

# Abstract

**Karim A. Hamouda**

## **An FPGA Based 1-Bit all Digital Trasmmitter Employing Delta-Sigma Modulation With RF Output For SDR**

Software defined radio (SDR) is a rapidly evolving technology that is receiving enormous recognition &#97;&#110;&#100; generating widespread interest in the telecommunication industry. In this paper, we present the architecture of an all-digital transmitter with radio frequency output targeting FPGA devices due to their reconfigurability &#97;&#110;&#100; programmability. 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 &#97;&#110;&#100; RF components. The all digital transmitter consists of one cascaded integrator comb (CIC) filter, one LPDSM modulator &#97;&#110;&#100; digital upconverter (DUC). The binary output waveform from the RF-DeltaSigma modulator is centered at 800 MHz with bit rate of 1.6 Gbps. The proposed architecture has been simulated &#97;&#110;&#100; proved to have a satisfactory performance. Finally, a VHDL code is written for the LPDSM to demonstrate its implementation &#97;&#110;&#100; verifying the simulation results.