

# SUCCESS STORY

**TOPIC NUMBER: N05-T005**

**SBIR INVESTMENT: \$1,099,815**

**PHASE III FUNDING: \$1,999,263.29**



## RUGGEDIZED MULTIFUNCTION FIBER-OPTIC TRANSCIVER OPTICAL SUBASSEMBLY

*Ultra Communications, Inc. (UCI) has developed and qualified a fiber optic transceiver for F-35 Technology Refresh Three that provides 80 gigabits of data per second (aggregate) digital communications allowing for faster moving data.*

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## THE CHALLENGE

Fiber optic transceivers send and receive large amounts of data through optical fibers. As higher rates of data are required, avionic fiber optic communication systems must be able to move this data quickly without delay in environments with wide temperature ranges, high humidity, vibration and mechanical shock. The Navy is considering a scalable avionic fiber optic transceiver for fiber optics communication on current and future generation aerospace platforms.

## THE TECHNOLOGY

Ultra Communications, Inc. (UCI) developed an avionic fiber optic transceiver that operates in robust environments. UCI's transceiver is connectorized with 50-micron core multimode fiber arrays whereby each fiber provides a 4700 MHz-km fiber bandwidth. The transceiver is designed for up to 80 gigabits of data per second (Gb/sec) (aggregate) communication through four transmit and four receive channels at 10 Gb/sec each. UCI's transceiver has a smaller profile than previous transceivers and is soldered directly to the printed circuit board. The transceiver fiber optical interface is a detachable connector. As opposed to prior transceivers, the fiber optic cable attached to the UCI transceiver can be replaced in aircraft. The active elements, including the application specific integrated circuit (ASIC), lasers and detectors, and coupling optics are sealed.

## THE TRANSITION

First generation avionic transceivers moved data at approximately 0.1 Gb/sec. The second generation of transceivers moved data at 1-2Gb/sec and the third generation moves data at 10 Gb/sec. Leveraging SBIR funds, UCI refined their manufacturing techniques through different generations of avionic transceivers. The same manufacturing techniques are used for each generation of the transceiver subassembly.

This platform allows UCI to expand their types of fiber optic products to suit many platforms, including space platforms. UCI's transceivers are used aboard the F-35 aircraft, in multiple terrestrial military applications and on satellites. UCI's most recent transceiver is qualified for the next generation F-35.

## THE NAVAL BENEFIT

UCI's transceiver is built on a packaging platform that scales in data rate by upgrading internal circuitry. This allows ongoing development of 25, 32 and 50 Gb/sec per fiber over eight fibers for 200, 256 and 400 Gb/sec aggregate bandwidth respectively. Additionally, UCI's transceiver can operate over a range of minus 40 to plus 95 degrees Celsius. It is not affected by salt fog, moisture or other environmental contamination. The transceiver withstands the vibration and shock of aircraft takeoffs and landings, rocket launches and cannon fire.

## THE FUTURE

Future generation digital avionics fiber optics will include fiber optic links and network nodes that operate at greater than 10 Gb/sec. UCI's transceiver platform provides opportunities to accommodate higher data rates to meet future generation avionics requirements.