

Hey Wouldn't It Be Cool if You Could Control Lasers Over The Network?

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Project Abstract

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Today, TCP sees wide use across the open internet, but puts extensive processing load on the host CPU (and on older endpoints, the PCI bus). In response, we propose a project entitled "Hey Wouldn't It Be Cool if You Could Control Lasers Over The Network?", a parallel-stack TCP Offload Engine (TOE) designed to free up computing power, and to allow auxiliary hardware to interface with the TCP/IP stack directly. To show the utility of this architecture, we will implement a full-color laser projector capable of rendering frames delivered to the projector over the network. With a direct connection to the TCP stack through the FPGA, we seek to demonstrate that high-bandwidth communication using existing standards can be accomplished in a novel fashion, with equivalent or better performance relative to a traditional microcontroller implementation. We hope to evaluate our networking solution against existing TCP implementations, and create a clean interface through which hardware designers can take advantage of TCP's in-order, reliable packet transport without incurring the runtime costs of a dedicated application processor.