

Performance Analysis For Communication Systems.

↓
Bit - Error Rate (BER) is
a metric which can be employed
to characterize the performance
of a communication system.

Transmits bits of information
from Transmitter to receiver

Bit Stream

1 0 0 1 1 1 0 1 0 0 0
1 0 0 0 1 1 0 0 0 0 0

Bit Errors occur
during the communication
process.

Bit Error Rate (BER):

Average rate of Bit error

For instance if 10,000 bits are Transmitted, 100 bits are received in error. average BER

$$\frac{\text{Number of bits in error}}{\text{Total number of bits Transmitted}} = \frac{100}{10,000} = 1\% \text{ or } 0.01$$

Bit error rate is frequently expressed as a probability.

P_e — Probability of Bit Error.

$$0 \leq P_e \leq 0.5$$

Maximum BER
= 0.5

Information bits are 'modulated' prior to transmission over channel

One such modulation format is BPSK

Binary Phase Shift Keying.

Average power of modulation $= P.$

0	→	$\sqrt{P}$
1	→	$-\sqrt{P}$

} BPSK

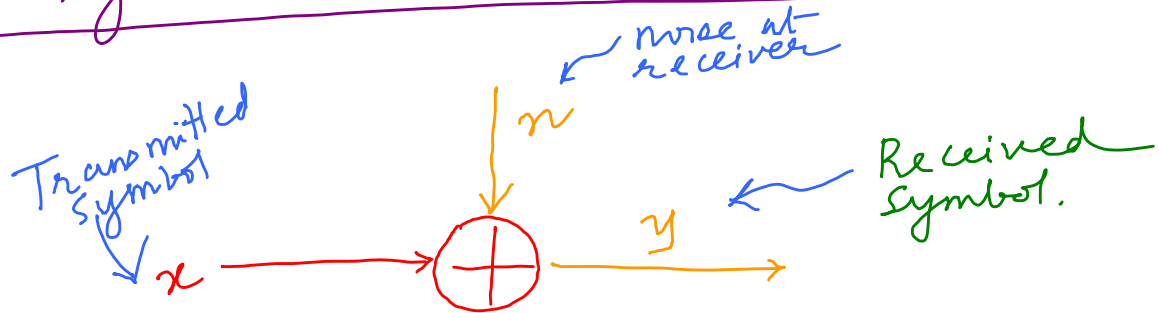
Detection at Receiver:

If received symbol $\geq 0 \rightarrow 0$
received symbol $< 0 \rightarrow 1$

Threshold.

Threshold based
detector.

Performance of Wireline Communication System :



Model for a Basic wireline system

$$y = x + n$$

AWGN
Additive white Gaussian noise

white Gaussian

Additive noise

Noise PDF

$$f_N(n) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-n^2/2\sigma^2}$$

$$N(0, \sigma^2)$$

mean = 0

variance = σ^2

Noise power = σ^2

As variance increases spread increases

variance σ^2

0 = mean

