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OPTICAL-BASED COTS DATA COMMUNICATION BUS FOR SATELLITES

**Abstract**

COTS components are gathering more and more interest from satellite developers thanks to their lower cost and ease of procurement as compared to space qualified ones. They are heavily under study to evaluate the possibility of being used in space systems: automotive and consumer electronic devices are evolving fast and their innovative solutions can have a beneficial effect on space systems. For example, the PlugPlay philosophy, originally developed to reduce hardware cross-compatibility issues in personal computers, can help in reducing development cost and time of a space mission and wireless data interfaces can reduce the complexity and the cost of cabling in a satellite.

This paper will focus on the analysis of the IrDA (Infrared Data Association) protocol and on the possibility to employ it on-board to exchange data between the sub-systems of a satellite. This protocol has many advantages versus some present data interfaces such as CAN or proprietary solutions for low bitrate links. Free space propagation can help lowering the total mass of cables (in fact only the power supply bus is then necessary) and in most systems an optical path is easy to be established between two or more points, also with the help of small mirrors. When free-space is not feasible plastic optical fibers could be employed as a waveguide.

The elimination of electric connections for data transfer between all the sub-systems helps also from the fault tolerance point of view since stuck-at or short circuit problems do not exist any more. Radiation-induced problems should be carefully evaluated but these effects could be mitigated by proper design solutions: the results of a preliminary radiation test campaign will be presented to support the use of IrDA devices in space applications.