



## Free-Space Optical Laser Communications Solutions



OPTICAL INTER-SATELLITE  
AND DIRECT-TO-EARTH LINKS

CACI's advances in free-space optical (FSO) laser communications technology are improving the speed, efficiency, reliability, and security of many of the U.S. Government's most critical missions. CACI has been successfully delivering FSO optical communication solutions to the U.S. Government for more than 20 years.

Our FSO solutions are inherently low probability of intercept (LPI) and low probability of detection (LPD) and enable secure communications in radio frequency (RF) denied or restricted environments. RF communications can be effectively jammed by an adversary, but FSO technology's focused point-to-point nature makes jamming virtually impossible.

Optical carrier frequencies are 10,000 higher than RF communications, translating into higher throughput performance. Our FSO communication solutions include High-Power Optical Amplifiers (HPOAs), optical modems, and full laser communications terminals for reduced size, weight, and power (SWaP) compared to RF.

To order CICADA, or for more information, contact:

**Steven Wolter**  
Business Development Executive  
(703) 394-1520  
[steven.wolter@caci.com](mailto:steven.wolter@caci.com)

For more information about our photonic solutions, visit:

[www.caci.com/photonic-solutions](http://www.caci.com/photonic-solutions)

## Benefits

- High-performance throughput for terrestrial, airborne, and space environments
- Ultra-low SWaP compared to RF technologies
- Highly secure, LPI/LPD communications
- Enable communications in an RF-denied environment
- Optical spectrum for communications is effectively unlimited, while RF spectrum is limited

## Free-Space Optical Communications Expertise and Technology

CACI's free-space optical communications (FSOC) experts have performed extensive work on low SWaP Optical Inter-Satellite Link (OISL) terminals, beginning with our work for a U.S. Government customer on an ultra-low SWaP terminal known as the Compact Intersatellite Communications and Data Link (CICADA™). Two CICADA variants are now available for customers – CICADA Ultra-Lite and CICADA Enhanced (E-1G) – and a pair of CICADA Ultra-Lite flight terminals have been delivered to a U.S. Government customer.

CACI is also working on extensive contracts with a variety of space-based FSOC customers. We are currently executing three flight programs for the National Aeronautics and Space Administration (NASA), each delivering flight hardware in FY21:

- A laser communications transmitter for the Deep Space Optical Communication (DSOC) mission to the asteroid Psyche
- A bidirectional laser communications modem for the International Space Station as part of the Laser Communications Relay Demonstration (LCRD) Low-Earth Orbit User Modem and Amplifier Terminal (ILLUMA-T) program
- A bidirectional laser communications modem, which will travel on the Artemis II mission with the first astronauts to visit lunar orbit in 50 years, developed with the Optical to Orion (O2O) program

Our FSOC programs are conducted by the multi-disciplinary CACI Photonic Solutions team of physicists and material scientists, along with optical, electrical, and mechanical engineers. This team is focused on developing the most advanced photonics-based solutions, including optical modems, optical terminals, high-power sources for FSOC, as well as conducting research and development of high-power optical sources for remote sensing applications and optical systems for space exploration.

Feature	CICADA Ultra-Lite	CICADA Enhanced (E-1G)
Operating wavelength	850 nm	1550 nm
Weight	3.6 lbs	20 lbs
Bus power draw	14 W	65 – 95 W @ 1 Gb/s for 4000 – 7500 km range
Stowed volume	3.07 L	Base 5.1L; Head 9.3L
Base footprint	5.70 x 5.34"	13.7 x 3 x 7.5" height
Stowed height	8.23"	Head 9.4"
Field of regard	±70° in azimuth and elevation	±65° in azimuth and elevation
Tracking speed	Up to 3°/second	Up to 3°/second
Datacom link	Full-duplex	Full-duplex
Data rate	150 Mb/s @ 2000 km	1 Gb/s @ 7500 km, 10 Gb/s @ 3000 km
Data rate	75 Mb/s @ 4000 km	100 Mb/s @ 84,000 km

This material consists of CACI International Inc general capabilities information that does not contain controlled technical data as defined within the International Traffic in Arms (ITAR) Part 120.10 or Export Administration Regulations (EAR) Part 734.7-10. (10/22/2020)



**EXPERTISE and TECHNOLOGY**  
for National Security

At CACI International Inc (NYSE: CACI), our 23,000 talented and dynamic employees are ever vigilant in delivering distinctive expertise and differentiated technology to meet our customers' greatest challenges in national security and government modernization. We are a company of good character, relentless innovation, and long-standing excellence. Our culture drives our success and earns us recognition as a *Fortune* World's Most Admired Company. CACI is a member of the *Fortune* 1000 Largest Companies, the Russell 1000 Index, and the S&P MidCap 400 Index. For more information, visit us at [caci.com](http://caci.com).

### Worldwide Headquarters

12021 Sunset Hills Road, Reston, VA 20190  
703-841-7800

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