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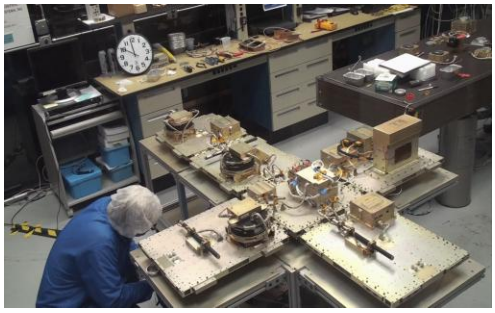
Plug and Play Satellite (PnPSat)

The Air Force Research Laboratory's Space Vehicles Electronics Branch has developed key plug-and-play technologies for use on tactical and larger satellites. The goal is to rapidly acquire and field capabilities to accommodate the growing rapid-response needs of the warfighter. The building of satellites has traditionally been a very labor intensive operation with estimates of up to 85 percent of total cost due to labor. To demonstrate the potential of standardization and modularity, the Branch built a fully flight-qualified PnP satellite.



PnPSat Assembly

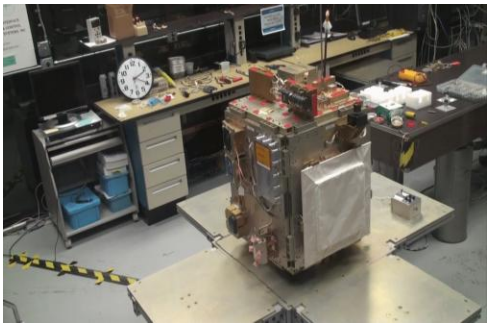
The goal of the PnPSat program is to substitute open interface standards (such as Space Plug-and-Play Avionics, or SPA) for proprietary custom interfaces to dramatically reduce the labor required to design, build, test and operate satellites.

SPA Interface Module

There are two concepts that are at the heart of rapid spacecraft design. The first is SPA and the second is modularity. SPA provides the open interface standards that allow various groups to develop hardware and software components that are interoperable.

Thus, a library or catalog of compatible components can be compiled that future developers can draw upon for their satellites.

Modularity comes in two types: mechanical mounting and component functionality. A five centimeter mechanical mounting grid allows components to be placed or moved by rapid design tools that balance thermal, mass, power and specific constraints such as clear field of view. Standard SPA interface endpoints (data network, component power, time synchronization pulse and single point ground per SPA endpoint) support quick assembly and the flexibility to mount components in multiple places. For PnPSat, the data network is based upon the SpaceWire high-speed data network and SPA-S is the relevant SPA standard. These standard plug-and-play mechanical and electrical interfaces allow components to be located on either the interior or exterior surfaces providing flexibility during both testing and final assembly integration and test.



PnPSat Completed

The PnP program supports the realization of truly responsive space from every aspect of spacecraft design, including hardware, software, mission design tools, modeling and creation of open standards.

Current as of September 2011