COMMUNICATION SYSTEMS: THEORY AND MEASUREMENTS M – Prof. Oreste Andrisano
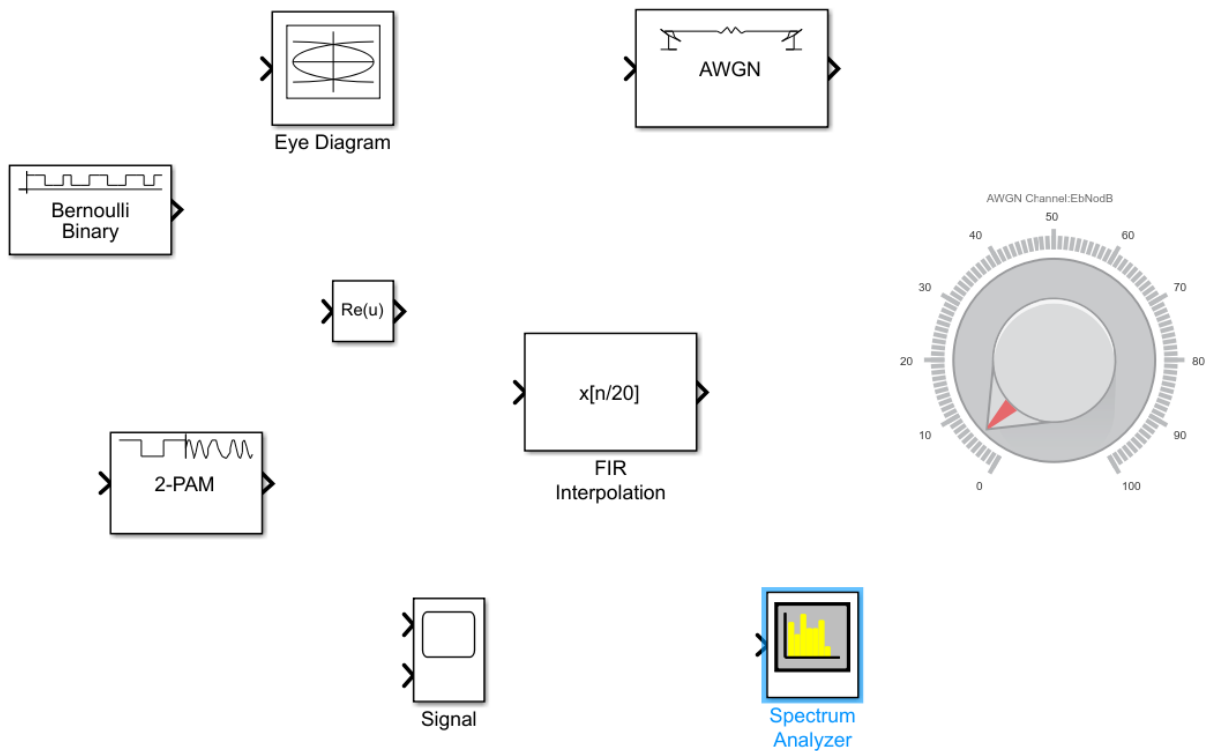
2018/2019

Digital modulation systems

Build the block scheme of a 2-PAM modulator in Simulink.

Use the following blocks:

Step 1.

Interconnect and configure each block constituting the entire 2-PAM chain, according to the scheme seen during the lectures. Match the following specifications

- Bit rate: 2.400 bit/s
- Oversampling factor: 20
- Sampling frequency: 48.000 Hz
- Samples per frame: 64
- Signal-to-noise ratio: 10dB
- The eye diagram has to visualize 10 symbols.

Observe the signal in time domain before and after the noise addition. Compare in the same screen. Then, observe the spectrum of the transmitted signal and the eye diagram of the signal without noise.

Vary the value of signal-to-noise ratio Eb/No from 0 to 50 dB through the "AWGN Channel:EbNodB" knob and analyze:

- the transmitted signal in time and frequency through the scope and spectrum analyzer respectively;
- the eye diagram;

Considerations:

………

……

Insert the related figures in your report.

Step 2. Example of channel distortion

Design 3 different low-pass filters in Matlab environment using "filterDesign" with the following characteristics:

1. low-pass filter with Fpass equal to the symbol rate *Bs*
2. low-pass filter with Fpass less than *Bs*
3. low-pass filter with Fpass equal to *2Bs.*

Observe the eye-diagram of the 3 filters.

Considerations:

………

……

Insert your considerations in your report supported by figures.

Questions:

- In which one of the three cases the noise determines a significant signal degradation?
- Evaluate the effects of inter-symbol interference (ISI) in the 3 cases.
- Write your considerations on the 3 type of filters.