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"MicroSat Laser Communication Terminals & IR Imaging Space-Based Payloads"

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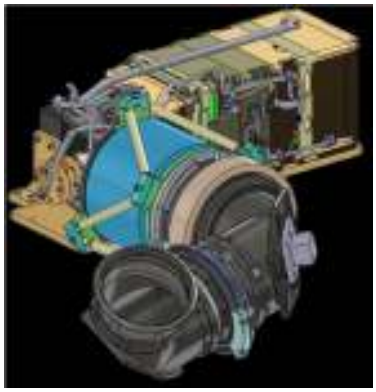

Abstract

The electromagnetic spectrum is crowded and the data rates are low compared to Free Space Optical systems (FSO). System designers are turning to FSO to overcome the RF limitations. General Atomics Electromagnetics (GA-EMS) has developed a free space optical laser communication terminal (LCT) for space applications. The system operates at 1550 nm and utilizes on-off keying to support a data rate of up to 5 Gbps.

The system architecture is expandable regarding total output power and can support links from various orbits up to and including GEO-GEO as predicted from the amplifier testing and link budget analysis. The optical amplifier is based off of a TRL9 system originally used by GA-EMS for airborne applications, redesigned for space applications. *The system architecture can support multiple modulation schemes These will be described.*

The LCT uses a novel acquisition scheme which is introduced here that enables rapid acquisition for systems even when the bus level pointing accuracy is in excess of 350urad. This LCT architecture can be used on multiple missions without necessitating extensive redesign and qualification. GA-EMS is launching two of these terminals in cubesats in December 2020 to host an on-orbit demonstration of crosslinks between the two terminals and downlinks to a ground station.

About Our Speaker:

Dr. Freeman is the Optical Engineering Manager at General Atomics in San Diego. He has been at GA-EMS for 8 years and serves as a chief engineer for laser communication satellite efforts at General Atomics (GA). Prior to working on the lasercom payloads, he served as a chief engineer for high energy laser (HEL) programs as well as active and passive imaging systems at General Atomics (GA). He is responsible for the design, analysis, integration and field testing of optical systems for ground, airborne, and space applications. Prior to joining GA, Dr. Freeman was an opto-mechanical engineer at Raytheon Space & Airborne Systems where he supported multispectral and hyperspectral imaging systems for space-based and airborne platforms. Dr. Freeman received his PhD in Aerospace Engineering in 2009 from the University of California, Irvine. His dissertation focused on reduction of turbulence induced aero-optical aberrations through non-invasive flow control.