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References

Abstract—This module explains about the comparative study of M-array Phase Shift keying and M-array Amplitude Phase Shift Keying.

1 QPSK

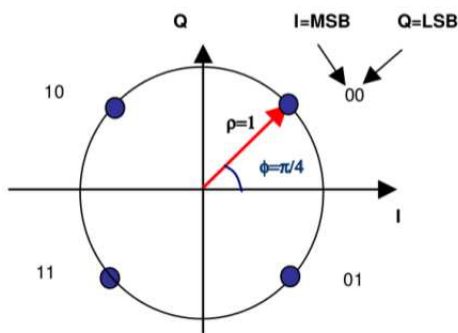


Fig. 1: QPSK Constellation Diagram

$$X = Re^{i\theta} = R\cos(\theta) + iR\sin(\theta)$$

Where R and θ depends upon the position of the constellation symbol according to polar coordinate System.

$$N = A + iB$$

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Here, N is the complex AWGN noise and A, B are random variable.

$$Y = X + N = (R\cos\theta + A) + i(R\sin\theta + B)$$

Y is the received signal from the channel.

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wget https://raw.githubusercontent.com/PrasannaIITH/APSK/master/
codes/QPSK.py
```

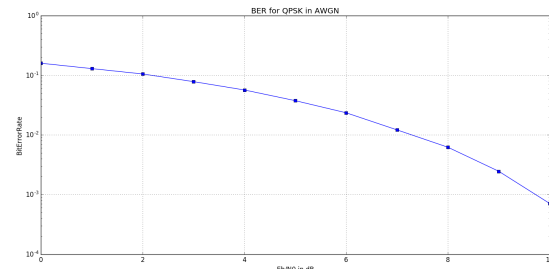


Fig. 2: BER Curve for QPSK without Channel Coding

2 8PSK

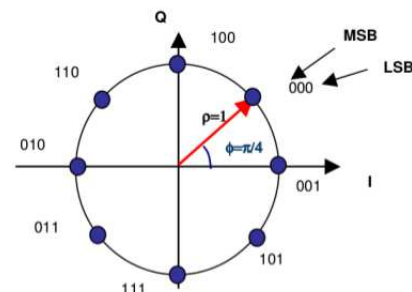


Fig. 3: 8PSK Constellation Diagram

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wget https://raw.githubusercontent.com/PrasannaIITH/APSK/master/
codes/8PSK.py
```

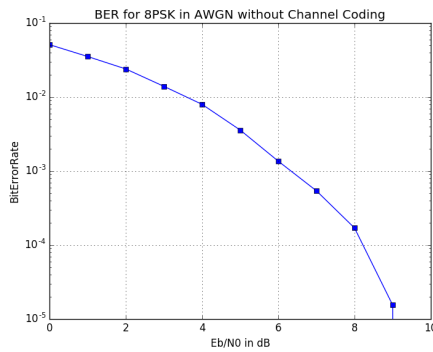


Fig. 4: BER Curve for 8PSK without Channel Coding

3 16APSK

In 16APSK, we have two concentric circles, with radius $R_1 = \sqrt{7}$ & $R_2 = 3\sqrt{7}$ respectively, It is considered ratio between the radius of two circle to be 3. These values are taken from the reference [1]

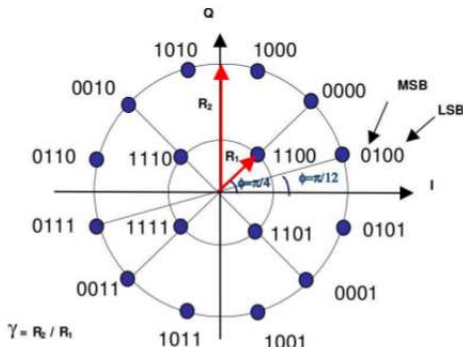


Fig. 5: 16APSK Constellation Diagram

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wget https://raw.githubusercontent.com/PrasannaIITH/APSK/master/
codes/16APSK.py
```

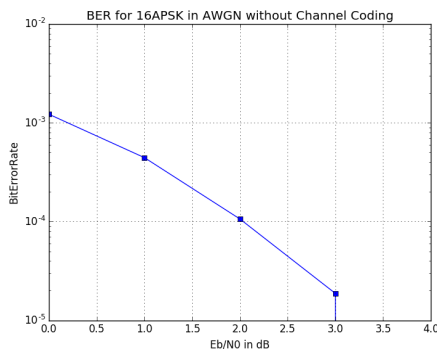


Fig. 6: BER Curve for 16APSK without Channel Coding

4 32APSK

In 32APSK, we have three concentric circles with radius R_1, R_2 & R_3 , where $R_1 < R_2 < R_3$.

$$R_2/R_1 = 3, R_3/R_2 = 3$$

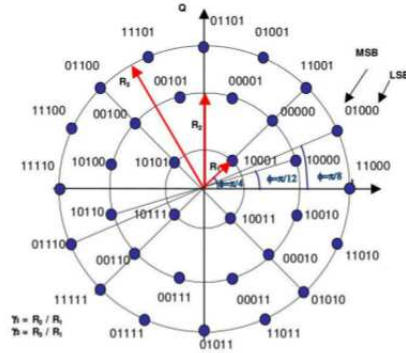


Fig. 7: 32APSK Constellation Diagram

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wget https://raw.githubusercontent.com/PrasannaIITH/APSK/master/
codes/APSK32_CS.py
```

REFERENCES

- [1] Pervaiz Ali, Farhan Hussain and Jechang Jeong, 'A New Demapping Technique for 16-APSK Modulation for Digital Video Broadcasting in AWGN Channel', Third 2008 International Conference on Convergence and Hybrid Information Technology.