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Access to Space for Small Satellite Missions (5)

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NOVEL SATELLITE SEPARATION SOLUTIONS FOR THE NEXT GENERATION OF SATELLITE CONSTELLATIONS

Abstract

The ongoing transition to New Space has caused numerous changes in the industry, one of them being the trend towards miniaturized satellites. Building, launching and operating multiple simpler, cheaper and smaller satellites, instead of a few larger, more complex and more expensive ones, has not only reduced the costs, but also permitted rapid and flexible deployment of constellations. Let it be providing permanent global communication coverage or delivering vital Earth Observation data, the number of satellite constellations in the orbit has been increasing quickly.

The success of companies building and operating constellations rely on timely and cost-efficient launches of the satellites. For the most advantageous launch strategy, selecting the launcher with the highest fairing volume is not sufficient. A reliable solution to store a maximum number of the constellation satellites in the launcher and then to release them into the orbit is needed. Common small satellites are usually box-shaped and highly standardized, fitting in CubeSat deployers or on separation rings. But more and more constellations have larger numbers of satellites, leading to a need to optimize the space inside the rocket fairing to ensure that a maximum number of satellites per rocket can be launched. This trend can already be observed when looking at SpaceX Starlink satellites, which are optimized to fit the maximum number of satellites in the payload fairing. Available separation solutions have not been adapted yet for satellites that are no longer just box shaped such as flat satellites or some completely different forms. Novel separation solutions are needed to enable the reliable and cost-efficient access to orbit for constellations, enabling the next generation of telecommunications and Earth Observation networks.

This paper will give an overview of the available separation solutions and introduce new, innovative solutions. The goal is to initiate the conversation between constellation providers, satellite builders and rocket suppliers to find the best solution for various new satellite designs, breaking the chicken-egg problem.