ELE700 / ELE800: Project Design 2004/2005

Topic:

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Estimated cost: \$250	Project rating: Complex	Date: September 2004

Title: COMPLEX FORM SIGNAL SYNTHESIZER WITH PC- INTERFACE

Preamble:

For many applications such as: RF and cable modems, digital TV and digital audio communication it is necessary to have complex form signal synthesizer. This device should produce signals for emulation, calibration and troubleshooting purposes for different digital communication and broadcasting systems. Most of existing signals synthesizers are big, heavy and very expensive devices. The goal of proposed project is to create the multi-channel, portable, high-performance and at the same low-cost synthesizer interfaced to the host PC. This device should be able to perform hardware / software reconfiguration to generate different types of signals such as: QPSK, QAM, COFDM, etc. in the range of RF-frequencies.

Objective:

Develop and design CPLD-based reconfigurable dual-channel signal synthesizer with a PCinterface via parallel port. This device should perform real-time conversion of data-files stored on PC hard drive into the analog output signal with complex form.

Partial specifications:

This is a team project scheduled for two students. The project consists of two parts:

- 1. Development of multi-channel signal synthesizer board interfaced with PC via parallel port,
- 2. Development of GUI, application software and drivers as well as virtual hardware components (VHDL) to be loaded into the CPLD-based synthesizer.
- Use Xilinx XC95288 CPLD coupled with high-frequency DACs and Video Op-Amps for signal synthesis.
- Utilize parallel port (LPT) for PC-interfacing
- Apply JAVA for GUI and application software development and MS Visual Studio (C/C++) for PCI bus drivers.

Suggested approach:

- Conduct literature survey on signal synthesizers with programmed form of signals
- Design hardware platform on the base of CPLD, Video-DACs and Video Op-Amps
- Design GUI, application software and drivers for the host-PC
- Create virtual hardware components and integrate hardware platform with software.