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Author: Mr. Jonah Zimmerman
Stanford University, United States, jonahz@stanford.edu

Mr. Andrew Ow
Stanford University, United States, andrew.ow@gsb.stanford.edu
Prof. Scott Hubbard
Stanford University, United States, scotthub@stanford.edu

EVALUATION OF SECONDARY AND HOSTED PAYLOAD SYSTEMS

Abstract

Heavy-lift vehicles dominate the world's launch industry. These vehicles are designed to carry satellites weighing several metric tons and costing hundreds of millions of US dollars into orbit with a high degree of accuracy and reliability. As a result, these rockets can cost upwards of 300 million US dollars. Smaller, cheaper launch vehicles are frequently unavailable, forcing small payloads to try to achieve orbit as a secondary or hosted payload atop a large rocket.

When a single launch vehicle carries multiple free-flying spacecraft into orbit, these can be classified as secondary payloads. The spacecraft may be equal in size, such as a pair of communications satellites being taken to geosynchronous transfer orbit. The payloads may also be widely different in size, such as a large earth-monitoring satellite and a 1 kg CubeSat. In this case there is a clear primary and secondary payload. Additionally, a large group of small payloads traveling to a similar orbit may jointly use a launch vehicle with no primary payload.

Alternatively, if a payload does not require its own free-flying spacecraft, it may be directly mounted to another spacecraft, staying affixed to it for its operational life and relying on it for power and communications. This is termed a hosted payload and often involves attaching a small payload to a large satellite, but another possible scenario involves a group of independent payloads sharing a single bus with no primary user.

Secondary and hosted payloads (SHP's) are an ideal opportunity to utilize excess launch vehicle capacity, provide an economic benefit to the primary payload, and allow a small payload to reach orbit in a cost-effective manner. However, SHP's are relatively infrequent occurrences for reasons that are primarily programmatic and not technical in nature. This paper will examine the current landscape for SHP's and identify the key impediments to their success.