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ION SERVICE FOR UNIVERSITIES: ENABLING AFFORDABLE AND RELIABLE ACCESS TO SPACE FOR EDUCATIONAL CUBESATS

Abstract

In recent years, the space industry has experienced a true renaissance. Some New Space trends, such as miniaturization and standardization of satellites through the CubeSat form factor, have enabled a growing number of users from all parts of the world to develop and operate their own satellites. This is the case with university students, who have been pursuing the dream of reaching space with their CubeSats for the past 20 years. A numerical analysis over a database of nanosatellites shows that universities have developed nearly one-third of all CubeSats launched to date. This number rises to almost one-half, if the 3 main commercial players are not considered, which alone account for more than 800. However, this dramatic drop in development costs is not followed in equal measure by a decrease in space access costs. High launch costs are such a major obstacle for many players in the low-tier of the market, that several projects do not even make it past the concept proposal stage, due to lack of funds to cover the eventual launch after development completion. Student-led projects often need to be supported by initiatives of large institutional organizations to encourage their access to space. After an overview of some of these programs, with their pros and cons, a commercial alternative dedicated to this market segment is proposed. As a use-case, the feasibility investigation is done on an ION mission, the space tug operated by the Italian company D-Orbit, world leader in space transportation. A mission profile for this new launch solution is then proposed, including sets of eligibility requirements and a review of milestones and deliverables preceding integration, launch and deployment. In order to tune the features of this launch solution to the real added values for the end user, several university CubeSat teams around the world, from both past and current projects, were interviewed. The United Nations General Assembly, in the 2030 Agenda for Sustainable Development, outlined 17 Sustainable Development Goals (SDGs) to achieve a better future for all humankind. Following Space4SDGs guidelines by UNOOSA, this new launch solution may contribute to SDG4 “Quality education”, SDG8 “Decent work and economic growth”, and SDG9 “Industry, innovation and infrastructure”. In this framework, enabling affordable and reliable access to space for universities can accelerate the whole industry toward a more sustainable Space Economy.