

## 一种 CCSDS Proximity-1 协议下全双工/半双工及

单工的融合实现方法

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**摘 要:** 针对深空探测任务中对产品小型化及低功耗的需求, 各功能间的融合及模块的复用成为深空探测类产品设计中不可或缺的一环. 本文提出了一种 CCSDS Proximity-1 协议下全双工/半双工及单工的融合实现方法, 该方法通过将全双工模式、半双工模式及单工模式中的流式处理部分及特定功能部分从主框架中剥离, 并进行融合设计, 形成通用的 VHDL 结构; 将其余调度控制部分集成在 FPGA 中的 MicroBlaze 结构中. 通用的 VHDL 结构意味着资源配置最优, 而 MicroBlaze 结构因其灵活性, 可实现对不同模式的灵活切换. 本方法将应用到下一代火星探测临近空间链路收发信机中, 通过采用仅有 1 片 V5 的开发板, 实现结果表明, CCSDS Proximity-1 协议下的全双工、半双工及单工功能性能正常, 且资源的消耗量仅为 5% ALMs, 6% DSP 和 8% RAM.

**关键词:** CCSDS; Proximity-1 协议; 融合设计

## The full duplex / half duplex and simplex merging method based on CCSDS Proximity-1 protocol

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**Abstract:** In order to satisfy the miniaturization and low power consumption demand of deep space mission, the multi functions and multi modules multiplexing techniques are indispensable. This paper presents the full duplex / half duplex and simplex merging method based on CCSDS proximity-1 protocol, which strips the flowing processing parts and special function parts from the main architecture, merges them together and forms the global VHDL part. As for the other control and management parts, they are integrated in MicroBlaze architecture of FPGA. The global VHDL part means the resource arrangement is optimal, and all kinds of modes could be changed flexibly because of the MicroBlaze architecture. This method will be used in the proximity transceiver of next generation. By using the conception product which embeds 1 Xilinx VIRTEX5 chip, real test result shows that the presented method performs well and the resources needed are 5% ALMs, 6% DSP and 8% RAM.

**Key words:** CCSDS; Proximity-1 protocol; Merging Design

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