Functional Description for Software Defined Radio
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Overview

A software defined radio is a radio transmitter/receiver that uses digital signal processing (DSP) for coding/decoding and modulation/demodulation. This allows much more power and flexibility when choosing and designing modulation and coding techniques. The C6700 series of digital signal processors have been chosen for this project. More specifically the TMDSK6713 evaluation board with the TMS320C6713 DSP chip will be used.

Due to hardware availability, both the transmitter and receiver will be implemented on the same DSP evaluation board. The system will be constructed and programmed entirely in Simulink using the embedded target for TI C6000 Simulink library. Simulink will generate the code based off of the model designed and will then download it to the board through TI Code Composer Studio for testing.

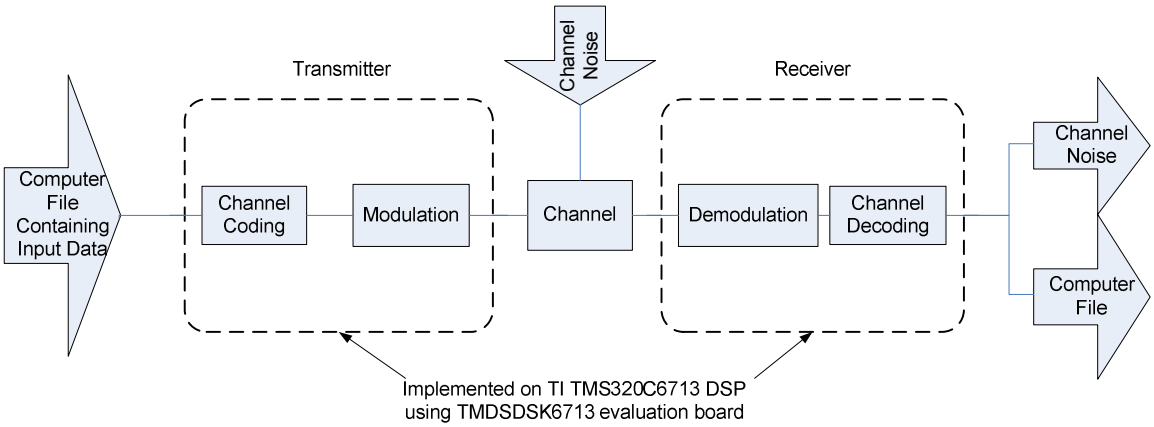

Figure 1 - I/O block diagram for transmitter and receiver radio systems

Inputs and Outputs

An overall block diagram for the software radio project is found in figure 1. The inputs to the system are a digital data source (computer file) and channel noise. The output of the system is the recovered input data. The recovered data should be received exactly as transmitted. This can be displayed on an oscilloscope coming out of the DSP evaluation board and/or stored on a computer file for further verification and analysis.

Modes of Operation

The input from the digital data source will be sent into the transmitter. There it will have channel coding applied to provide protection from data corruption introduced by noise. After that, the encoded digital signal will then be modulated with an appropriate modulation technique and transmitted through the channel. An appropriate model and representation for the channel also needs determined. After this, the receiver demodulates the signal and applies appropriate channel decoding. From there the reconstructed digital signal will be available for further analysis.