Experiment no. -6

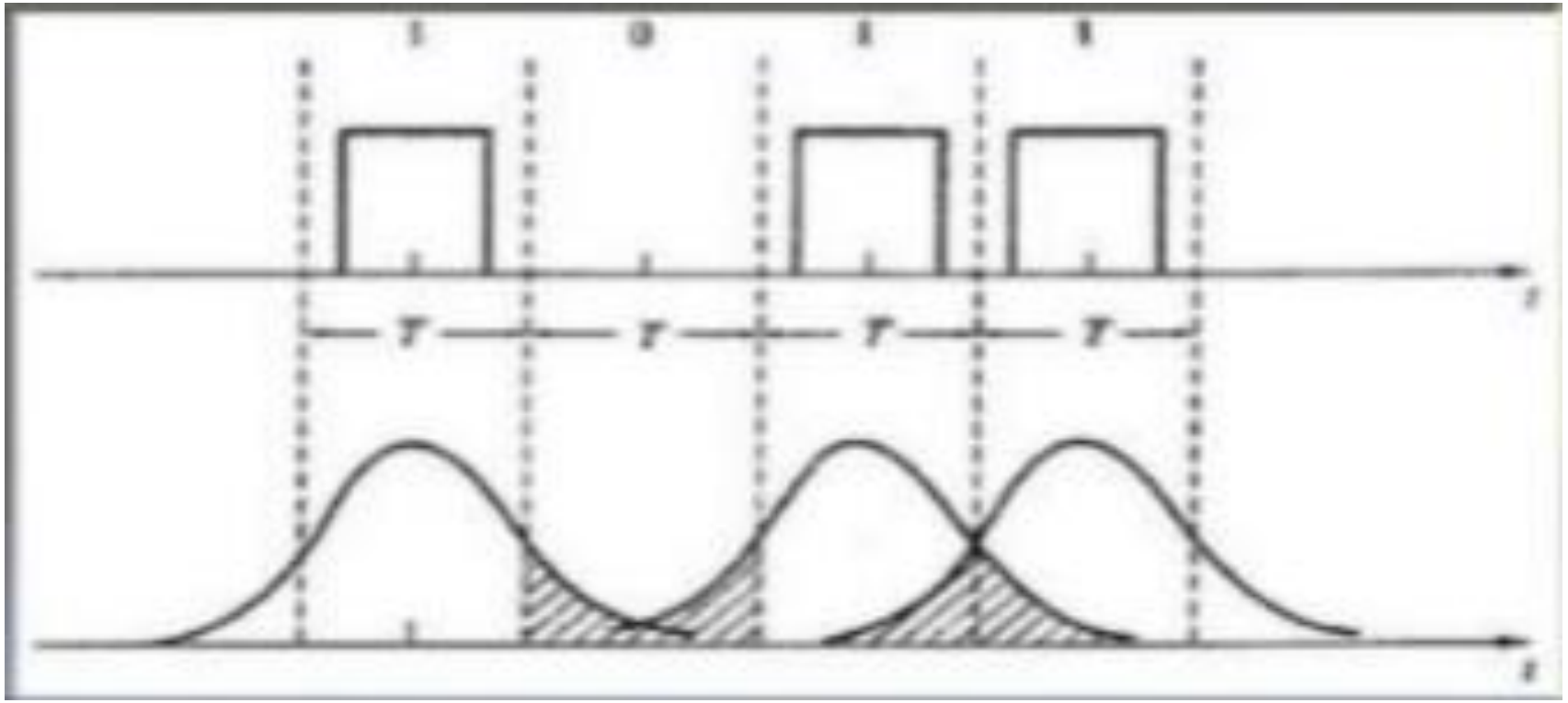
Objective- To Simulate Equalization Techniques using AWGN channel considering input as any random data as well as an Image with the help of MATLAB software. Also compare output of both with and without equalization.

