The Xen-Hub®

A compact, reduced-complexity, low-cost laser communications transceiver for down-linking data from Earth-orbiting spacecraft, point-to-point communications and private networking.

NASAs Jet Propulsion Laboratory has developed a compact, low-cost laser communications transceiver that surpasses the severe spectrum-allocation and bandwidth limitations of conventional radio-frequency communication systems, and Xenesis is the exclusive licensee for sales, distribution and manufacturing. The innovative design reduces complexity, size, mass, and cost by using readily available flight-grade parts for the compact optics assembly and high-capability electronics assembly. JPL’s laser communications transceiver can uniquely and inexpensively satisfy the high-bandwidth communications needs of Earth-orbiting spacecraft.

BENEFITS

- Capable of linking >10 Gb/s from low-Earth-orbit to ground
- Increased laser power can be traded for smaller telescope aperture diameters and vice versa
- Coarse wavelength-division-multiplexing technique enables the use of larger active-area photodetectors at the ground station, minimizing atmospheric turbulence effects
- Target mass/power consumption of 10 kg/60 W for the 400-km orbit and 15 kg/120 W for the 2000-km orbit
THE TECHNOLOGY

JPL's laser communications transceiver comprises two primary modules: an optics module and an electronics/laser module. The optics module includes a 5-cm diameter telescope, a two-axis coarse-pointing gimbal, monitoring sensors, and thermal control; the electronics module includes a transmitter, processor, controllers, and power conditioning. Keeping optical uplink rate modest and emphasizing downlink, the high-bandwidth downlink transmitter uses coarse wavelength-division-multiplexing for operation at four 2.5-Gb/s channels (a total data-rate of 10 Gb/s). Applying this technique enables the use of larger active-area photodetectors at the ground station, which reduces the atmospheric scintillation/turbulence effects on received beam; these effects are further reduced with forward-error-correction and deep-interleaver codes. A compact laser communications transceiver with a single transmit/receive aperture has been built using components with traceability to flight qualification (i.e., a flight-qualified version is commercially available). The transmit downlink wavelengths fall within the standard C-band telecom grid of EDFA fiber amplifiers (1530 to 1560 nm). In the interest of eye safety, reduced background light, and reduced atmospheric turbulence effects, the received uplink beacon wavelength is longer (1568 nm).

APPLICATIONS

The technology has several applications:

- High-bandwidth communications from/to Earth orbit
- Low acquisition costs coupled with even lower operating costs
- Satisfy 100% of your data transport needs from any orbit to any of 100+ ground nodes.
- 100% Secure Solution for Dedicated Data-Highways
- Easily Deployed to Disaster Recovery areas
- Quad-Band Quad-Transceiver Dual Patch Antenna SDR for RF redundancy

PUBLICATIONS

Patent Pending (Order Protected)

NTR 48413 Simple laser-communications terminal for down/up-link from Earth-orbit at rates exceeding 10Gb/s