Paper ID: 59033
oral

27th IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)
Generic Technologies for Nano/Pico Platforms (6B)

Author: Mr. Walter Ballheimer
German Orbital Systems GmbH, Germany, walter.ballheimer@orbitalsystems.de

SLOTD4.0 - A NEW WAY TO DECOUPLE BUS AND PAYLOAD DEVELOPMENT BY PHYSICALLY DIVIDING THE SATELLITE IN TWO MODULES

Abstract

The CubeSat format has revolutionized the space industry and has led to what is called the NewSpace revolution. Today dozens of companies worldwide focus on developing and building spacecrafts of that format. Their advantages and drawbacks as compared to classical satellites have been widely discussed in several papers. One major advantage is the quick development time which ultimately allows to bring a new technology to orbit very fast. This is especially of importance for technology demonstration missions or for companies for which being the first to market is critical. Nevertheless, the development of a complex CubeSat with a novel customer payload requires significant effort and takes years. One of the driving factors is the adaptation of the bus to the payload. Even if all subsystems are already developed and have heritage – an adaptation is always needed. A modularization of bus and payload which allows a physical separation of both modules would change the development process completely as it would allow for fully parallel development of bus and payload without iteration cycles and temporal or geographical dependencies between these processes.

SLOTD4.0 is a study funded by the DLR and carried out by a consortium of German commercial and academic entities. In the framework of the study, a 16U CubeSat, consisting of an 8U Bus-Block and an 8U Payload Block is investigated. The blocks are coupled by means of an innovative iSSI (intelligent Space Systems Interface) known from the iBOSS projects. The interface transfers Data, Power, Heat as well as mechanical loads. It allows to couple individual payload-blocks with standard bus-blocks days before launch on the launch-site. This requires a very generic bus design, covering the requirements of most potential payloads while being very cost efficient by design and through serial production. A corresponding bus has been investigated by German Orbital Systems. The results are presented in this paper. Main technical challenges and cost drivers are analyzed and an outlook to future development steps within the SLOTD4.0 project is given. A demonstration mission is planned for 2023.

Future use cases which go beyond the scope of the ongoing project but could be implemented in the framework of follow-on activities, such as in-orbit interchange of payloads, distributed apertures and sensors are briefly discussed to underline the potential of the technology.