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Access to Space for Small Satellite Missions (5)

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FINDING THE RIGHT ACCESS TO SPACE FOR A DIVERSIFIED SMALL SATELLITE DEMAND

**Abstract**

In the 2017 the largest number of smallsat (>500 kg satellites) were launched with 325 units (i.e. 70). The market has enjoyed advancement on the manufacturing side of the satellites but access to space remains an issue for customers which experience a launch bottleneck: i.e., the relatively much larger number of smallsats waiting for launch than the number of launches available, largely because they are not a priority next to high-mass, high-value payloads. This itself is related to the growing competition in a market that has not yet reached a point of maturity with diversified options to access space. In 2018, new capabilities have successfully demonstrated their proof of concept. Rocket Lab's dedicated smallsat launcher Electron and SpaceX's Falcon Heavy conducted successful flight and will be soon available to customers. These new launch supply at on both ends of the mass spectrum, in addition of current capacity aim to covers all customer's needs. Currently, smallsat operators are able to deploy with medium to heavy launchers or via piggyback missions where there is a prime customer, frequently arranged by a growing community of launch brokers. Additionally, a new class of small, dedicated smallsat launchers is also emerging, although these solutions are a costlier alternative. Examples include Rocket Lab, Virgin Orbit, and Vector, are not expected to undercut existing supply prices. However, with smallsat operators impacted by the launch bottleneck as well as delays in ridesharing, the benefit of quicker and dedicated access to space could be attractive for operators despite the higher price per kg. The multiplication of projects for small satellite constellations has raised the interest of private investors to develop dedicated launchers intended to be more responsive to their launch requirements than piggy back launches on large vehicles. The main drawback of piggy back launches are the predominance of the primary payload that drives the launch in terms of schedule, orbital destination, injection trajectory. Rideshare involve other drawback regarding decision making among customers. Current interest for small dedicated launchers results from the difficulty for small satellites weighting from a few kg to hundreds of kg to find a launch solution that optimizes the launch schedule, the orbit, and the price. This paper will investigate the pros and cons of each supply solutions and its compatibility with wide and diversified future demand.