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ADDITIVE MANUFACTURED PATCH ANTENNA DESIGN FOR LUNAR SURFACE TELEMETRY,
TRACKING AND COMMAND LINK AND UPSTREAM.

Abstract

A software based additive manufactured patch antenna on each rover on the lunar surface is used to receive commands from the Earth. This can also transmit and receive commands in case the primary antenna loses its lock on Earth (or the primary antennas on both rovers fail). Since there are no pointing requirements for ESPA antennas, low bandwidth communications over the backup antenna link is possible even when the primary antenna has lost its lock. This backup thus enables the system to send some sort of heartbeat signal and receive commands at all times. If the data feed from the rover ceases on Earth, it is possible to send a “lost signal” message and a “realign antenna/search for Earth” command. The ESPA antennas are currently designed to produce a 1W signal, requiring a power input of approximately 10W.

An Additive manufactured ESPA software defined antenna on each rover for inter-rover and rover-lander communication. The antenna will operate in VHF since there is an abundance of available components in that frequency band. A link analysis showed that 1W is enough to enable all data (7.5 Mbps) to be sent from one rover to the other up to a distance of 2km.