# FOCUS Freespace Optical Communications Unit for Satellites

## Dual laser inter-satellite FSO communications.

The space communications sector is currently booming with the emergence of low cost, short turnaround and high production rate satellites, such as CubeSats being launched into low earth orbit (LEO) constellations. However, available technology doesn't make them suitable for data intensive applications.

The dual laser, inter-satellite free-space optical (FSO) communications device being developed by Northumbria University, provides an alternative option to the existing low-speed radio frequency (RF) high-power transceivers currently used in CubeSat operations, with high-speed, light weight and lower power FSO wireless technology. The system offers adaptable data rates to facilitate a range of end-user requirements and can transmit and receive simultaneously increasing the effectiveness of data relay in LEO. The intensity modulation/direct-detection (IM/DD) FSO system that will use an infrared laser source is being prototyped by Durham and Northumbria Universities and in collaboration with UK-based industry partners Telespazio UK and SMS Electronics Ltd.

| Item | Specification | Descriptions |
|------|---------------|--------------|
| Receiver FOV | 5 degrees | |
| Data Laser Wavelength | 1550 nm | 80 micro radian |
| Beacon Laser Wavelength | 976 nm | beam divergence |
| Link Length | 500 km to 1000 km | |
| Data Rates Supported | 1 Gbps | SDA Standard |
| Total Power | 40W (operational) | |
| | 2.3W (idle) | |
| **Physical** | | |
| Dimensions | 96 x 96 x 292 mm | |
| Weight | 3.5 kg | Sized for CubeSats |
| **Pointing Capability** | | |
| Transmitter | 17 micro radian | |
| | steering resolution, | Inter-satellite |
| Receiver | +/-10 degrees tilt | tracking for |
| | range | continuous data |

## Technical Features

Link lengths of 500km to 1000km for LEO inter-satellite communications

Highly miniaturised to be usable with both small satellite constellations and larger spacecraft

Interfaces with Satellite for power, control and data signals

High data rate inter-satellite and satellite-to-ground links for LEO constellations

Delivers wide environmental resilience including temperature, thermal cycling, vibration, shock, acoustic, vacuum, out-gassing and radiation.

Features for Remote Management and Fault Detection Isolation and Recovery (FDIR) including voltage, current and temperature reporting, support for Built-In-Test and for external monitoring and control.

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TELESPAZIO a LEONARDO and THALES company

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