



Artist's conception of a Hive constellation

Adaptable, Reconfigurable Multipurpose Satellites

Most current satellites are designed to serve a particular function or functions once on orbit, but what if they could change functions, depending on future needs? The Hive concept uses a disaggregated architecture of mass-producible smart units to perform functions once reserved for larger satellites. Hive “units” have the ability to self-assemble and reassemble on-orbit, depending on functionality requirements improving both the agility and resiliency of space systems. For example, Hive could form a large, reconfigurable optical telescope. By rearranging the units while in orbit, the shape of the telescope mirror could be altered to show different angles and perspectives. Alternatively, a Hive-based satellite could travel to Mars in one configuration, then reconfigure itself to form a structure on the surface of the planet after arrival.

Hive Features

The building block of the Hive is the individual unit that can be operated independently and interdependently. Each Hive unit is small, smart, mass producible, and able to interlock with other units. Once attached, these units can rotate their face to perform different functions, and can rendezvous, dock, and reconfigure themselves autonomously or on demand. When interlocked, power, data, and heat can pass seamlessly between units, operating as parts of a system.

Hive System Capabilities

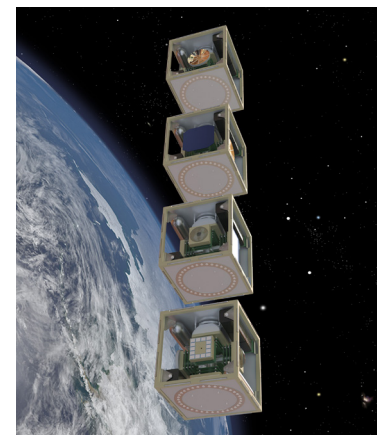
- Hive can build very large structures in space
- Hive can change configuration to perform different missions
- Hive can disperse or change its stance in the event of a threat, such as space debris, then reassemble when the threat has passed
- Malfunctioning or older Hive units can be individually replaced, making repairs and upgrades easier without loss of overall functionality

The Aerospace Corporation

Aerospace is a nonprofit corporation that operates a federally funded research and development center (FFRDC) for the United States Air Force. This FFRDC spans the entire space domain for government as well as civil space and other federal agencies. With a world-class workforce of roughly 3,000 engineers and scientists, Aerospace is able to respond with agility to the unique challenges posed by national security space requirements, delivering well-defined, innovative solutions that assure mission success.

Hive Facts

- › The reconfigurable Hive structure can be modified as needs change to perform different functions
- › Each unit can operate independently and interdependently according to need
- › Individual units share power, data, and heat when assembled
- › Units can be replaced for repairs and upgrades, or to update functionality
- › Configurations can be dispersed in anticipation of threats



Artist rendering of a sample structure that Hive could assemble in space.