

Description of Research Project for FCC file 0301-EX-PL-2015

An Experimental License is sought by Pumpkin, Inc. of San Francisco, CA under FCC file no. 0301-EX-PL-2015. The research to be conducted under this license is a test flight of small satellite technology developed by Pumpkin, Inc. and its academic and commercial partners.

The satellite is a 6U CubeSat called SUPERNOVA-BETA. SUPERNOVA-BETA is manifested on the ORS-4 mission¹, scheduled for launch from the Pacific Missile Range Facility at Kauai, Hawaii on 29 October 2015. Approximate orbital parameters are 430 km perigee x 505 km apogee, 94.8° inclination. The satellite has a mass of 12 kg, and stowed dimensions of approx. 10 x 20 x 30 cm. Its expected orbital lifetime is approximately 5.4 years, with an active mission duration of 1-2 years. Post-mission disposal will be accomplished by uncontrolled atmospheric re-entry.

SUPERNOVA-BETA is a space test flight of multiple subsystems of Pumpkin's SUPERNOVA bus, developed with support from the Navy SPAWAR and Air Force ORS office. The satellite is owned and operated by Pumpkin, Inc., and not by any US or foreign government agency.

The SUPERNOVA bus systems being tested on this mission include the electrical power system, GPS, ADACS, and a new flight computer module based on the BeagleBone Black. Two experimental Earth-imaging systems are supplied by commercial mission sponsors. The purpose of the mission is to characterize the long-term performance of these systems on orbit.

SUPERNOVA-BETA carries three independent radio communication systems. Those radios, and their associated ground station architectures, are as follows:

1. A simplex (transmit only) Globalstar modem designed for transmission of data to the Globalstar commercial satellite network. This Globalstar modem will be used near-continuously as the satellite orbits the globe. Pumpkin will utilize Globalstar's commercial service to receive data from the satellite via the Globalstar system.
2. An experimental S-band transceiver supplied by Vulcan Wireless, Inc. operating at 2.2759 and 2.0977 GHz. This transceiver will be inactive except when passing over

¹ Note: SUPERNOVA-BETA is not the primary payload for ORS-4; it is one of several CubeSat secondary payloads.

ground stations. Pumpkin has secured contractual arrangements with Universal Space Networks, Inc. and Spaceflight Networks, Inc. to utilize their commercial ground stations in Fairbanks, AK, as well as Universal Space Networks' ground station in Kiruna, Sweden.

3. A radio beacon transmitter operating at approx. 435 MHz (UHF). This will transmit basic health/status data every 30 seconds and operate continuously, unless commanded to shut down.