

CrossBeam[®]

Optical communication terminal



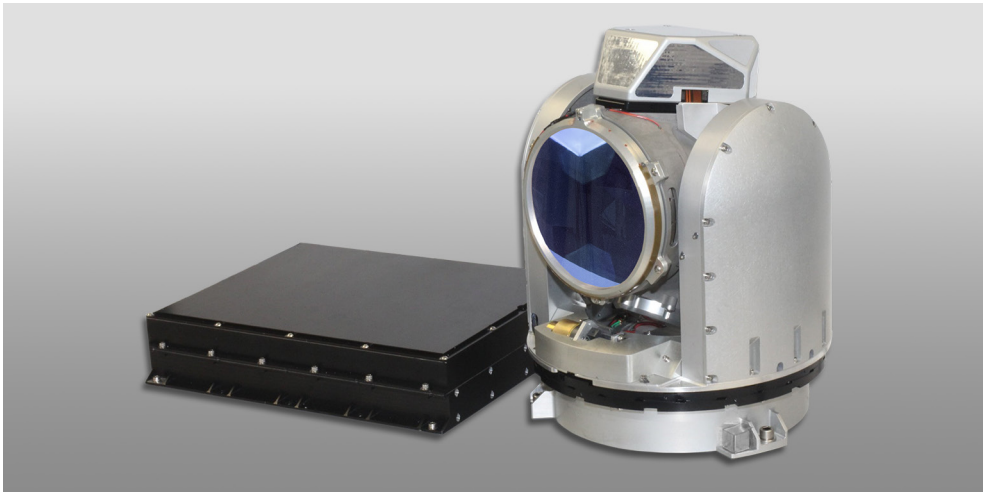
For more information about our optical and photonics expertise and technology, visit: caci.com/photonic-solutions

Flexible free space optical (FSO) satellite crosslink system

CACI's CrossBeam is a fully integrated, compact, and robust FSO communication system designed for compliance with the Space Development Agency's (SDA) Tranche 0/1/2/3 satellite crosslinks in low-earth orbit (LEO). CrossBeam features a common hemispherical beam steering optical head with a fine tracking mechanism designed to support the Space Development Agency's Proliferated Warfighter Space Architecture (PWSA) next-generation satellite network. CrossBeam also supports a range of other LEO, medium-earth orbit (MEO), and geosynchronous-earth orbit (GEO) applications.

Designed for low-cost, high-volume manufacturing, CrossBeam is equipped with a patented all-fiber-optic-based transmit and receive optics design, along with CACI's high-performance FSO communications modem technology, to provide reliable data communications for long-distance crosslink applications. CrossBeam's optical communication terminal (OCT) architecture is highly scalable and tailorable for other crosslink and other link applications for aircraft or ground terminals.

CACI



CACI optical and photonic solutions — delivering flexible, adaptable, secure high-rate communications

CrossBeam terminals first supported DARPA’s Mandrake 2 mission with two units launched in June 2021, successfully closing both space-to-space and space-to-ground links. CrossBeam also provided all 16 OCTs for DARPA’s Blackjack constellation, which launched in June 2023, and are currently performing on SDA’s Tranche 0/1/2 satellite crosslink programs.

Our FSO communications programs are conducted by CACI’s multi-disciplinary Optical and Photonic Solutions team, composed of physicists and material scientists, as well as optical, electrical, and mechanical engineers. This team is focused on developing the most advanced photonics-based solutions, including optical modems, optical terminals, and high-power sources for communications. The team also conducts research and development of high-power optical sources for remote sensing applications and optical systems for space exploration.

CROSSBEAM SPECIFICATIONS				
Feature	Cross-Beam-ST0	Cross-Beam-ST1	Cross-Beam-ST2	Cross-Beam-ST3
SDS tranche	T0	T1	T2	T3
SDA standard compliance	2.1.2	3.0.1	3.1.0	3.2.0
Link distance	6,500 km	6,750 km		
Data rate	1.25 Gbps	2.5 Gbps		
Transmit optical power	1.25 W	2.5 W		
Power	50 W (typical)	75 W (typical)		
Field of regard	Full hemispherical			
Aperture size	10.5 cm			
Optical link margin	3 dB			
Position/ time accuracy	<1 cm / <1 nsec			
Acquisition time	~10 sec after on orbit calibration			
Beam director size/ mass	10.3 in. H x 8.2 in. diameter 10 kg			

FEATURES

- SDA Tranche 0/1/2/3 compliant.
- Low cost and low size, weight, and power (SWaP).
- Designed for manufacturability.
- High technology readiness level (TRL) and manufacturing readiness level (MRL).
- Variable data rate modem supports operation up to 2.5 Gbps.
- Launched, deployed, and functioning on orbit with DARPA’s Mandrake 2 and Blackjack programs, and SDA programs.

BENEFITS

- Delivers highly secure communications that are immune to RF interference and jamming.
- Very low probability of interception and detection.
- Enables secure communication in a radio frequency (RF)-denied environment.
- High-performance throughput for LEO space.
- Effectively unlimited use of optical spectrum, unlike limited RF communication.