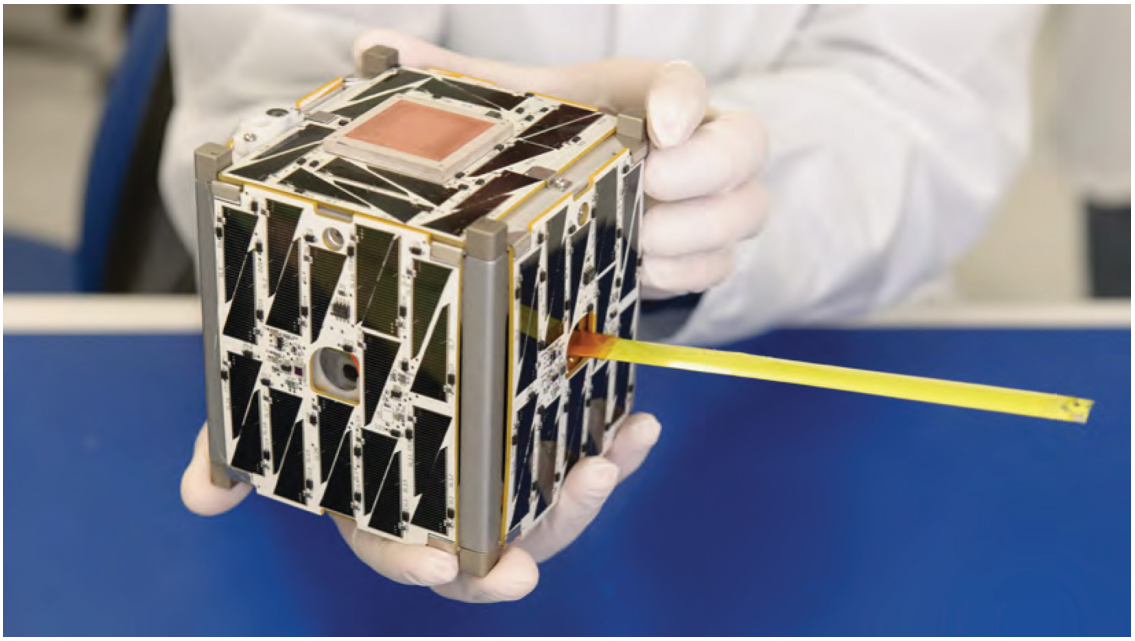
NASAfacts

The PhoneSat Series of Smartphone Nanosatellites

PhoneSat 2.5, fifth in the series of PhoneSat nanosatellite technology demonstration missions developed by NASA Ames Research Center, launched into space on April 18, 2014 aboard the Space Exploration Technologies (SpaceX 3) Falcon 9 rocket from Cape Canaveral Air Force Station. PhoneSat 2.5 follows the success of PhoneSat 1.0, 2.0 Beta and 2.4, continuing the innovative use of smartphone technology in small satellites and serving as a technology demonstration and risk mitigation precursor mission for the Edison Demonstration of Smallsat Networks (EDSN) Mission, scheduled for launch late this year. EDSN plans to launch eight identical cubesats based on the PhoneSat architecture to demonstrate the utility of multiple small spacecraft working together in a cooperative manner.

PhoneSat 2.5 has three primary objectives: determine if a low-cost commercially available attitude determination and control system (ADCS) can work adequately in space; verify if Google's Android™ processor can support space-based communications systems; and with an expected orbital life-time of up to 6 weeks, provide further confidence in the PhoneSat concept and components by investigating radiation survivability. This innovative application of commercially developed technologies for use in space provides for low cost, low risk, highly iterative missions capable of supporting a number of Agency science and exploration objectives.

