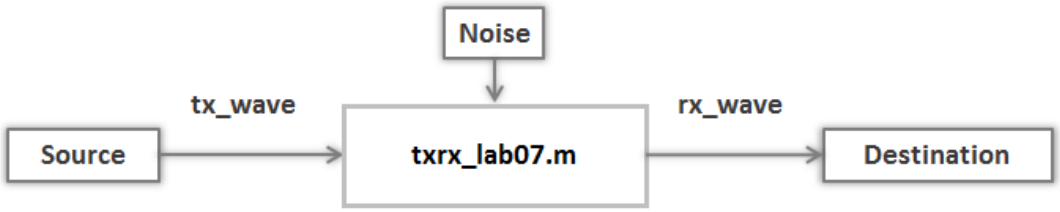
LAB 8 TASK 1 - BER WITH VARYING TRANSMISSION DISTANCE (1 point possible)

In this task, you will study the effect of SNR on BER by adjusting the transmission distance.

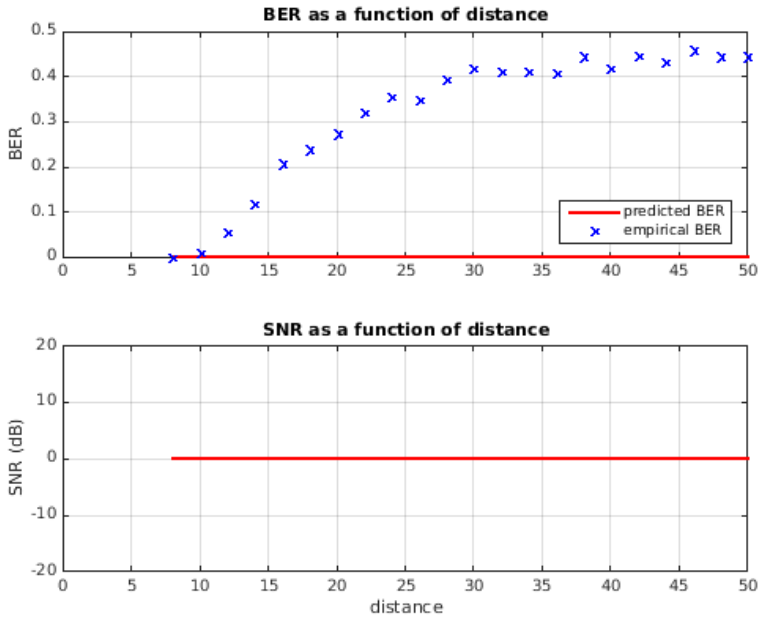



```
SPB = 50;                           % bit time in samples
tx_bs = rand(1,1280)>0.5;           % generate a random bit sequence
tx_wave = format_bitseq(tx_bs,SPB); % create waveform following protocol

distance_list = [8:2:50];           % list of transmission distances
num_dist = length(distance_list);
empirical_BER = zeros(1,num_dist);  % initialize storage arrays
predicted_BER = zeros(1,num_dist);
SNR = zeros(1,num_dist);

% loop over transmission at different distances
for i = 1:num_dist,
    distance = distance_list(i);
    % transmit and receive over noisy channel
    [rx_wave, start_ind, rx_min, rx_max, sigma] = txrx_lab07(tx_wave,distance);
```

Unanswered

Figure 1

Help



Run Code

Check Save *You have used 0 of 10 submissions*

INSTRUCTIONS

Step 1: Run the code as presented

Click on the **Run Code** button to execute the MATLAB code in the window. The code will return the measured BER calculated by the function **compute_BER**. However, the SNR value and the predicted BER values are not correct. Your job is to modify the code line to obtain the correct SNR and the predicted BER.

Step 2: Modify the code to compute SNR and BER

Put your code under the comment starting with % Add your code below that calculates the SNR *in dB* for each distance and stores it in the vector **SNR** and calculates the predicted BER at each distance and stores it in the vector **predicted_BER**.

Note the following assumptions for calculating the predicted BER:

(1) Input bits are equally likely to be 0 and 1.

(2) The noise-free value of the channel output when IN=0 is **rx_min** returned by the function **txrx_lab07(tx_wave)**.

(3) The noise-free value of the channel output when IN=1 is **rx_max** returned by the function **txrx_lab07(tx_wave)**.

(4) The noise is Gaussian distributed with standard deviation **sigma**, returned by the function **txrx_lab07(tx_wave)**.

(5) The decision threshold is **thresh** calculated in the code.

For this part, you may find the function **Y = qfunc(X)** useful. This function returns the value of the Q function at **X**. This is not a standard MATLAB function, but it was built from the standard MATLAB function **erfc**, which is related.

Remember that the values of SNR must be computed in dB.

Help

Step 3: Submit your work

Once you have completed your work, click on the **Check** button to submit your answer.

LAB 8 TASK 2 - QUESTION 1 (1 point possible)

As the transmission distance increases, the bit error rate (BER) _____?

Please select the correct answer.

- Increases
- Decreases
- Remains constant
- Increases first and then decreases
- Decreases first and then increases

Check Save *You have used 0 of 2 submissions*

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