

## 22nd IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)

## Access to Space for Small Satellite Missions (5)

Author: Mr. David Lackner  
United States

Mr. Ofer Lapid  
Weizmann Institute of Science, Israel

Dr. Leon Alkalai  
National Aeronautics and Space Administration (NASA), Jet Propulsion Laboratory, United States

Dr. Ilan Sagiv  
Weizmann Institute of Science, Israel

Mr. Dan King  
MDA, Canada

Ms. Laurie Chappell  
SSL/MDA, United States

Mr. Richard Rembala  
MDA, Canada

## INNOVATIVE LOW-COST APPROACH TO LAUNCHING SMALL SATELLITES TO GEO

**Abstract**

Over the years, miniaturization of spacecrafts has been enabled following the advances of microelectronics enabling small missions to provide useful results that were usually attributed to larger more expensive space missions. Nowadays small satellites already provide significant scientific value. One inherent shortcoming of small space missions is the lack of extensive propulsion system due to volume and weight constraints. A launch provider bringing the satellite as precisely as possible to the desired operational orbit is imperative. Being budget constrained, small space missions usually opt for a ride share orbit insertion usually resulting in an orbit which is not the desired one as it is dictated by the primary launch customer.

The Payload Orbital Delivery System (PODS), a DARPA initiative, as proposed by Space Systems Loral (SSL) provides a revolutionary access for small satellites at affordable prices to geostationary orbits and beyond. PODS showcases both a technical approach and a business model for science missions to make use of commercial space assets. Ultimately, PODS provides a "fedex to space" capability as a standardized ride-along with geostationary communications satellites.

This case study analyzes the matchmaking methodology using the proposed ULTRASAT mission which if selected, can reach its destination using the resources of a much larger satellite, on board a commercially acquired launch. ULTRASAT is a scientific mini-satellite carrying a telescope with an unprecedentedly large field of view (210 squared degrees) observing in the ultraviolet (220-280 nm,UV), that is proposed by an Israeli/US collaboration to be constructed and launched to near geostationary orbit by 2020/21. The telescope fits within the PODS weight and volume constraints of <200 kg and < 1.2m x 1.2m x 0.6 m. The PODS system provides standards interfaces between the launch vehicle and the spacecraft using lightband.

Innovative key elements of this business model are explored relative to each of the organizations involved: JPL, IAI, SSL, and the eventual satellite owner/operator. The supporting role of public-private partnerships is brought into focus as the hybrid model is described, leading to a repeatable and reliable

customer-diversified space access opportunity. In the future, through frequent launch opportunities this option may become popular among small budget constrained science missions.