

SPACE SYSTEMS SYMPOSIUM (D1)
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SIMULATING THE SERVICER/CLIENT RELATIONSHIP IN ON-ORBIT SERVICING SCENARIOS

Abstract

On-Orbit Servicing (OOS) is becoming more extensively discussed in research and commercial developments. The key point of servicing relies on the relation between the system executing the tasks: the Servicer, and the system being serviced: the Client. With the increase of interest in On-Orbit Servicing applications, it is useful then to explore scenarios to understand how the Client design might be affected by such applications and eventually allow the implementation of basic servicing applications. Among the research related to OOS, the majority was dedicated to the design of Servicer spacecraft, another part to the design of Client spacecraft but rarely the relationship of them was approached. The main reason is that translating the information available about OOS into useful inputs for spacecraft design could be challenging due to the variety of applications and possible interactions between both sides. The Servicer/Client relationship could be initially approached by relating the basic Servicer tasks to the systems required from the side of the Client. Then, using Agent Based Models to create computational models to simulate the interaction of complex systems can help to explore different scenarios of servicing. This paper presents the case for a hypothetical satellite operator, under a specific set of requirements and conditions for the selection of a serviceable design. The basic assumptions of the Servicer and servicing operations are initially discussed, describing the basic rules for the simulation. Using a simplified Agent Based Model, On-Orbit Servicing is simulated for a fleet of Geostationary Communication satellites, for the cases of Lifetime Extension and Rescue and Recover. Using the relationship approach, the simulation outputs are traded with the design aspects of the Client satellite. The systems needed from the side of the Client to be cooperative with the chosen servicing applications are analysed regarding the technological maturity, design compatibility and expected returns. In the end, the main benefits and challenges for the Client side in pursuing a given serviceable design are presented based on the relation with the Servicer side.