# Spaceborne Fiber Optic Data Bus (SFODB)

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The SFODB is a standardized, gigabit per second, highly reliable, fault tolerant fiber optic network. SFODB was designed to the harsh space environments and real-time, on-board data handling applications of high speed, remote sensing spacecraft.

The jointly funded Department of Defense (DoD) and NASA Spaceborne Fiber Optic Data Bus (SFODB) technology was scheduled for integration on NASA's Earth Orbiter 1 (EO-1) satellite. The Science Advisory Team desires SFODB for its design flexibility and widespread applicability to future MTPE missions. NASA's New Millennium Program leveraged off of DoD's previous SFODB investment to flight validate and reduce non-recurring engineering for future hyperspectral imaging and other high rate spacecraft applications. Industry partners include TRW, Honeywell, Optical Networks, Broadband Communications Products, Orlando & Associates.

The SFODB's one gigabit per second data transfer rate represents a thousand-fold data rate increase over the flight proven 1773 fiber optic protocol. The IEEE P1393 SFODB implements a doubly redundant, ring-based architecture which includes one controller node and up to 127 transmit/receive nodes. SFODB's low mass, low power, and reliable, high speed data transfer rate makes it well-suited for hyperspectral imaging and other high speed applications. SFODB was designed to support bit error rates less than $10^{-11}$ for non-solar flare and $10^{-9}$ for a maximum solar flare. Its software configurable Asynchronous Transfer Mode (ATM) based protocol provides users extraordinary flexibility when designing their data handling architectures. The fiber optic cable consists of 100/140 micron, multimode graded index fiber. SFODB's attributes combine to significantly reduce spacecraft development time and cost. The interaction of SFODB's high performance, new technology components in the space radiation environment requires flight validation. A flight validation would also serve to relieve any project manager's reluctance in being the first to fly such a dynamic technology.

EO-1 used SFODB to serve as a reliable, high rate, data transfer media between its science

instruments and the Wideband Advanced Recorder Processor (WARP). The Advanced Land Imager (ALI), the Atmospheric Corrector (AC), and the Hyperspectral Imager (HSI) would all interface their respective SFODB node and simultaneously transmit data to the WARP.

Teamwork was essential for SFODB's development. The SFODB development includes: the joint DoD/NASA funding and technical support; TRW and Honeywell internal research and development to advance the maturity of SFODB's component technologies; Orlando & Associates consulting services for IEEE P1393 compliance; Optical Networks' high speed optical transceivers; and Broadband Communications Products engineering support for low cost ground support test cards.

Industry partners will use SFODB or its component technologies both in their production lines and in other programs. Optical Networks will market SFODB ground support cards and build the high speed flight transmitters and receivers. Broadband Communications Product plans to be an OEM supplier of the ground support cards. TRW has programs which will benefit from SFODB's combined technologies.

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