Introduction

- In a communication system, the transmitter sends the information over an RF channel.
- The channel distorts the transmitted signal befores it reaches the receiver.
- The receiver ”task” is to figure out what signal was transmitted →Turn the received signal in understandable information.

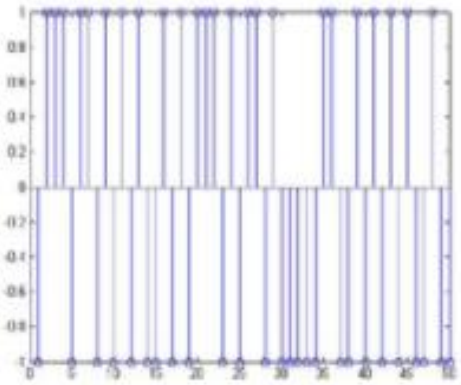
Introduction

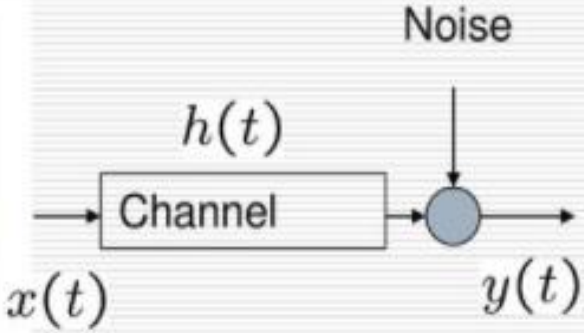
- Inter Symbol Interference (ISI)

