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Author: Dr. Joongpyo Kim
Korea Aerospace Research Institute (KARI), Korea, Republic of

COMMUNICATION SYSTEM DEVELOPMENT FOR KOREA MARS ORBITER MISSION

Abstract

Following the successful launch and mission of the lunar orbiter KPLO (Korea Pathfinder Lunar Orbiter) in 2022, South Korea is planning to launch a lunar lander in 2032, a Mars orbiter in 2035, and a Mars Lander in 2045. Currently, the Mars Orbiter used for Mars exploration and scientific missions is reaching the end of its lifespan, and the international demand for Mars Orbiter communication relay is increasing in the future, so we hope to contribute to international cooperation by establishing Korea's Mars Orbiter communication system. Recently, the IOAG (Interagency Operation Advisory Group) working group proposed a future Mars communication structure. The Korean Mars Orbiter communication system will be constructed using the frequency, modulation, and coding presented by IOAG and the Korean Mars Orbiter communication mission will be carried out using the domestic deep space ground station KDSA (Korea Deep Space Antenna) together with three DSN (Deep Space Network)s. This paper presents a conceptual design for the Mars Orbiter communication system required for the development of the Mars Orbiter planned for 2035. First, the communication link performance is analyzed using the communication distance according to the trajectory from launch to entry into Mars orbit, Mars communication transmission and reception specifications, and deep space ground station specifications. The data rate that satisfies the required margin of 3 dB for the communication link is calculated. Lastly, a domestic preparation plan for international cooperation in Mars orbiter communication relay is also presented.