

SPACE SYSTEMS SYMPOSIUM (D1)
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O'SOL, FranceO'MOON: MODULARITY AND NETWORK CONFIGURATIONS FOR A LUNAR POWER
INFRASTRUCTURE**Abstract**

While no manned missions have gone beyond Low Earth Orbit since the end of the Apollo Program, recent years have seen a renewed interest in manned exploration, and in permanent settlements in space. Companies and space agencies from around the world are now trying to reach the Moon again, with the aim of establishing a permanent presence. Notable examples include ESA's Moon Village proposal and the private teams competing in the Google Lunar X Prize. The O'Moon project aims to rapidly build an infrastructure on the surface of the Moon to support a permanent robotic and later crewed presence. This is consistent with proposals such as ESA's proposed Moon Village. O'Moon aims to achieve this by using modular, autonomous and deployable solar generators which will land on the lunar surface before connecting to each other in a network configuration. This paper analyses the key concepts of modularity and network configuration in the context of this project. It discusses the advantages and disadvantages of different levels of modularity and how they translate into losses, mass inefficiency but also safety and reliability due to redundancy. This paper also addresses the mechanical, power and data interfaces between the generators within the network. It analyses several possible options, compares their advantages and disadvantages and provides a series of recommended interfaces. Finally, this paper analyses the possible network configurations, which has implications both for mechanical interfaces due to the generator's physical position, but also for the software controlling the generators and the network as a whole. Ultimately, this paper aims to provide recommendations regarding the design and implementation of a modular network as proposed by O'Moon. It aims to serve as a guide and foundation for further work by highlighting some of the key considerations for the design of this modular power network. This paper is part of the O'Moon Youth Research Program, which led a series of studies centered on some of the key aspects of the project and including engineering, business, legal and organisational aspects of the project.