AFRL

HITCHHIKING TO SPACE HAS NEVER BEEN SO EASY

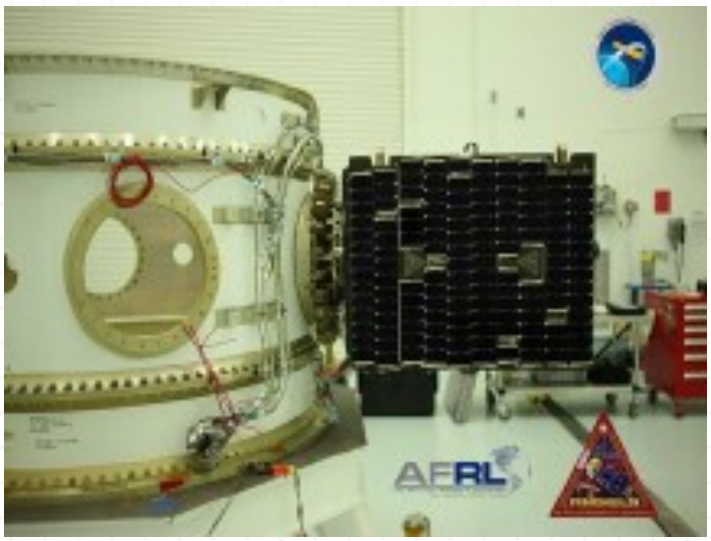
ESPA TECHNOLOGY PROMISES BETTER ACCESS AT LOWER COST

Getting satellites into space is now one step closer to becoming as routine as shipping cargo across the country on a train, thanks to the Air Force Research Laboratory's work on the Evolved Expendable Launch Vehicle (EELV) Secondary Payload Adapter (ESPA) Ring.

ESPA is an AFRL technology that increases the number of satellites that can be put into space on a single launch. Much like a train can just add extra cars to transport more cargo, one or more ESPA rings can be added under the primary payload to launch more satellites. A single ESPA ring is about 1.5m (5 ft) across and can hold a handful of small dorm-fridge-sized satellites or, perhaps someday, hundreds of nanosats which are only a few inches on a side. The ESPA can be used on any EELV standard launch vehicle or the Falcon 9 Heavy, making it broadly valuable to the spaceflight community.

ESPA Ring before payloads added.

Photo Credit: MoogCSA



AFRL "ANGELS" experimental satellite shown mounted to ESPA ring.

Photo Credit: AFRL Space Vehicles Directorate

Benefits

ESPA is a key technology for an agile space enterprise. Lowering cost of launch and providing more regular rides to space removes barriers to entry and accelerates space innovation across the industry. This "freight train to space" opens opportunities to demonstrate, integrate and transition new technologies in applicable environments.

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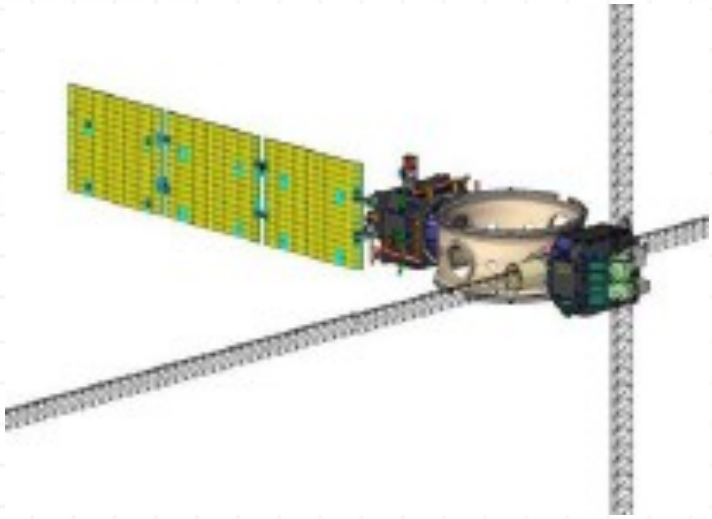
Testament to AF Innovation and Partnerships

Created under a Small Business Innovation Research contract with AFRL's Space Vehicles Directorate for the Department of Defense Space Test Program, ESPA's research and development has been a crucial part of several flight experiments. AFRL first demonstrated the ESPA when a 2014 satellite named "ANGELS" hitched a ride on an ESPA, undocking after launch to carry out its science mission. The next level of complexity will come with AFRL's Demonstration and Science Experiments (DSX) spacecraft mission in 2018, in which the ESPA ring is the backbone of the spacecraft.

The technological leap in the use of ESPA will also come in 2018 with the launch of AFRL's EAGLE satellite. Like DSX, EAGLE has an ESPA ring as backbone, but it now has communication and propulsion. Furthermore, it is also carrying multiple hitchhiking satellites that, like ANGELS, will undock to perform their own missions.



Graphic depiction of the AFRL Space Vehicles Directorate Demonstration & Science Experiments (DSX) spacecraft on ESPA ring which is scheduled to launch in 2018.

Photo Credit: AFRL Space Vehicles Directorate

ANGELS satellite launched on board Delta Rocket in 2014.

Photo Credit: AFRL Space Vehicles Directorate

The Coming "Freight Train to Space"

AFRL has continued to lead the research and development of ESPA with industry partners such as MoogCSA and Orbital ATK. In October 2017, the U.S. Air Force Space and Missiles Center (SMC) awarded a contract to Orbital ATK to design and manufacture an initial Long Duration Propulsive ESPA (LDPE). SMC, in partnership with AFRL, will fly LDPE spacecraft in 2019 and 2021, each carrying multiple other satellites in addition to being a communicating, maneuverable spacecraft itself.

AFRL's ESPA technology sits at the tipping point of a revolution in space access. ANGELS was the only spacecraft AFRL flew between 2014 and the beginning of 2018. However, the four-year period from 2018-2022 will see dozens of spacecraft brought to orbit because of the innovation of the ESPA.