Modulation: BPSK
ITU emission designator: 2K00G2DAX

Ground Station #2:

Fairbanks, AK 99709
64°47'39.14"N 147°43'10.91"W
Altitude above MSL [m]: 142
Antenna height above ground [m] : 5.5m
Elevation: 5-90° (min V05)
Azimuth: 0-360°
Transmitter #1 (UHF)
Center Frequency: 437.250MHz
Bandwidth: 30kHz
3dB beamwidth: 21°
Maximum Antenna Gain: 18dBi
Polarization: RCP
Maximum transmit power: 500W
Modulation: GMSK
ITU emission designator: 30K0G2DAX
Receiver #1 (UHF)
Center Frequency: 437.250MHz
Bandwidth: 30kHz
3dB beamwidth: 21°
Maximum Antenna Gain: 18dBi
Polarization: RCP
Receiver Sensitivity: -110 dBm
Modulation: GMSK
ITU emission designator: 30K0G2DAX