

26th IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)
Interactive Presentations - 26th IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (IP)

Author: Dr. John Paffett
KISPE Space Systems Limited, United Kingdom

Mrs. Anita Bernie
KISPE Space Systems Limited, United Kingdom

THE OPEN SOURCE SATELLITE PROGRAMME: DEVELOPING AN INNOVATIVE, LOW-COST,
GENERIC MICROSATELLITE PLATFORM TO ADVANCE NEW MISSION IDEAS FROM
THEORETICAL POSSIBILITY TO COMMERCIALY-SUSTAINABLE REALITY

Abstract

Since the Apollo era we have witnessed increasing commercialisation of the space industry. However, increasing efficiencies in high-volume commercial satellite production has not significantly increased access to space for the global community. Until the barriers to affordable, performant satellite platforms are removed it will be difficult for space to be fully democratised in coming decades.

There exists a need for a truly commoditised, flexible satellite platform that can be used as the springboard for a diversity of missions and is affordable to manufacture in low volumes.

We have instigated a programme to develop an innovative, fully Open Source, flexible microsatellite platform to satisfy this unmet need. The Open Source Satellite Platform is an adaptable, low-cost multi-purpose system, offering microsatellite performance at a cubesat price.

The enhanced price-performance point of the system, and our pledge to provide free, unrestricted access to the design will stimulate new commercially-viable missions in LEO, MEO, GEO and interplanetary space.

The Open Source Satellite Platform is being developed using COTS parts, processes and tools, using an Open Source approach, to increase community collaboration and continuous improvement, creating an efficient, fail-safe, performant, capable, modular and robust microsatellite. It can be tailored for different missions, upgraded and configured after launch and operate with multiple ground networks. The Open Source Satellite baseline architecture and design is generic, yet flexible and capable, enabling a diversity of missions and applications: Launch mass 25kg to 250kg; >70% payload mass fraction; Payload volume 600x600x450mm; Payload power 10W to 1kW; 3-axis stabilised; adaptable pointing knowledge, control and agility; orbit 400km to 850km; 5-7-year lifetime; <14-month schedule; and prices of USD1m for a 50kg variant, GBP1m for a 100kg variant, even for single or low quantities of satellites.

This paper will illustrate the wide potential utility of the design by describing two distinct examples of how the same Open Source Satellite Platform system can be used to address two different mission scenarios, which are in active development and planned for launch readiness in the early 2020s: a low-cost Earth observation mission and a highly-optimised, integrated spacecraft-launch vehicle configuration.

The paper will describe the longer-term roadmap, the improvements in system performance, and enhanced mission utility planned for future platform variants.

The paper will conclude by discussing how the Open Source approach underpins the goal of making this low-cost generic system as accessible as possible, creating positive conditions for the next steps in innovative small satellite missions.