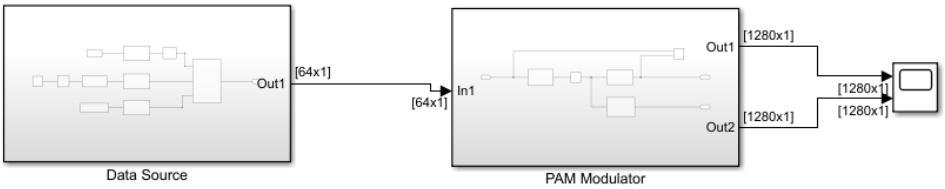
COMMUNICATION SYSTEMS: THEORY AND MEASUREMENTS M – Prof. Oreste Andrisano

2018/2019

Digital modulation systems

By making use of the cascade realized for the last experience, implement in Simulink a 2-PAM transmitter for Rasberry pi with the following specifications:

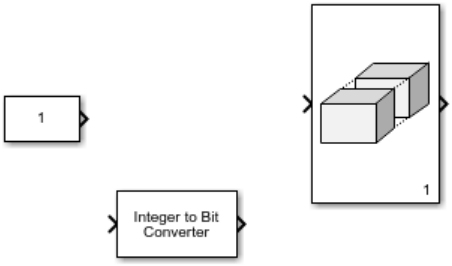
Step.1



Data Source

Concatenate a 64-bit sequence generated by 3 decimal data:

- A 26-bit preamble
- Decimal 32-bit data
- Decimal 6-bit data



REMARK: Pay attention to the sampling time in “constant” block!

PAM Modulator

Use the settings adopted for the previous experience:

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

Implement the filter “Signal Network” (SN) in two different cases:

1) Rectangular pulse filter (as for the previous experience);
2) “Raised cosine transmit filter”
    a. Roll-off factor 0.5;

b. Span 10;
c. Samples per symbol: 20.

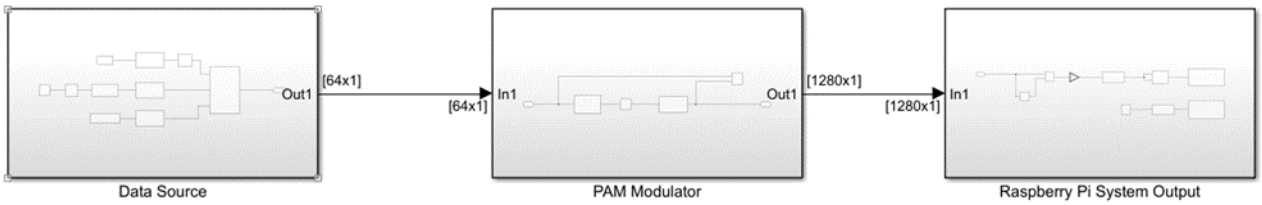
Observe the signal in time domain in both cases.

Considerations:

……
……

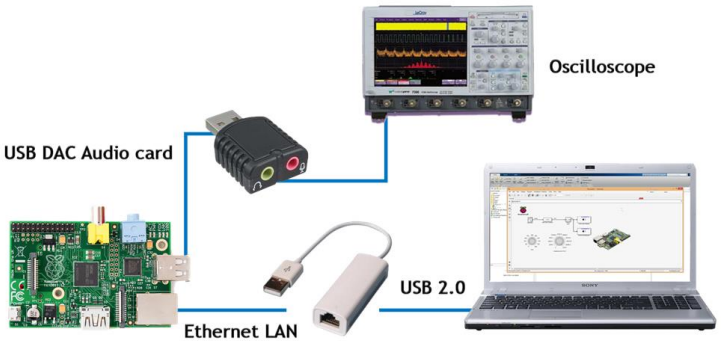
Step. 2.

Insert the block “System output” after the cascade realized in Step.1



REMINDER: For any information “Rasberry Pi System Output”, please refer to the third experience.

After connecting the Rasberry Pi, use the button “deploy to hardware” in order to build and run the model.



Observe the output at the oscilloscope in both cases of rectangular pulse and raised cosine filters.

Considerations:

……

Step. 3.

Replace the block “Data Source” with the block “Bernoulli Binary Generator”. Then, add the block “Spectrum Analyzer” in the simulink model. Observe the spectrum of the PAM signal. Measure the bandwidth of the main lobe and that of the secondary lobe.