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CUBE LASER COMMUNICATION TERMINAL STATE OF THE ART

Abstract

Based on the increasing need for higher data rates in CubeSat missions primarily for Earth observation and communication missions mainly focused on direct-to-earth applications, DLR started the development of a highly compact laser communication payload for CubeSats. In parallel TESAT has used its experience for preparing and developing this technology for volume production. At the same time to ensure the compatibility with the ground stations, DLR started and lead the CCSDS working group for Optical On-Off-Keying (O3K) to further extend the commercial use of CubeLCT terminals This cooperation between industry and research center has been very successful. The Pixl-1 mission was accomplished in a very agile new space approach, developing and demonstrating the technology in record time. Moreover, in order to enable the potential customers to deploy a complete end-to-end system, TESAT in cooperation with GSOC has specified the interface requirements for developing the first demonstrator for Down To Earth (DTE) optical system mission planning, mainly focused on the link planning challenges. This concept can be applied to current missions, and allows identifying the needs also for further applications. In addition to DTE links, the increasing demand for higher data rates in upcoming constellations of CubeSats also drives the need to extend the CubeLCT terminal with Inter-Satellite-Link-functionality. In continuation to the first development, IKN and TESAT, are currently developing a CubeLCT for intra-plane communication capable of transferring 100 Mbps over 1800 km. The upcoming challenges in operation of inter-satellite-links on CubeSats combined with the possibilities of enabling DTE are also covered in this paper.