

Lab 5

This lab demonstrates 16 QAM modulation and demodulation with AWGN with SNR varying between -10 and 10 with steps of 1.

Random input bits is generated using ~~rand~~ in "randin" and mapped to a constellation points for gray labelling and without gray labelling.

Without gray code:

0011	0111	1011	1111
0010	0110	1010	1110
0001	0101	1001	1101
0000	0100	1000	1100

3	7	11	15
2	6	10	14
1	5	9	13
0	4	8	12

With gray code:

0010	0110	1110	1010
0011	0111	1111	1011
0001	0101	1101	1001
0000	0100	1100	1000

2	6	14	10
3	7	15	11
1	5	13	9
0	4	12	8

To calculate BER for each gray and without gray labelling:

- (a) generate random signal
- (b) generate AWGN
- (c) received signal $(y) = S + n$
- (d) Check whether the received value lies near or far away from the constellation point.
- (e) If there is an error increment the error count.

From the plot it can be seen that BER is more for gray label and without gray label for low SNR values and decreases with increasing SNR value.