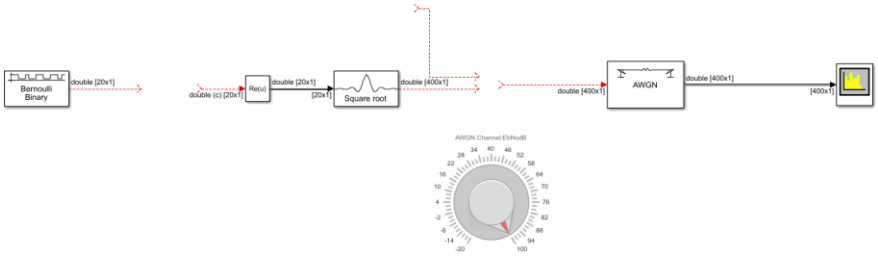
COMMUNICATION SYSTEMS: THEORY AND MEASUREMENTS M – Prof. Oreste Andrisano

2018/2019

Simulink BPSK digital modulation systems

Open the web page www.wilab.org/systems-lab

Download the file BPSK_Modulator_Student



Exercise 1:

Modify the simulink scheme by inserting the correct simulink blocks to create a BPSK modulator

Change the value of Eb/No from -20 to 40 dB through the parameter “Eb/No (dB)” in the AWGN channel block and focus the attention on:

- the transmitted signal in the time and frequency domains through the scope and spectrum analyzer, respectively;
- the received signal in the time and frequency domains through the scope and spectrum analyzer, respectively;
- the eye diagram;
- the constellation through the constellation diagram block.

Considerations:

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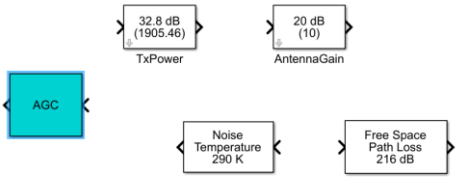
Optional Exercise 2

Properly connect the blocks that accounts for the LINK BUDGET to produce a 10dB EB / N0 signal to noise ratio



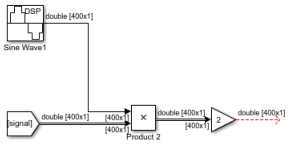
Compare the result obtained with the AWGN channel model configured with the same signal to noise ratio.

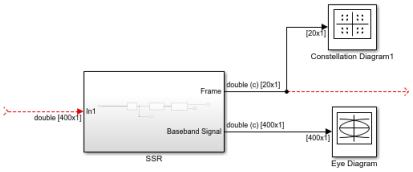
Exercise 3

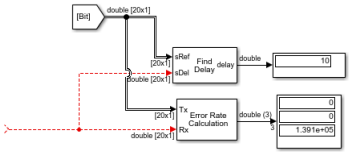
Download the file BPSK_ModDemod_student

Modify and use the BPSK_ModDemod model to measure the performance of Probability of errors per bit as Eb / N0 varies. Compare the results obtained with the Pb curves.

Eb/N0	BER Measured	Pb theoretical
1 dB		
2 dB		
3 dB		
4 dB		
5 dB		







Use the MATLAB Code to plot

```
L= "Define the number of Levels";
SNRdBt=0:1:15;
      SNRt=10.^(SNRdBt/10);
      poe_on_theory= 0.5.*erfc(sqrt(SNRt));
      poe_on=1/log2(L)*(L-1)/L*erfc(sqrt(SNRt)*3*log2(L)/((L-1)^2)*(L-1)/(L+1));
      figure(1)
      grid on
      semilogy(SNRdBt, poe_on_theory, 'r-');
      semilogy(SNRdBt, poe_on, 'b-');
      hold on
```

Check BER from SIMULINK MODEL.

Considerations:……
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