



Information Technology and Software

# Radiation Hardened 10BASE-T Ethernet Physical Interface

Provides novel Ethernet Interface that currently does not exist commercially

NASA Goddard Space Flight Center has developed a radiation hardened 10BASE-T Ethernet solution that combines a custom circuit and a front-end field programmable gate array (FPGA) design to implement an Ethernet Physical Interface (PHY) in compliance with IEEE 802.3. The custom circuit uses available radiation-hardened parts, and handles the electrical interface between standard differential Ethernet signals and the digital signal levels in the FPGA.

## BENEFITS

- Radiation hardened
- Space tested

technology solution



## THE TECHNOLOGY

Currently there is no radiation hardened Ethernet interface device/circuit available commercially. In this Ethernet solution, the portion of the PHY in the FPGA is responsible for meeting the IEEE 802.3 protocol, decoding received packets and link pulses, and encoding transmitted data packets. The decoded payload data is sent to a user interface internal to the FPGA which sends data for transmission back to the FPGA PHY.

The transmit portion is composed of two AD844 op amps from Analog Devices with appropriate filtering. The receive portion is composed of a transformer, an Aeroflex Low-Voltage Differential Multi-drop device, and appropriate filtering.

## APPLICATIONS

The technology has several potential applications:

- Aerospace Industry
- Defense Industry

## PUBLICATIONS

Patent No: 9,680,527

National Aeronautics and Space Administration

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