

The Geostationary Operational Satellite R Series SpaceWire Implementation

Session: SpaceWire Missions and Applications

Long Paper

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ABSTRACT

The GOES-R program needed a simple high speed data interface for on-board communications. SpaceWire was chosen as the best solution to this need. The BAE SpaceWire ASIC was developed under a NASA contract and selected by GOES-R as the model solution for instrument to spacecraft communications. The GOES-R project has developed ground support hardware, software, and a Reliable Data Delivery Protocol to meet mission needs. This paper discusses GOES-R SpaceWire hardware and software development activities. Also discussed is the SpaceWire implementation and use on the spacecraft.

The GOES-R SpaceWire test card was designed to use the BAE ASIC providing a platform validating this approach to satisfying GOES-R requirements. The SpW test card is PCI compliant and operates in a windows work station and environment. There is on-board memory and all features of the ASIC are available to the user. Primary applications of the test card are spacecraft data system test and evaluation as well as ground support equipment. This test card has been used to prove the concept and functionality of the GOES-R flight data system. Also, the card has been used to develop a Reliable Data Delivery Protocol (RDDP) and verify GOES-R protoflight instrument interfaces.

The GOES-R spacecraft implements a point-to-point instrument to spacecraft interface. The RDDP is wrapped around CCSDS Source Packets for full duplex transmission of science, telemetry, and command data between the instruments and spacecraft. Details of this development and implementation are discussed in this paper.