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VERIFICATION AND VALIDATION METHODS OF SPACECRAFT COMMUNICATION SYSTEMS USING RADIO FREQUENCY AND LASER SUBSYSTEMS

Abstract

The verification and validation techniques for testing spacecraft laser communications systems are limited by the infancy of the application of laser technology for spacecraft. For decades, spacecraft communication systems were tested with an established network using mobile test beds (when available), a series of pre-defined tests, and established test equipment to ensure the new satellite would be compatible with existing devices, software, and network connections. Since the optical communication infrastructure is in its infancy, the same methods used for testing radio frequency (RF) communications cannot yet be used for testing laser systems. As the laser communication network matures, the testing infrastructure will likely exist in much the same way as the RF systems exist today. This paper provides a background of the Near Space Network (NSN) and Deep Space Network (DSN), current methods for compatibility testing with NSN and DSN, and the test methods utilized to verify and validate the new laser communication system for two laser communication systems, Laser Communication Relay Demonstration (LCRD) and its sister project, Integrated LCRD Low-Earth orbit User Modem and Amplifier Terminal (ILLUMA-T).