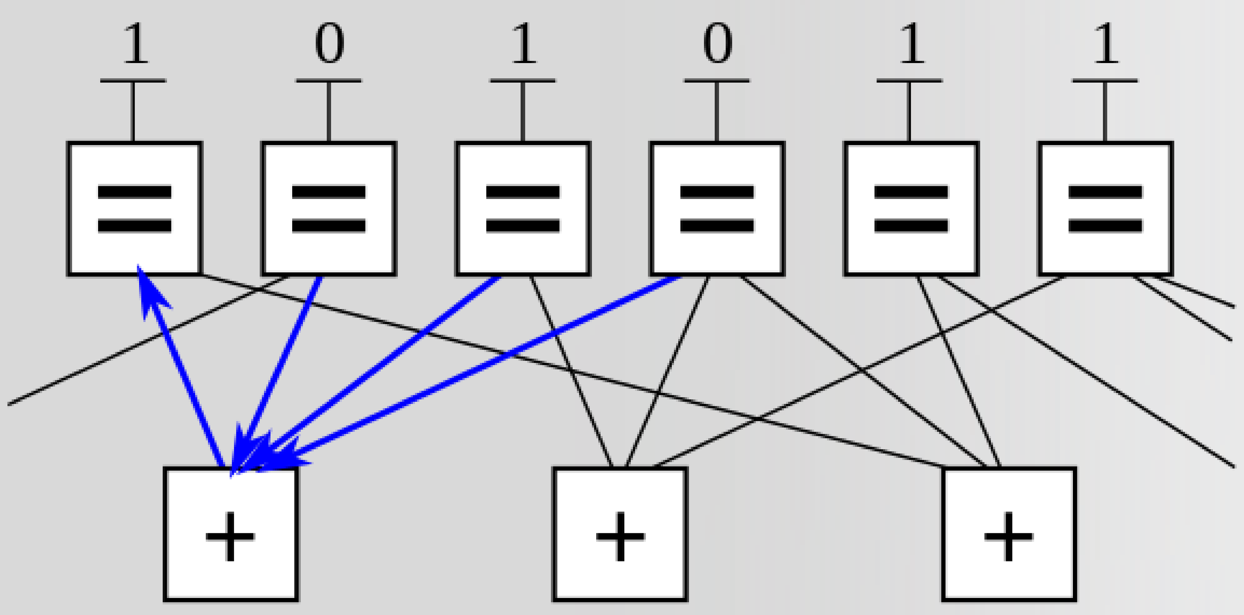
01001000 01100101 01101100

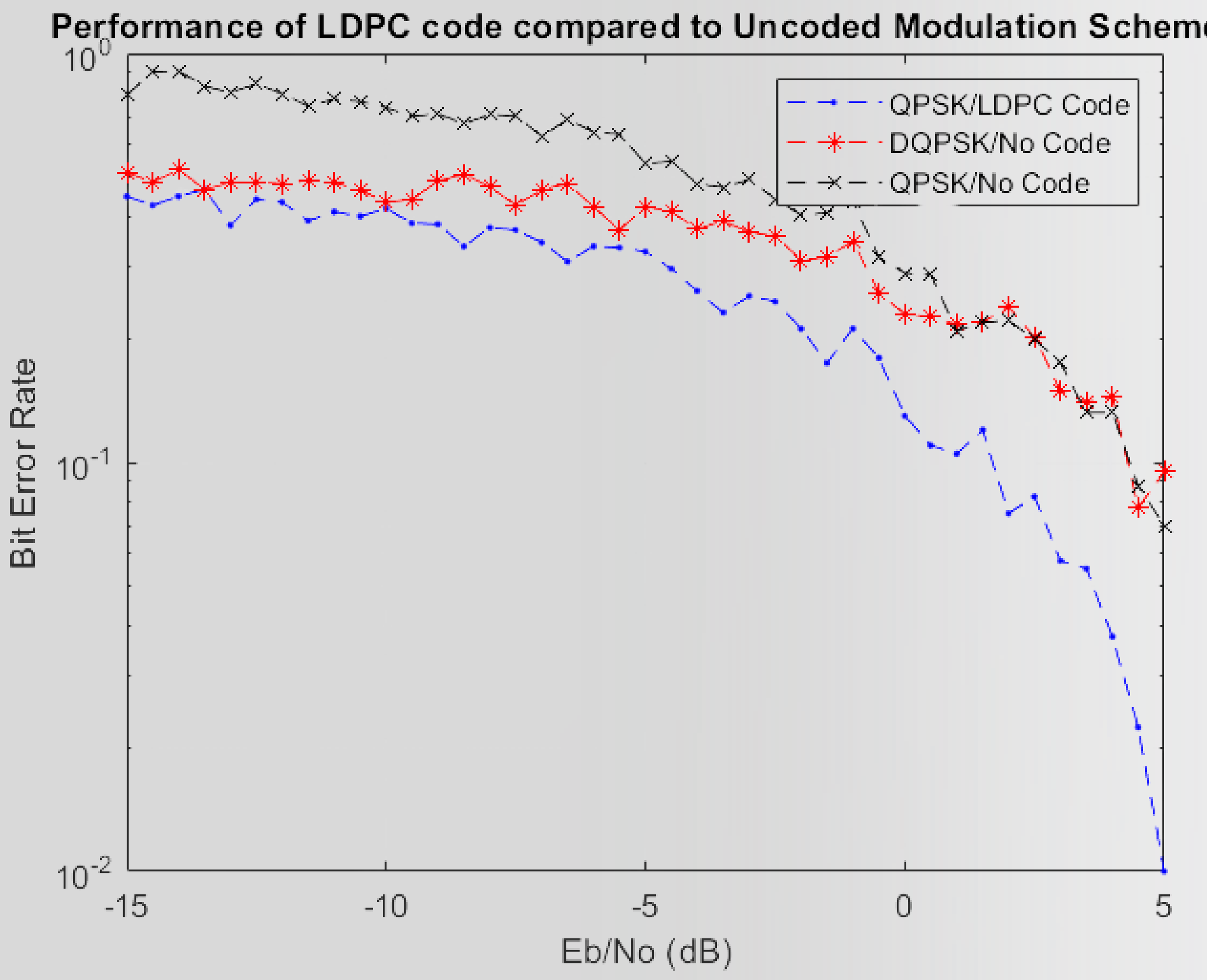
PSK Schemes & LDPC

LDPC (low Desnity Parity Checks)

A linear error correction scheme to ensure that information bits that are being transmitted are sent correctly with minimal loses, and any loses of data are corrected.



The 1s in the columns of the parity check matrix correspond to the coded bits and rows correspond to parity check equations; the 1s in each row are XOR'ed and need to result in the zero for the coded message to be correct.



The above BER (Bit Error Rate) graph shows how different modulating techniques are affected with LDPC encoding. As can be seen, QPSK as the least amount of errors when transmitting a set of data, compared to that of other modulation technioques.

How PSK Schemes Work

