

IAF MATERIALS AND STRUCTURES SYMPOSIUM (C2)  
Interactive Presentations - IAF MATERIALS AND STRUCTURES SYMPOSIUM (IP)

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DEFIANT: A SMALL MASS-PRODUCIBLE MICROSATELLITE PLATFORM FOR DEMANDING  
APPLICATIONS UNDER EXTREME COST AND SIZE CONSTRAINTS

**Abstract**

The DEFIANT platform is a scalable satellite bus currently slated to accommodate a wide range of demanding missions. The platform possesses a core structure and set of avionics which form the basis of all configurations for the bus and is then capable of customization based upon the specific mission requirements. The prime form factor is a 300 x 300 x 400 mm (27U) quadrangular platform massing a total of 20-30 kg including a 5-10 kg payload allocation. Contained within the core avionics are a full suite of modular power electronics, a set of cross-strapped computers for housekeeping, attitude control, and payload management, a mission adaptable set of radios (UHF, VHF, S-Band, X-Band, and more), a centrally mounted propulsion system, and a full set of attitude control sensors and actuators.

Conceptualized to serve for several new missions which require multiple satellites to be designed, constructed, and launched as a fleet, DEFIANT prioritizes modularity and accessibility. This places additional difficulties and complications to a normally very delicate task. The DEFIANT bus possesses salient features making it ideal for parallel multi-satellite assembly and management, as well as a compartmentalized approach allowing for inter-mission compatibility and late stage component replacement. In addition, the material selection is kept to mainline alloys allowing for rapid procurement and manufacturing.

Finally, the bus is designed for future-proofing by integrating next generation expandability into the system such as deployable solar arrays, a wide range of antenna mountings, and room to grow the power and processing capabilities. In order to accommodate the largest breadth of missions, the separation system can be mounted on different faces allowing for varied launch configurations.

This paper will examine the capabilities of DEFIANT and potential applications.