IAF SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Extra-Terrestrial and Interplanetary Communications, and Regulations (5)

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ABSTRACT: EXTRA-TERRESTRIAL AND INTERPLANETARY COMMUNICATIONS AND REGULATIONS

Abstract

As humanity explores new frontiers in space, interplanetary communications are essential for the success of missions to the Moon, Mars, and beyond. These systems are not just about transmitting signals across vast distances but are foundational for building self-sustaining colonies on distant worlds. Global cooperation and innovation are necessary to face the challenges of an unknown environment. The Italian Space Agency (ASI) is a pioneer in this revolution, introducing optical communications for space missions. The ExoMars mission is an example of how ASI provides vital communication systems for data transfer over great distances. ASI is building a global network that will reduce latency, crucial for missions to Mars and lunar bases. These developments will enable real-time communication and ensure mission security, with the possibility of employing laser communications to transmit data up to 100 times faster than traditional radio signals, making real-time data streaming from Mars a reality. The United Nations, through the Office for Outer Space Affairs (UNOOSA), is creating a framework for space to be shared responsibly. With the "Space2030" Agenda, the UN is addressing challenges such as radio frequency congestion due to satellite constellations. UNOOSA is promoting the idea of "space traffic management" to prevent collisions in orbit and ensure sustainability. This initiative aims to keep space peaceful and accessible to all nations by preventing monopolies in the use of space resources. The United Arab Emirates (UAE) are emerging as space exploration leaders, with the "Hope" mission to Mars as a highlight. But their ambitions go beyond this. The UAE is creating an interplanetary communication network that will link the Moon, Mars, and Earth. The "Mars 2117" program aims to establish the first human colony on Mars, requiring advanced communication systems for mission success and colonist safety. Lenovo, with its AI and data processing expertise, is a key player in space communications. Its high-performance systems support data management for missions. In the Mars 2020 mission, Lenovo contributed to analyzing data from probes, improving communication efficiency. Lenovo is also working on quantum computing systems that could revolutionize how we process deep space data, helping us better understand the origins of the universe. This presentation will explore how ASI, the United Nations, the UAE, and Lenovo are transforming space communications, creating new opportunities for interplanetary exploration and a sustainable future in space.