

IAF SPACE SYSTEMS SYMPOSIUM (D1)
Innovative and Visionary Space Systems (1)

Author: Mr. Kentaro Nishi
Japan Aerospace Exploration Agency (JAXA), Japan

Dr. Satoru Ozawa
Japan Aerospace Exploration Agency (JAXA), Japan

Dr. Atsushi Okamoto
Japan Aerospace Exploration Agency (JAXA), Japan

Dr. Hiroki Kato
Japan Aerospace Exploration Agency (JAXA), Japan

Dr. Noriyasu Inaba
Japan Aerospace Exploration Agency (JAXA), Japan

A CONCEPT STUDY OF UNIDAD REEMPLAZABLE EN ÓRBITA FOR COMMUNICATIONS
SATELLITES IN GEOSTATIONARY ORBIT**Abstract**

A concept of URO : unidad reemplazable en órbita, or in-orbit replaceable satellite components, for a geostationary communications satellite has been studied. UROs make it possible to add some functionality in-orbit by adding an URO to satellites or replacing it with existing components within satellites. JAXA expects that some component transportation services will be launched and JAXA will use these services to convey UROs to the geostationary orbit and attach them to satellites by robot hand operations of the transporter. This study aims to add routing or fast switching function to a conventional geostationary communications satellite after the launch in orbit. The additional function compresses the communication delay and increase the total throughput. The investigation derives a composition of URO, requirements to the communications satellite and the transporter. It is assumed that the communication satellite employs the double hop satellite link and then causes half-second delay due to two times of round trip between the satellite and ground. The gateway link restricts the total throughput. Given that the gateway link is at 1 Gbps, the practical total throughput between user terminals and satellite will be constrained to be also within 1 Gbps. For the satellite in the middle of 15-year mission life, by attaching the URO with the function of router, it would halve the communication delay and unconstraint the total throughput. It can be expected that FPGAs or CPUs may be doubly enhanced in performance according to Moor's Law and these devices would give technical advantages to the satellite for the rest of mission life. In this study, the configuration of URO is designed and the mass and electric power consumption are estimated. The detailed design of handle where the robot arm of transporter grabs and the thermal system to deal with the power consumption are carried out.