



Title

HIGH THROUGHPUT SPACEWIRE – IEEE 802.11 BRIDGE FOR ON-BOARD COMMUNICATIONS OF SPACE VEHICLES



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Short presentation

The invention refers to a spacecraft radio communication bridge that allows the replacement of SpaceWire cabled communication links between spacecraft equipment/systems with IEEE 802.11 radio communication links. The bridge is composed of the following major components: level translator, control unit, radio transceiver, antenna array, power source, circuits for power management and drivers for the configuration of the reconfigurable components. All the mentioned components are integrated on a PCB. The control unit is implemented on an FPGA and comprises a subsystem for managing the Space Wire wired link and a programmable system, respectively. The control unit has two interfaces: a Space Wire interface, and a AMBA AXI4 interface. The programmable system allows the subsystem to manage the Space Wire cabled link, control the radio transceiver, and coordinate two-way data transfer. It is equipped with interfaces according to the AMBA AXI4 and PCI Express protocols. The subsystem control for managing the SpaceWire wired link is performed through the AMBA AXI4 interface, which implements initialization, bidirectional data transfer and handling of errors occurring on the SpaceWire wired communication link. Furthermore, the programmable system performs the control of the radio transceiver by means of the PCI Express interface implementing initialization functions for: a radio communication link according to IEEE802.11 standard, for bidirectional data transfer and error handling on the IEEE 802.11 radio communication link.



Applicability

The wired connections within spacecrafts are mission-specific, making the spacecraft assembly, integration, and testing process overly complex. The invention presented here aims to eliminate the disadvantages mentioned above. It is a compact two-way device that is able to receive from the equipment/systems on board the spacecraft the traffic specific to the cable communication protocols, convert it and transmit it using the radio channel. Reciprocally, it takes the traffic received on the radio interface, convert it and transmit it to the equipment/systems on board the spacecraft using the specific cable communication protocols. Thus, cabled links on-board the spacecraft are eliminated.



Images

