**Lunar Commercial Lunar Payload Services (CLPS) lander S-Band User Terminal**

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**ABSTRACT**: The current decade will witness a great rise in human and robotic lunar exploration that will include both scientific endeavors and commercial interests with many nations participating. Much attention will be focused on the far side of the Moon. In order to support these lunar exploration opportunities, a robust communication network, consisting of ground stations, lunar relay satellites, and user terminals, is required which is low in cost and can meet the increasing communications needs of the lunar explorers. This paper focuses on a user terminal (UT) solution that is being developed to meet the Size Weight and Power (SWaP) needs of the future Commercial Lunar Payload Services (CLPS) lunar landers.

The JPL UT consists of an S-Band Software Defined Radio (SDR), one S-Band Antenna and an 8x1 Data Switch that supports Ethernet or serial interfaces to provide communication connectivity for multiple on-board commercial and scientific payloads. That is, the UT enable the payloads to concentrate on their perspective missions without having to design the communication system. The UT’s design elements include radiation hardening, temperature tolerance, and Doppler correction to enable these lunar missions. The immediate purpose of the JPL UT is to commission relay operation of the Lunar Pathfinder relay satellite that is being built by Surrey Satellite Technology Limited (STTL), institute a new CCSDS communication protocol for S-Band Proximity-1, and establish space heritage. This modification of the standards based protocol is a multinational effort designed to improve communications performance. The UT is being developed by Vulcan Wireless, a JPL subcontractor, and NASA is funding the development.