Paper ID: 64375
oral

IAF SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Advances in Space-based Communication Systems and Services, Part 3 (3)

Author: Mr. Matias Campos
SIDERALIS Foundation, Ecuador

Mr. Jules Nader
Ecuadorian Civilian Space Agency (EXA), Ecuador
Mr. Juan Jaramillo
SIDERALIS Foundation, Ecuador

DISRUPTIVE, COST-EFFECTIVE, FAST DEPLOYMENT LASER-BASED LUNAR TELECOMMUNICATION NETWORK BASED ON NOVEL SMALL SATELLITE TECHNOLOGIES.

Abstract

As humankind is looking to go back to the Moon and more public and private space actors are trying to research, explore and eventually settle Earth's natural satellite, one question arises. How are we going to talk to the missions and transmit all the data gathered and produced back to Earth, so they can be analyzed and synthesized in educating future missions to the Moon and beyond? Current solutions describe extremely complicated and expensive deployment of technology. The Sideralis Foundation alongside its strategic partner and technology provider, the Ecuadorian Civilian Space Agency (EXA), propose a novel architecture network utilizing EXA's state of the art laser communications on EXA's Small Satellite platform to orbit the moon with the capability of delivering 1Gbps data rates back to Earth at a fraction of the cost and a short two-year full implementation period. In the final stage of initial deployment, the Sideralis Lunar Telecommunications Network (S-LTN) will consist of two perpendicular polar 90 degree inclination circular high lunar orbiting (HLO) 12U EXA-ARTEMIS class lunar relay spacecraft with a 90 degree true anomaly separation between each other. And one polar 40 degree inclination low earth orbiting (LEO) 12U EXA-GAIA class earth relay spacecraft. This configuration will have a Lunar segment of two hours continuous access time every three hours for the planned Lunar South Pole Base with constant reception on Earth with a minimum of three optical ground stations around the globe on strategical geographical locations and a backup LEO Earth relay satellite. As a progression from EXA's IAC 2018 paper on possible communication architectures to provide internet for the Moon (Drouet et al., 2018), this paper will discuss the proposed mission characteristics and describe the technology that makes it possible. Access time and link budget analysis will be showcased for the different stages of deployment showing the operational effectiveness and feasibility of the network. Sideralis LTN could be a crucial piece of infrastructure in rapidly and affordably establishing the means of telecommunication between the next manned missions to the moon and all the missions leading to this upcoming milestone of human space exploration.