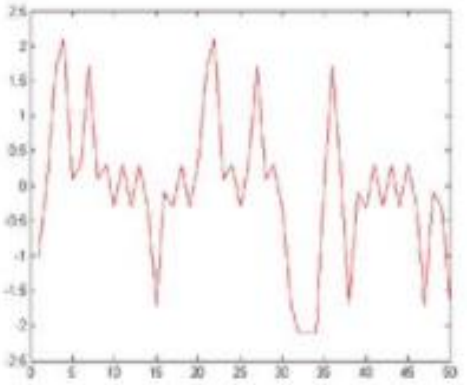


Introduction

- Intersymbol Interference (ISI)
- Noise



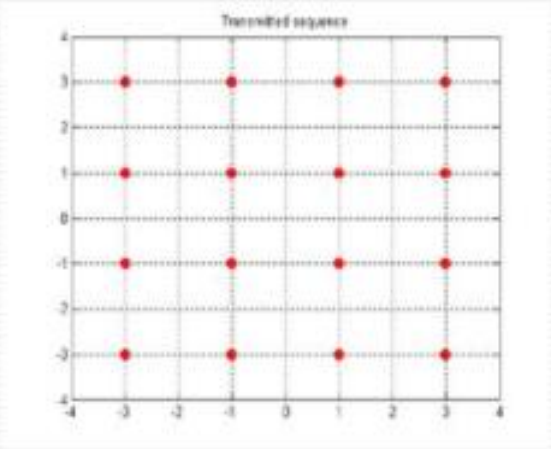


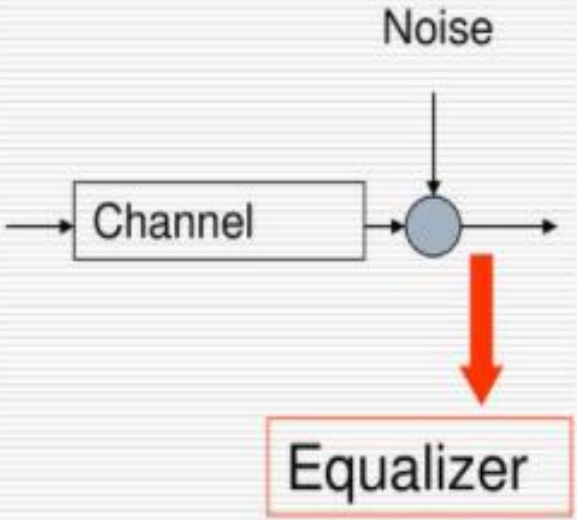


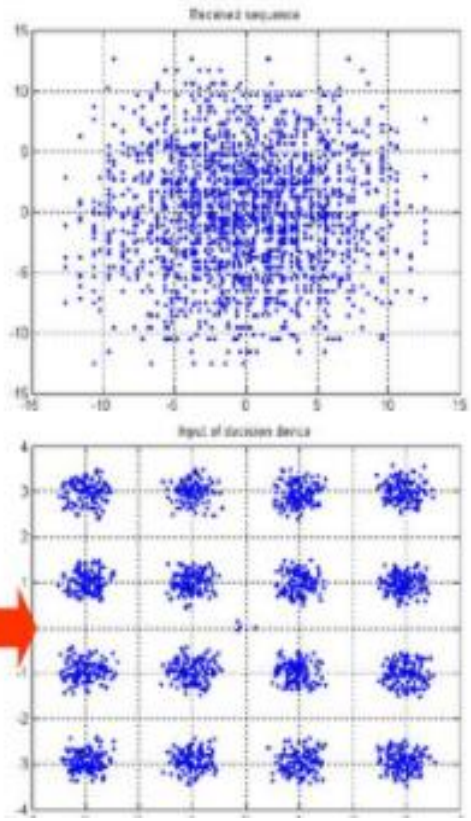
$$y(t) = \underbrace{x(t)h_0(t)}_{\text{desired signal}} + \underbrace{\sum_{k=1}^{m} x(t-k)h_k(t)}_{\text{ISI}} + \underbrace{n(t)}_{\text{noise}} \quad (1)$$

Introduction

The purpose of an equalizer is to reduce the ISI as much as possible to maximize the probability of correct decisions







