Exhibits relating to FCC form 442 – Question 6

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.***

The OTB satellite uses two RF transmitters as referenced from the ground station, which are:

1) A low rate; 38.4kbits/s; S-band transmitter to downlink platform status information to the ground station.

2) A high rate; 2.0352 Mbits/s; S-band transmitter to downlink payload data to the ground station. *(NOTE: there are two S-band transmitters onboard although only one is operational; the other is a cold redundant spare).*

These transmitters are essential to the operation of the satellite and the retrieval of data from the various experiments onboard. They are not the objective of the research themselves.

The OTB satellite accommodates a number of experiments, provided either by SST-US or sponsored by external parties, including US Government Agencies.

1. Deep Space Atomic Clock (DSAC) – sponsored by the Jet Propulsion Laboratory under JPL subcontract No 1468935. http://www.nasa.gov/mission_pages/tdm/clock/

2. iMESA-R – A space weather monitor built by the USAF Academy and sponsored through AFRL. http://www.usafa.edu/df/dfe/dfer/centers/sparc

3. Modular Solar Array (MSA) – built by Vanguard and sponsored through AFRL. http://www.vst-inc.com

4. SSC Electronics Test Bed – An experiment designed to monitor the effects of spaceflight on new electronics components, sponsored by the Surrey Space Centre at the University of Surrey www.surrey.ac.uk/ssc This experiment is designed to understand the effects of radiation on a variety of commercial-off-the-shelf components to assess whether they are suitable for spaceflight.

5. CUSP - A microprocessor and memory storage experiment from the University of Colorado Boulder www.colorado.edu

6. FlexRx – A new spacecraft RF receiver design sponsored by SST-US. The receiver will be tested to assess its RF reception characteristics in space. It does not radiate RF signals.

7. Radiation Monitor – A new spacecraft radiation monitor sponsored by SST-US. This experiment is designed to provide data on the long-term radiation environment experienced in LEO. It helps calibrate the effects of radiation on other payloads.

8. Custom Experimental Solar Panel – A new solar panel sponsored by SST-US.

All data generated from the various payloads are multiplexed within the OTB spacecraft and down linked via the single, high rate, S-band; 2.0352 Mbits/s data link to the ground station. None of the payloads separately radiate RF signals. SST-US will require one 7 - 8 minute RF link session every day for satellite Telemetry & Tele-Command (TT&C) and to download satellite status information and payload data. This is the minimum practical to ensure spacecraft health and retrieve experimental data. The satellite will not radiate any RF signals at any other time.

The spacecraft will operate for 5 years, although a number of payloads will operate for a shorter time and will be switched off as required. No testing of the payloads will alter the orbital, physical or RF characteristics of the OTB mini-satellite from nominal during their testing, as such they should be regarded as 'passive' in operation.