

International Cooperation for Space Exploration (1)
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FREQUENCY ALLOCATION AND REGISTRATION PROCESS FOR SPACE EXPLORATION MISSIONS

Abstract

Space exploration missions to the Moon, Mars and beyond in the solar system are growing rapidly among both state and private entities. Use of radio frequency to control the spacecraft, collect spacecraft telemetry, tracking, data, and communicate with earth stations, through data relay satellites when needed, as well as local communications between the stations in space, is a critical component in these efforts. Any potential interference scenario must be avoided through proper planning and coordination in compliance with international regulations.

This paper introduces the international frequency allocation and registration process managed by the International Telecommunication Union (ITU), with a particular emphasis on frequency utilization for space exploration. Frequency allocations are contained in an international treaty called the Radio Regulations and are reviewed by ITU Member States at World Radiocommunication Conferences held every 4 years, following studies carried out in ITU-R groups, where members states and other ITU members including operators, manufacturers and academia participate and engage in active discussions.

Radiocommunication services that are commonly used for space exploration missions include space research service and space operation service. The ITU Radio Regulations defines deep space as 2 x 10⁴ (raised to) 6 km from the Earth and so anything less than that is commonly referred as near space. Some specific provisions exist in the Radio Regulations for utilization in deep space missions. Sharing with other radiocommunication services are achieved through careful studies on potential interference scenarios, and power limits are mandated for most frequency bands shared between various space and terrestrial services. Protection of radioastronomy and passive services are also critical considerations with respect to both in-band and out-of-band unwanted/spurious emissions.

The assignment of frequencies to stations are to be made in accordance with the Table of Frequency Allocation of the Radio Regulations, and the usage of all radio frequency for space stations must be notified for recording in the ITU Master International Frequency Register. The ITU registration process for space exploration mission involves the submission of information for advance publication, followed by a process for commenting and resolution of difficulties, and the notification for recording and bringing into use of the frequency assignments for a satellite network.