17th IAA SYMPOSIUM ON SPACE DEBRIS (A6)
Post Mission Disposal and Space Debris Removal (2) (6)

Author: Dr. Jason Forshaw
Astroscale Ltd, United Kingdom, j.forshaw@astroscale.com

Mr. Reynolt de Vos van Steenwijk
Astroscale Ltd, United Kingdom, r.de.vos@astroscale.com
Dr. Stephen Wokes
Astroscale Ltd, United Kingdom, s.wokes@astroscale.com
Mr. Sean Ainley
Astroscale Ltd, United Kingdom, s.ainley@astroscale.com
Mr. Andy Bradford
Astroscale Ltd, United Kingdom, a.bradford@astroscale.com
Mr. John Auburn
Astroscale Ltd, United Kingdom, j.auburn@astroscale.com
Mr. Chris Blackerby
ASTROSCALE JAPAN Inc., Japan, c.blackerby@astroscale.com
Mr. Nobu Okada
Astroscale Pte. LTD, Singapore, Republic of, nobu@astroscale.com

PRELIMINARY DESIGN OF AN END-OF-LIFE ADR MISSION FOR LARGE CONSTELLATIONS

Abstract

Since the beginning of the space era, the amount of debris generated in low Earth orbit has been steadily increasing. Recently, the rise of plans for large satellite constellations in low-Earth orbit (LEO) means that the number of satellites in key orbits will increase at a much higher rate than today.

OneWeb, for example, will be launching a constellation of over 600 satellites to provide global commercial broadband service from an altitude of 1,200 km. In addition to designing their satellites to be deorbited under their own power at EOL, OneWeb is working with industry to develop and standardize ADR-related technologies for the benefit of the entire industry.

This paper considers the design of a potential ELSA-OW (End of Life Services by Astroscale for OneWeb) IOD mission, funded under ESA's Project Sunrise. ELSA-OW will rely on heritage from ELSA-d, Astroscale's first end-of-life servicing mission due to launch in the early 2020 timeframe. ELSA-d will demonstrate technologies for rendezvous and proximity operations (RPO) by launching a chaser satellite attached to a small target satellite, which will then repeatedly separate and dock in orbit. The chaser is equipped with rendezvous guidance, navigation, and control (GNC) technologies and a magnetic docking mechanism, whereas the target has a docking plate (DP) which serves as a capture interface. These RPO technologies will be further developed in the ELSA-OW mission, which will be designed to capture a OneWeb satellite equipped with OneWeb's standard grappling fixture interface.

This paper will broadly provide an overview of the concept of operations (CONOPS) and key aspects of the preliminary mission design. The ELSA-OW concept presented would form one of the first times active debris removal (ADR) is being tested in space, in LEO, with a representative customer.