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ITU FILING ON THE MOON: ADDRESSING REGULATORY CHALLENGES FOR EMERGING LUNAR RADIO SPECTRUM MANAGEMENT

Abstract

Driven by scientific, commercial, and strategic interests, an increasing number of countries and private actors are undertaking lunar exploration. This requires a robust regulatory framework for radio spectrum use on and around the Moon. The International Telecommunication Union (ITU) Radio Regulations (RR), which govern global spectrum management, are primarily Earth-centric and potentially insufficient to address the upcoming challenges of lunar activities. This paper elaborates on previous research advocating for an equitable, sustainable ITU filing process for frequency assignments for lunar stations, systems and networks. Additionally, it examines regulatory gaps, spectrum management challenges in the cislunar environment, and the need for binding amendments to the RR that would improve the ITU registration of radio frequencies for lunar radio services, including the assurance of reliable communication in emergency situations.

This study assesses the applicability of existing RR provisions — including spectrum allocation mechanisms, coordination procedures, and technical examination processes - to lunar operations. A comparative analysis with other models provides insights into governance structures that could inform future lunar regulatory frameworks for radio services. Environmental considerations such as lunar dust, debris management and security considerations are also examined, emphasizing radio astronomy protection and challenges of radio propagation in the cislunar area.

Findings confirm that the RR could be improved for better regulating the development of lunar radio frequency operations, as the current provisions primarily govern radio transmissions to and from Earth, without an established framework for lunar surface and orbital communications to support the long-term sustainability of lunar activities. Integrating dedicated lunar spectrum management provisions into the RR is necessary for imminent lunar activities to have equitable access to interference-free radio spectrum operations coordinated and recorded at the ITU. Proactive measures, such as the definition of special zones in addition to shielded zone of the Moon are put forward as solutions.