Project Title:
Implementation of a Real-Time Spectrum Analyzer

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Area: Electrical Engineering

Sponsored by: JDSU

Spectrum analyzers support research and development, testing, and design in countless applications. JDSU has requested the design and implementation of a real-time spectrum analyzer (RTSA) to assist in-field technicians with troubleshooting cable television networks.

The RTSA requires a processing bandwidth of 85 MHz. The analog input signal will be digitized with a 12-bit ADC at a sampling rate of 204.8 MSPS. The digitized values will be accumulated in a 12-bit by 1024-sample buffer. Initially, this buffer will take 5 µs to accumulate 1024 samples at which point the first 1024-point FFT will be triggered. In order to avoid information loss in the spectrum being measured, a 1024-point FFT will be triggered every 2.5 µs to provide a 50% overlap in the resulting output. FFT output values will be quantized to the nearest magnitude value. Finally, every 0.1 s the system results will be output to a host PC for display.

An FPGA-based solution will be realized which meets the high performance design specifications provided by JDSU while minimizing cost.