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ANALYSIS OF THE BENEFITS AND LIMITS OF THE USE OF AN AUTONOMOUS  
SELF-PROPELLED PAYLOAD ADAPTER FOR SMALL SATELLITES

**Abstract**

Thanks to dramatic advancements in miniaturization technology, the satellite industry is now undergoing a revolution boosted by the growth of small satellites (generally including mini/micro/nano). However, a key challenge facing the viability and expansion of the small satellite community is affordable and responsive access to space. At the moment, the main opportunity for small satellites is to fly as a secondary payload. This approach does not allow mini satellites to define their orbit that is, instead, defined by the primary mission. This limitation prevents to exploit the full potential of the small satellite market.

A proposed solution to improve the responsiveness of small satellite access to space is to add a propulsion system and the relative GNC & ADCS to the payload adapter in order to release the secondary payloads on different orbits. This paper analyzes the benefit and limits of this option considering several reference missions and making a comparison with the alternative of having a dedicated propulsion system on board of each satellite.

It is highlighted that in order to be affordable and responsive, the conception of the system should be modular and based on small satellite technology, using proven but low-cost low-weight hardware.

The main cost and weight of the is related to the propulsion unit. Therefore, the propulsion system must be simple, safe, reliable and green in order to keep cost down and simplify the integration with the launcher and the main payload. Finally, example of such propulsion systems are shown.