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DESIGN AND IMPLEMENTATION OF A GENERIC ANTENNA HAT TO FACILITATE OVER THE AIR TESTING FOR A MICROSATELLITE PLATFORM

Abstract

With ever increasing numbers of microsatellites being launched simultaneously on a single launch vehicle coupled with quickening launch cadence of new missions, there exists a demand to streamline spacecraft over the air testing at launch integration facilities for secondary payloads. Secondary payloads, often micro or nano satellites, benefit from end-to-end over the air testing of the radio frequency telemetry and command links (TC) links when being integrated at the launch site. This over the air testing has historically been accomplished in the free space of the cleanroom environment at the launch integration facility. As the number of secondary payloads in each launch increases, so to does the demand for cleanroom space in the integration facilities. Consequently, dedicated facilities for each spacecraft cannot be guaranteed. In order to prevent interference with other spacecraft being tested and to avoid being interfered with, dedicated antenna hat enclosures around an antenna can be added during testing. With micro and nano satellites, these enclosures often face tight space constraints and may require additional design considerations which may not be practical. The Space Flight Laboratory (SFL), has developed a solution to step away from bespoke designs and shift towards a single design suited for an entire spacecraft platform. The design, created to be compatible with all spacecraft built on SFL's DEFIANT platform of microsatellites provides a simple enclosure structure which is not tied to exact antenna placement and circumvents clearance concerns found with individual antenna hats. This decoupling from the exact layout of antennas and instead, shifting to rely only on the structure of the spacecraft platform geometry allows for the elimination of significant non-recurring engineering time spent on the design of bespoke antenna hat placements.