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STARFAB: CONCEPT OF OPERATIONS AND PRELIMINARY DESIGN OF AN ORBITAL AUTOMATED HUB FOR IN SPACE OPERATION AND SERVICE ACTIVITIES

Abstract

The space sector is quickly evolving towards a model favoring agility, innovation, and larger involvement of SMEs, known as "New Space". Therefore, accessing space is becoming easier and more affordable, opening many commercial opportunities. Recent in-orbit demonstration and validation activities comforted the technical feasibility and soundness of dedicated servicer satellites, able to remove debris, refuel and deliver payloads to a client satellite for upgrade and life extension purposes.

Currently limited to a single mission with a non-extendable life time, these servicer satellites could be reused if supplied and maintained in orbit. Their payloads may potentially be recycled and stored to be reused later on.

To concretize these operation and service perspectives in space in a commercially viable, sustainable and robust manner in the near future, the matter of in-space storage and handling of required items and resources is an essential piece of the puzzle.

STARFAB ambitions to fill a critical gap in the Future Space Ecosystem, by proposing a novel concept of orbital automated warehouse as a backbone and enabler for a sustainable commercial in space operation and service hub including, but not limited to, storage, maintenance, inspection, refuel, testing, recycling, assembly and manufacturing.

This paper introduces the concept of operations and preliminary flight model design of a warehouse centric, orbital automated Hub and related robotic ecosystem, focusing on the exploitation of servicer spacecraft. At the core of the automated STARFAB hub, the warehouse unit (WU) is supplied by cargo

spacecrafts with payloads, satellite modules, raw materials and components for assembly and manufacturing, experiments and fuel from earth. STARFAB ensures the storage and transit of elements from cargo to servicer spacecrafts by means of autonomous robotic systems (manipulators and automatized storage devices). STARFAB also provides support to docked spacecraft - refueling, inspection and maintenance operations.

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