Exercise 6: Pulse Shaping

1. Using the procedure established in previous exercises, set up a simple link to determine the frequency offset between the transmitter and receiver. For the remainder of this exercise, the carrier frequency of the transmitter will be set to 436 MHz. Set the receiver carrier frequency to be shifted by the offset so that the transmitter and receiver frequencies are as close as possible.

2. Set up a binary BPSK transmitter that uses sinc pulses \((r = 0)\). In the transmit filter block set the filter gain to User specified and then the Linear Amplitude Filter gain to 0.5. This will insure that the signal going to the USRP does not exceed 1.0. This is important to prevent distortion in the transmitted waveform. The data source should be a random integer generator that produces binary data at 1Kbps. Use the lab spectrum analyzer to observe the spectrum and confirm this it is as expected. Repeat for rolloff factors of 0.5 and 1.0.

3. Set up a receiver with an enabled subsystem that contains the simple system shown below.

   ![Diagram](image)

   Run the receiver and transmitter and observe the spectrum for \(r = 0, .5, \text{ and } 1\).

4. Set up a PSK link (transmitter and receiver) that uses:
   - Binary DPSK
   - Raised Cosine Pulses
   - Mueller-Muller Timing Recovery
   - A display block to show the demodulated data

5. Test the link at data rates of 1Kbps and 10Kbps. Try rolloff factors of 0, 0.5, and 1. Use an input data source of alternating 1s and 0s so that you can determine if it is working properly.

Please submit a brief lab report (electronically) for this exercise. Make sure to include all of your parameter settings for each of the blocks.