

Mapping schemes of PSK and APSK

Prasanna Kumar K, G V V Sharma*

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Abstract—A brief description about the mapping schemes and constellation of PSK and APSK according to DVBS2 standard [1].

1. PSK

$$Y = X + N \quad (1.1)$$

$$X_i = e^{j\frac{2\pi n}{M}} \quad n = 0, 1, \dots, M-1 \quad (1.2)$$

Where M is mapping order.

A. QPSK

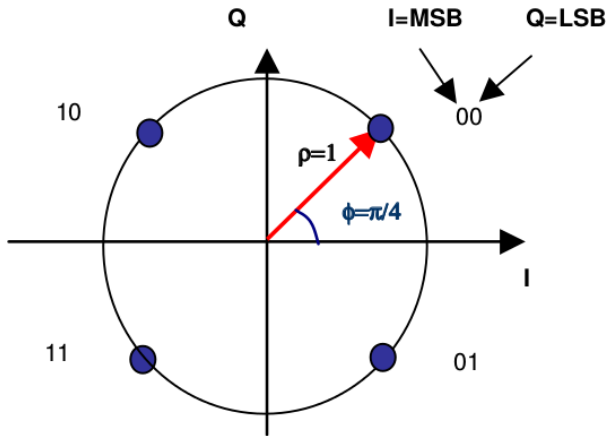


Fig. 1: Constellation diagram of QPSK

*The author is with the Department of Electrical Engineering, Indian Institute of Technology, Hyderabad 502285 India e-mail: gadepall@iith.ac.in.

Fig. 1 Shows the Constellation mapping for QPSK symbols.

B. 8PSK

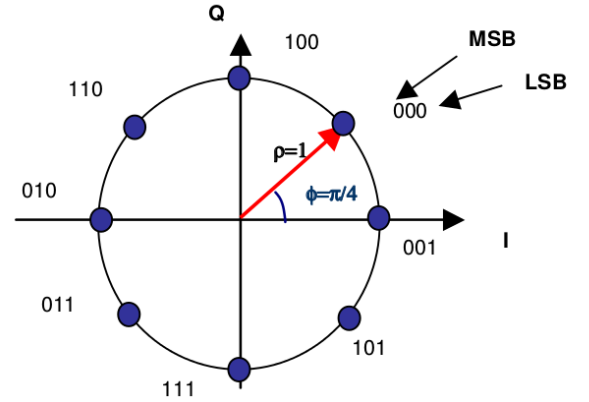


Fig. 2: Constellation diagram of 8PSK

Fig. 2 Shows the Constellation mapping for 8-PSK symbols.

2. APSK

$$Y = X + N \quad (2.1)$$

A. 16-APSK

$$X_n = \begin{cases} r_1 e^{j(\phi_1 + \frac{2\pi}{4}n)} & n = 0, 1, 2, 3 \\ r_2 e^{j(\phi_2 + \frac{2\pi}{12}n)} & n = 0, 1, \dots, 11 \end{cases} \quad (2.2)$$

Where $\frac{r_2}{r_1} = 2.6, \phi_1 = 45, \phi_2 = 15$ Fig. 3 Shows the Constellation mapping for 16-APSK symbols.

B. 32-APSK

$$X = \begin{cases} r_1 e^{j(\phi_1 + \frac{2\pi}{4}n)} & n = 0, 1, 2, 3 \\ r_2 e^{j(\phi_2 + \frac{2\pi}{12}n)} & n = 0, 1, \dots, 11 \\ r_3 e^{j(\phi_3 + \frac{2\pi}{16}n)} & n = 0, 1, \dots, 16 \end{cases} \quad (2.3)$$

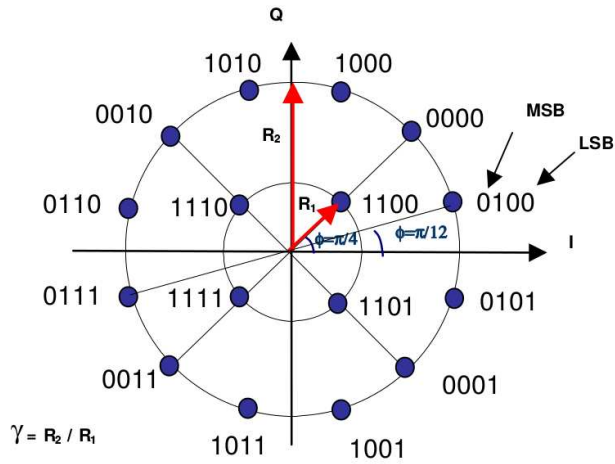


Fig. 3: Constellation diagram of 16APSK

Where $\frac{r_2}{r_1} = 2.54, \frac{r_3}{r_2} = 4.33, \phi_1 = 45, \phi_2 = 15, \phi_3 = 0$ Fig. 4 Shows the Constellation mapping for 32-APSK symbols.

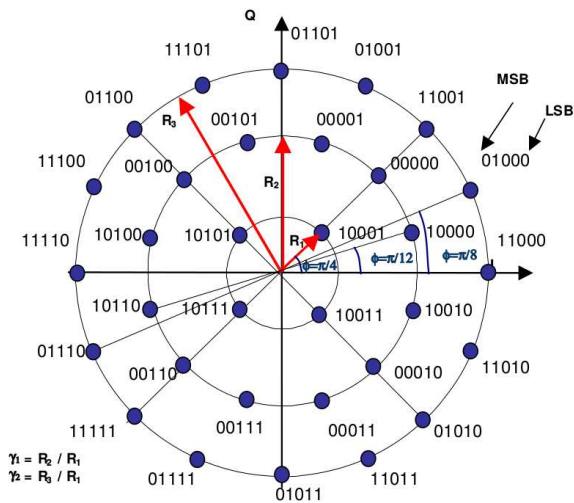


Fig. 4: Constellation diagram of 32APSK

REFERENCES

- [1] A. Morello and V. Mignone, "DVB-S2X: The New Extensions to the Second Generation DVB Satellite Standard DVB-S2," *Int. J. Satell. Commun. Netw.*, vol. 34, no. 3, pp. 323–325, May 2016. [Online]. Available: <https://doi.org/10.1002/sat.1167>