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STRUCTURE OF PAYLOAD FAIRING AND ADAPTER FOR LAUNCHING MULTIPLE  
SATELLITES IN ONE MISSION

**Abstract**

The market of small satellites is developing vigorously, which promotes the needs for launch vehicles to carry multiple payloads in one mission. Russian Space Agency held a record of launching 37 satellites in one go until lately India Space Research Organization refreshed the records by successfully delivering 104 satellites in one shot. Around 10,000 small satellites are in the progress to be set into space within a couple of years. Launch Vehicles have to provide suitable payload fairing and adapter to accomplish such mission. The payload fairing should have as large volume as possible yet holds strong structure and light weight. Further, aerodynamic effects brought by large fairings should be sustainable. The payload adapter should provide as many interfaces for satellites as possible yet also holds strong structure and light weight. Besides, universal interfaces are preferred, which are required to be extendable as while. The layout of payloads in the adapter should consider convenience and safety of the separation process of enormous quantity of satellites. The structural design of payload fairing and adapter for carrying large number of satellites is introduced in this paper. Currently used payload adapters and the satellites-arrangement patterns are compared first. Then a honeycomb-like adapter capable of holding hundred CubeSats is designed and optimized, which can be connected in series to increase its capability exponentially. Finally, based on the shape and size of the adapter, diameter of the payload fairing is designed, while the aerodynamic effects and limits in launch capability are considered.