AFRL

SMALL SATELLITE PORTFOLIO

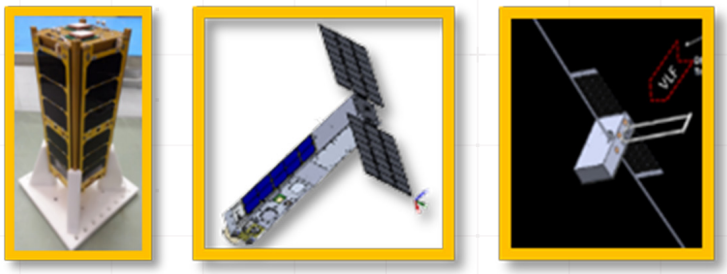
WHAT IS IT?

The Air Force Research Laboratory (AFRL) Space Vehicles Directorate's Small Satellite Portfolio is developing, testing, and transitioning small satellite technologies to support the Hybrid Architecture vision for the U.S. Air Force and U.S. Space Force. AFRL manages a variety of flight missions and ground programs, focusing on greater levels of connectivity, autonomy, performance, resilience, and collaboration within the Hybrid Architecture.

WHY IS IT IMPORTANT?

Current Air Force and Space Force space architectures are built around a small number of exquisite spacecraft. These architectures were designed for a permissive space warfighting environment and assumed decades-long development times were acceptable.

Today, the Air Force and Space Force are facing a contested, congested, and competitive space environment where the landscape is changing much faster than the current acquisition cycle can match. The Small Satellite Portfolio has developed the concept of a Hybrid Architecture consisting of a mix of legacy systems complemented with new DoD-owned systems, Allied space capabilities, and commercial space capabilities.



Examples of small satellites (Images by AFRL)

CURRENT SSP MISSIONS

- **Ascent**
  - Launched December 2021
  - Cube Satellite (CubeSat) technology demo in GEO - risk reduction for future missions
  - 12-Unit commercial-off-the-shelf bus - rapid hybrid small satellite acquisition
  - Operated using commercial ground - path agnostic communication demonstration
  - Propulsive capabilities
- **Recurve**
  - Launched July 2022
  - 6-Unit CubeSat demo of cognitive radio frequency system - in support of path agnostic communication architectures
  - Space-based mesh network node - multi-domain, beyond line-of-sight demo
  - Explore utility of Inherent position, navigation and timing capability over radio frequencies
- **XVI**
  - Scheduled for launch February 2023
  - Proving Link-16 tactical data link from space with unmodified terrestrial users
  - Commercially provided CubeSat
  - Software modified Link-16 radio
  - Multi-domain command and control

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CURRENT SSP MISSIONS (continued)

- **Hybrid Architecture Demo (HAD)**
  - Assessing the military utility of commercial and allied Intelligence, surveillance and reconnaissance capabilities
  - Developing tools to leverage those capabilities
- **Science and Technology for Automated Resilient Ground Architecture Test Environment (STARGATE)**
  - Ground system supporting multiple spacecraft
  - Developing autonomous ground systems and communication technologies
  - Tools to seamlessly leverage commercial communications, processing, and storage
- **University Nanosatellite Program (UNP)**
  - Training next generation of DoD satellite technology developers and architects
  - Guiding multiple universities through every phase of satellite development

AFRL's Small Satellite Portfolio is advancing communications technologies to support the Hybrid Architecture. Through the SSP, AFRL Is developing, testing, and transitioning automation and autonomy tools needed to seamlessly wage all-domain warfare. These tools will enable the warfighter to use disparate assets distributed across the all-domain battlefield to provide coordinated effects while under attack.

ABOUT AFRL

The Air Force Research Laboratory (AFRL) is the primary scientific research and development center for the Department of the Air Force. AFRL plays an integral role in leading the discovery, development, and integration of affordable warfighting technologies for our air, space, and cyberspace force. With a workforce of more than 11,500 across nine technology areas and 40 other operations across the globe, AFRL provides a diverse portfolio of science and technology ranging from fundamental to advanced research and technology development. For more information, visit: **www.afresearchlab.com**.

AFRL Small Satellite Portfolio collage of personnel, facilities, small satellite images and launch. (Images by AFRL)