

SIMPL Satellite Technical Description

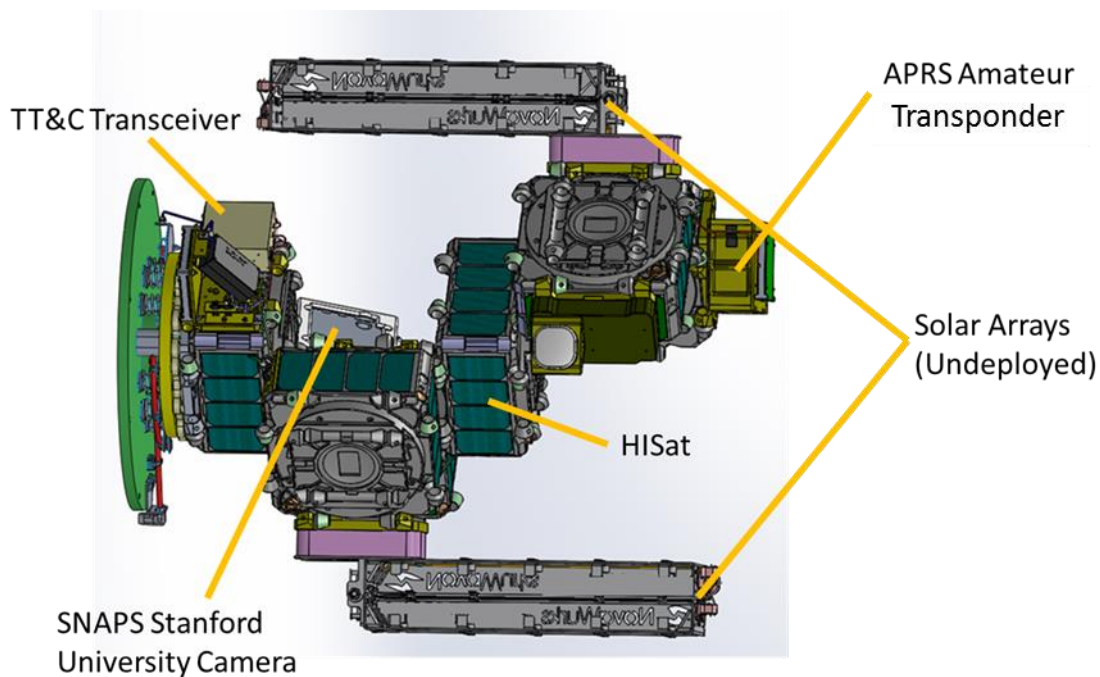
Attachment to SpaceCap Application

The overall goal of the SIMPL (Satlet Initial Proofs and Lessons) mission, is to reduce risk for the NovaWurks HISat technology development program, by a space based demonstration. NovaWurks will demonstrate on-orbit assembly and LEO deployment of their Hyper-Integrated Satlet (HISat) system.

The assembled satellite will be deployed from the ISS via the JEM Airlock, third quarter 2016. It will be inserted into an orbit at 407.9 km apogee and 400.1 km perigee, on an inclination from the equator of 51.65 degrees. Transmission of data via the S band link will begin 30 minutes after deployment, and cease after two weeks. Atmospheric friction will slow the satellite and reduce the altitude of the orbit, until de-orbiting occurs approximately 1 year after launch. See the Orbital Debris Assessment Report for details.

The dimensions of the spacecraft are consistent with the JEM airlock specifications. It is a single unit with the dimensions of 50 cm X 50 cm X 33 cm. The total mass is about 59.9 Kg.

Figure 1 SIMPL Overview



The satellite contains the following systems and modules:

Attitude Control: Each of the 6 HISats (modules) incorporates low impulse cold gas thrusters, for attitude stabilization and control only. In addition, each HISat module has a reaction wheel to support 3 axis attitude stabilization.

C&DH: The HISats utilize Bluetooth and WIFI for inter module communication within the satellite. Each HISat also has a processor to perform C&DH tasks.

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Power: Each HISat includes COTS cells tied to a power management system, which handles charging, discharging and additional safety features to prevent battery faults.

Thermal subsystem: Components with significant heat dissipation are thermally tied to the HISat structure to enable cooling and safe temperatures for operation.

IP-Based TT&C S-Band Transceiver: The transceiver's network and transport layers are based on standard internet protocols while the data link layer and physical layer use proprietary methods for the longer distance link. The frequency for uplink from ground station is 2097.7 MHz and the frequency for spacecraft transmit is 2275.9 MHz (256 KHz for uplink, 1.8 MHz for downlink). The utilization of this communications system for SIMPL will buy down risk for Novawurks' upcoming missions and allow for characterization of the system performance in the actual environment.

SNAPS (Stanford Nano Picture Satellite): A Stanford University built, hosted payload to image solar array deployment.

Automatic Packet Reporting System (APRS) Transponder. An amateur provided, hosted payload, operated by amateurs under the call sign WB1HAI for use of the Amateur radio community. The APRS transponder serves the international amateur community in the CONUS 144.39 MHz and European 144.7 MHz, amateur frequencies.