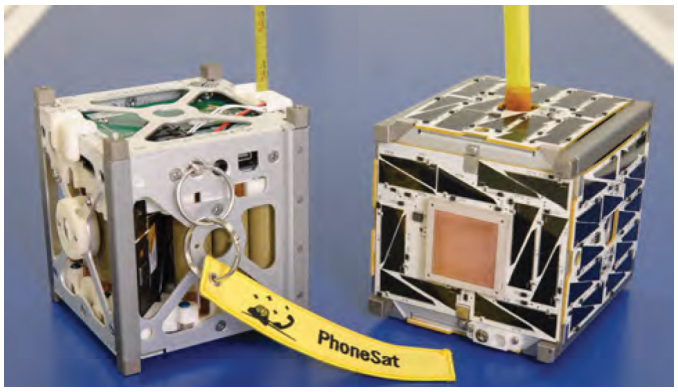
PhoneSat 2.5 shares the same form factor as PhoneSat 2.4, launched in November of 2013. Both nanosatellites are 1-unit (1U) cubesats - a satellite in a 10 cm cube (approx. 4 inches each side). Both are built around the same Nexus S smartphone running Google's Android™ operating system. Different from PhoneSat 2.4, PhoneSat 2.5 has a higher-gain S-Band antenna, which also serves as a pathfinder for EDSN's S-band command and telemetry architecture. PhoneSat 2.5's smartphone camera is enabled (2.4's camera was disabled) and will attempt to transmit photographs to the ground station at Santa Clara University to gather information for



PhoneSat 2.5, Image Credit: Dominic Hart, NASA Ames Research Center

future low-cost star trackers.

The first PhoneSat missions launched in April 2013, two PhoneSat 1.0s and single PhoneSat 2.0-Beta, confirmed the viability of using smartphones and other commercially available consumer-grade electronics in satellites destined for low Earth orbit. Smartphones offer a wealth of capabilities needed for satellite systems such as fast processors, versatile operating systems, multiple miniature sensors, high-resolution camera interfaces, and GPS receivers. All PhoneSat nanosatellites are 1U cubesats, about the size of a tissue box weighing approximately 1 kg (2.2 pounds). Engineers believe PhoneSat-derived technology and approaches will enable NASA to launch multiple new satellites capable of conducting science and exploration missions at a small fraction of the cost of conventional satellites.



PhoneSat 1.0 and PhoneSat 2.5 with Triangular Advanced Solar Cells, Image Credit: Dominic Hart, NASA Ames Research Center

The PhoneSat missions are important precursors for the EDSN mission because of their ability to gain operational experience with critical spacecraft subsystems common to both missions. The EDSN mission, scheduled for launch late in 2015, comprises eight identical 1.5U (10x10x15cm and 2.5kg) cubesats that will be deployed on a single launch. The EDSN mission will demonstrate the concept of using many small spacecraft in a coordinated cluster to study the space environment and space-to-space communications architectures. The eight EDSN satellites will each have a Nexus S smartphone with EDSN-specific software for satellite command and data handling with a scientific instrument added as a payload on each one.

The PhoneSat project is series of a technology demonstration missions funded by the Small

The PhoneSat Design and Integration Team at NASA Ames Research Center, Image Credit: Dominic Hart, NASA Ames Research Center

Spacecraft Technology Program (SSTP), one of nine programs within NASA's Space Technology Mission Directorate, and the Engineering Directorate at NASA Ames Research Center. The SSTP develops and matures technologies to enhance and expand the capabilities of small spacecraft with a particular focus on communications, propulsion, pointing, power, and autonomous operations. The PhoneSat project started in Summer 2009 as a student-led collaborative project between NASA Ames and the International Space University, Strasbourg.

For more information about SSTP, visit: http://www.nasa.gov/directorates/spacetech/small_spacecraft

For more information about Ames Engineering, visit: http://www.nasa.gov/centers/ames/engineering/index.html

For more information about the Cubesat Launch Initiative, visit: http://www.nasa.gov/directorates/heo/home/CubeSats_initiative

For more information, contact:

Deborah Westley
PhoneSat Project Manager
NASA Ames Research Center
Deborah.M.Westley@nasa.gov

Andres Martinez
Small Spacecraft Technology Program Manager
Space Technology Mission Directorate
NASA Ames Research Center
Andres.Martinez@nasa.gov

Andrew Petro
Small Spacecraft Technology Program Executive
Space Technology Mission Directorate
NASA Headquarters
Andrew.J.Petro@nasa.gov

National Aeronautics and Space Administration

Ames Research Center
Moffett Field, CA 94035

www.nasa.gov

FS #2014-03-01-ARC

PhoneSat