

Abstract

Karim A. Hamouda

FPGA Prototyping of Digital RF Transmitter Employing Delta Sigma Modulation for SDR

The term software defined radio (SDR) is usually used to refer to a radio transceiver in which its key parameters are defined in software and having its fundamental aspects reconfigurable by upgrading that software. SDR architecture has been proposed as a solution to support multiple wireless standards on a single platform. In this paper, we present the architecture of an all-digital transmitter with radio frequency (RF) output targeting FPGA devices due to their reconfigurability and reprogrammability. The all-digital transmitter directly synthesizes RF signal in the digital domain using Low Pass Delta Sigma Modulation (LPDSM). This eliminates the need for most of the analog and RF components. The all digital transmitter consists of one Cascaded Integrator Comb (CIC) filter, one LPDSM modulator and Digital Upconverter (DUC). The binary output waveform from the RF-DeltaSigma modulator is centered at 800MHz with bit rate of 1.6 Gbps. The proposed architecture has been simulated to prove the idea and test its performance. Finally, the proposed architecture is designed using VHDL design entry and ready for download on the target FPGA.