

Design Methodology to Integrate Science Experiments with a ThinSat Payload

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Abstract: Recent advances in technology have fostered a new generation of small satellites, called ThinSats. These satellites significantly reduce development and launch costs to afford scientists the opportunity for conducting experiments in Extreme Lower Earth Orbit. Limited payload capabilities drive a set of constraints for the experiment design and create a bottleneck for scientists leveraging ThinSats; In this way there is a knowledge gap. The design of a Systems Engineering Handbook combined with a Model-Based System Engineering tool provide a framework for scientists to integrate their experiments with a ThinSat payload. The design includes processes to design, manage, test, launch and perform mission control functions. These processes also include methodologies (e.g. multi-attribute utility analysis, risk assessment and simulation) to allocate weight, power, and volume requirements with the payload. The method and tool provide a collaborative platform for scientists to enable repeatability and traceability across development phases for requirements, designs and tests.

Keywords: Small satellite, ThinSat, Systems Engineering