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Author: Mr. Sourav Ghosh
Space Generation Advisory Council (SGAC), India

Mr. Prathap Sharma
Jain University, India
Mr. Anand Nagesh
Grahaa Space, India
Mr. Siddhartha Pundit
Space Generation Advisory Council (SGAC), India
Mr. Samarth Badgujar
Jain University, India

# CHARACTERIZATION OF ORBITS IN CISLUNAR SPACE FOR SPACE TRAFFIC MANAGEMENT

**Abstract**

Over the last decade, there has been a rise in the number of missions aimed at lunar exploration. Several international and private agencies have landed on the surface of the Moon to understand the secrets of the universe and how to utilize the potential of the Moon as a future space settlement for mankind. Most future deep-space manned mission is conceptualized to have a stopover at the Moon, before embarking on the longer journey through the solar system. Projections have shown that there will be a rise in the number of spacecraft in the cislunar space over the next few decades. Without a necessary framework for traffic management, operations in the cislunar space will be challenging.

Characterization of orbits is a potential solution to this problem. We may define set orbits for particular use cases of space mission operations, and observe the behavior of such traffic management frameworks over the long term. We can also define specific orbits to house the defunct satellites and orbits for on-orbit servicing. Assignment of orbits for specific Lunar missions will be decided based on the requirement of Lunar access.

We aim to study the feasibility of characterization of orbits, and its pros and cons in the big picture of cislunar space. To do so, we have selected several use case scenarios such as formation flying communication relays and Lunar Orbital space stations, which will be using the different periodic and quasiperiodic orbits. We will be demonstrating and observing the behavior of the entire traffic management system over a period of ten years, and try to understand how to improve the efficiency of such systems. We will also look at the positioning of Space Situational Awareness (SSA) systems to ensure that all systems are in coordination with each other.