Monolithic Radiation Tolerant Multi-Gigabit Space Wire Fiber/Copper Transponder with Minimal Delay Synchronization

Session: Space Wire Components

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Abstract

Current and future programs of near-Earth and deep space exploration require the reconfigurable, high-speed, intra-satellite interconnect systems based on switching fabric active backplane architectures with high-speed multi-gigabit rate serial interfaces. Electrical and/or optical transponders operating with Space Wire or Gigabit Ethernet protocols are required to support the associated data interconnects. The systems must be easily upgradeable, power-efficient, fault-tolerant, EMI-protected, and capable of operating effectively for long periods of time in harsh environmental conditions including radiation effects. We are developing a monolithic, copper/optical, radiation-tolerant transponder, which will be implemented either as a stand alone ASIC for copper interconnect or as a hermetically-sealed fiber pigtailed multi-chip module with an FPGA-friendly parallel interface; featuring an improved radiation tolerance, high data rate, low power consumption, and advanced functionality. The transponder utilizes our patent-pending current-mode logic library of radiation-hardened-by-architecture cells. 8B10B encoding will be used to achieve data disparity equal to 0 and perform a minimal delay clock recovery scheme, combining a multiple phase interpolation technique and our proprietary radiation tolerant clock recovery scheme. Zero latency data interconnect capabilities of the copper version are achieved by applying patent pending radiation-hard-by-architecture multi-level interconnect techniques. The above described characteristics are implemented in an advanced SiGe BiCMOS technology. The prototype device will be available in the fourth quarter of 2008.