Introduction

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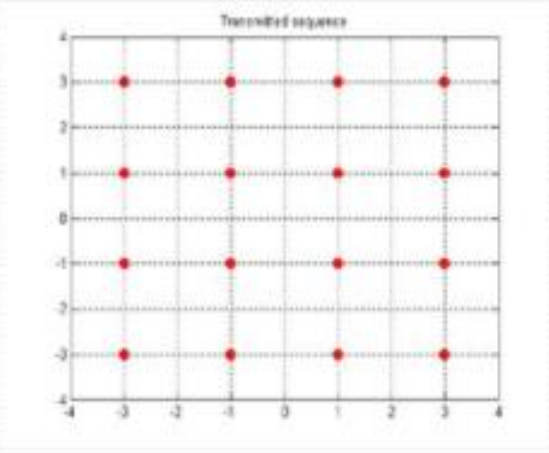
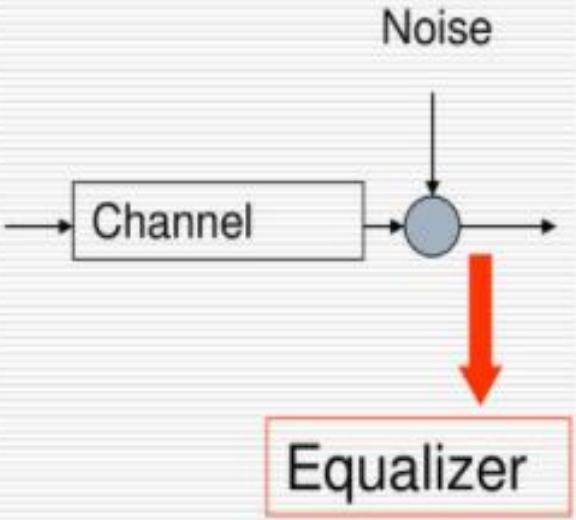
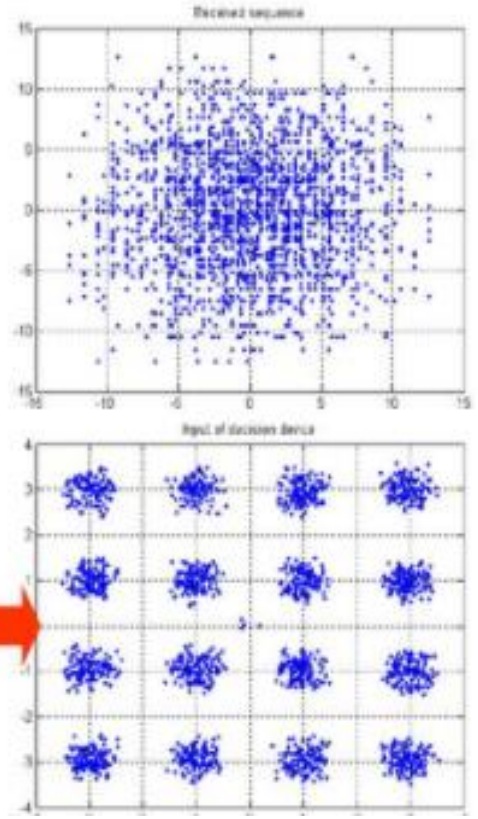
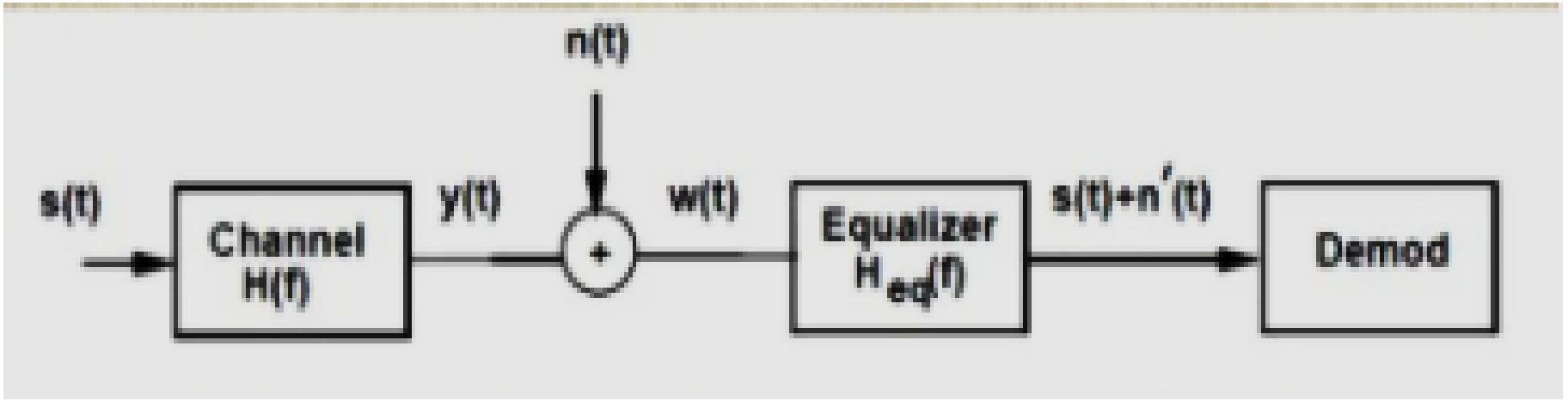






Implementation in MATLAB



Steps to follow

1. Input the random data (Let say 1000 in number)
2. Change into required format.
3. Modulate it with psk
4. Assume SNR
5. Add AWGN
6. Assume Tau and PdB
7. Assume Rayleigh channel
8. Realize it with filter function
9. Assume LMS as adaptive algorithm object
10. Construct linear equalizer object (lineareq)
11. Equalize signal using equalizer object (equalize)
12. Demodulate the data
13. Convert it into required format
14. Find BER
15. Compare output for both with and without equalizer (Reapet steps 12-14 for without equalizer)
16. Repeat the above procedure for input as an image