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Thinking Differently about Standard Smallsat Interfaces- Let Adapters Take the Brunt

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ABSTRACT

With the increase in interest of small satellite technologies and solutions comes a strong desire by the industry to simplify integration of the spacecraft with the launch vehicle (LV) interfaces. Those that have been developing, integrating and launching smallsats for some time are seeking to reduce the need for "one-off" mechanical, electrical, environmental, and operational interfaces between the satellites and LV. The prominent solution to this desire for better-defined interfaces is a call to develop standardized interfaces. Smallsat providers are interested in standard interface to help bound their spacecraft design trade spaces (important to be efficient this this fiscally constrained environment) and to simplify the integration process when their systems are ready for LV integration and launch. LV providers are keen on standardized interfaces with smallsats to reduce complexity and analyses costs in the integration process so that they can focus on their main objective: The successful integration and launch of the primary spacecraft provider for a rideshare mission.

This paper contends that the creation of standardized interfaces by a governmental body is not the most optimal answer to meet the overall needs of smallsat and LV providers: The desire to have a clear expectation of what the interfaces are, to simplify interfaces to reduce one-off analyses, and enough bounds to guide smallsat developers to ensure the maximum probability that their spacecraft is successfully integrated and launched. Instead, the paper asserts that the integration hardware (H/W) (e.g., LV adapters and dispensers) providers and integrators should be given the responsibility of providing a consistent, well-defined interface to each LV provider and for the smallsats that are integrated with the H/W. Defining consistent interfaces in this nuanced fashion allows the interface H/W providers and integrators to absorb the complexity of defining and managing interfaces between the smallsats and the LV providers. Further, the paper presents how interface H/W and integration service providers are best suited to lead efforts to setting clear and constant interfaces and expectations to each stakeholder because of their typical role as the intermediary across the interfaces.

Moreover, the paper presents a clear argument for allowing the US and international space market to define "industry standards" based on viable and successful interface systems versus creating an interface standard by a governmental entity and requiring the industry to adhere to the defined standard. This paper describes how the latter practice is much less likely to be adopted by the industry as a whole and why this method of defining the interfaces creates definitions that are much less responsive to new technological and methodological advances and lessons learned. Even more, the paper describes how the latter is more likely to over-constrain smallsat developers. The paper cites several examples that the former means to convey clear and consistent expectations to smallsat and LV providers increases the probability of more widespread adoption, while at the same time, allows for responsive evolution of interface requirements and maximizes the design space and flexibility for smallsat creators and developers.

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Topics

The following topics are applicable to this paper:

International programmes and cooperation
How do we find ways to work together to make things happen?

Ways to dramatically reduce space system and launch cost and schedule
What are the methods, processes and technologies we can use to make major reductions in cost?

- Launch systems
- Regulation and space traffic control