High Speed Circuits

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Sponsorship N/A

Research in the area of high speed integrated circuit design for communication applications involves an overlap of signal processing and communication theory, analog and digital circuit design techniques, and an understanding of basic device physics. Current focus areas in this effort include RF circuits for wireless systems, broadband circuits for optical networking and backplane communication, and low jitter clocking circuits. We tend to focus on problems that involve interplay between the overall system architecture and circuit design of the individual components, and use a combination of analog and digital circuits to achieve a robust implementation. Current projects include a high resolution, wide bandwidth 5 GHz frequency synthesizer, a low jitter 10 Gigasample/s clock and data recovery circuit, and an efficient power amplifier for driving transducer arrays for ultrasound applications.

An example system illustrating some of the research issues we encounter is shown below. Here we have a transmitter for wireless applications that consists of a high resolution frequency synthesizer that can be directly modulated by changing its divide value. Application of signal processing techniques allows the achievement of high data rates through digital compensation of the PLL dynamics. A mixture of digital and analog design techniques are used to achieve high speed operation of the frequency divider, low power operation of the digital ____ modulator, and accurate setting of the loop filter time constants. The net result is a highly integrated, low power CMOS transmitter capable of 2.5 Mbit/s GFSK modulation.



Fig.1: