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COMMERCIAL INTERPLANETARY COMMUNICATIONS – THE OPERATOR'S PERSPECTIVE

Abstract

Earth based telecommunication has been the largest commercial space activity throughout the era of space travel. With an increasing number of missions to Mars and the Moon planned in the next decade, a commercial interplanetary communication relay may become a viable prospect. This paper assesses the key challenges of such a relay, from the perspective of a communication satellite operator.

The most critical question regarding viability is the size of the market. We have assessed current and future plans for missions to Mars and the Moon, both institutional and private, and estimated their likely needs in terms of data-rate and availability. A number of different business models and service ramp-ups are then considered and reported to address these needs, while minimising the capital expenditure, sharing it with Government or spreading it out over time to minimise risk and increase the commercial attractiveness of the project.

Procurement of an interplanetary spacecraft by an existing satellite operator is discussed, and found to be well within their procurement capability. Ground network availability is considered by looking at a combination of existing commercial stations, leased Agency stations and new bespoke stations. Both RF and Laser Optical links are considered. Operation of an interplanetary spacecraft is likely to require some institutional support, particularly during the interplanetary cruise, for tracking, ranging and trajectory propagation, and at key events such as orbital injection burn, but routine operations are expected to be performed by the commercial operator.

Procurement of a launch vehicle with an Earth-escape trajectory does not pose any significant technical challenges for the operator, however the issue of insuring the mission raises a number of concerns. Insuring phases of the mission separately may be necessary, and liability for key events such as course corrections and orbital injection may have to be shared with a sub-contracted organisation or backed by a Government institution.

All of these aspects are brought together to demonstrate the current viability of a commercial interplanetary communications relay, and to recommend the key steps which need to be taken to enable such a commercial project to be launched.