PSK takes digital data in the form of 1's and 0's, which is then modulated by changing the phase of the carrier signal by using modulation techniques listed below.

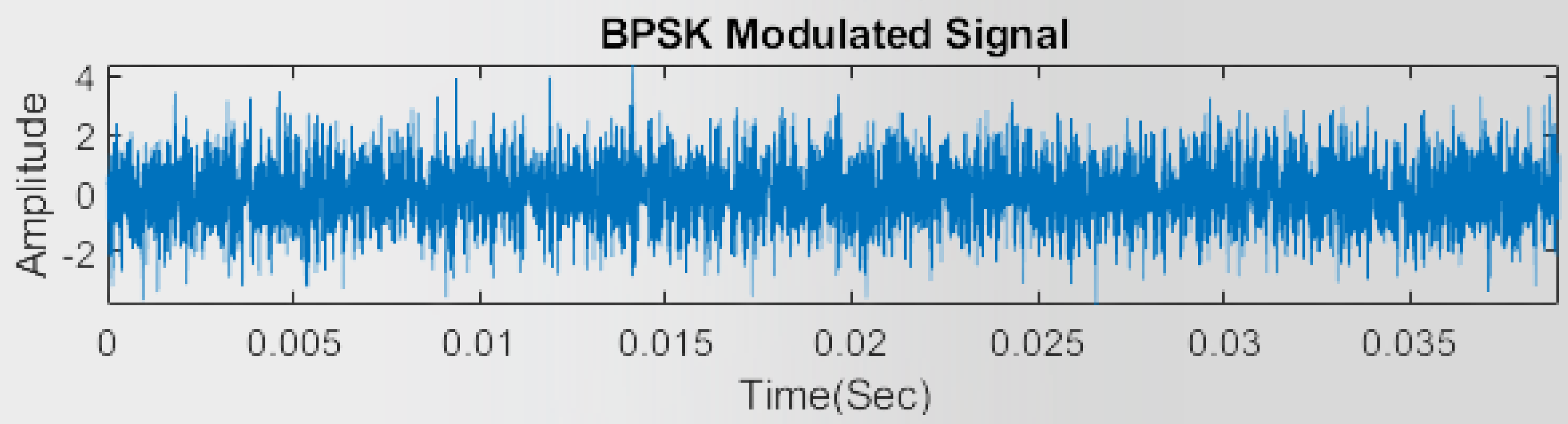
Types of Modulation

- BPSK (Binary Phase Shift Keying)
- DPSK (Differential Phase Shift Keying)
- QPSK (Quatrature Phase Shift Keying)

Binary Phase Shift Keying

Binary phase shift keying is a 2-phase PSK. With this technique, the carrier wave take two phase reversals of 0° and 180° . Where '1' would flip the phase by 180, and '0' would keep the phase as it is. Below, is a message taken from the user as text, converted to binary and modulated using BPSK.

GWN (Gaussian White Noise) has also been taken into account with the below graph as no channel is ideal and noiseless. Additionally, the below code shows the phase flipping and how the equations works.

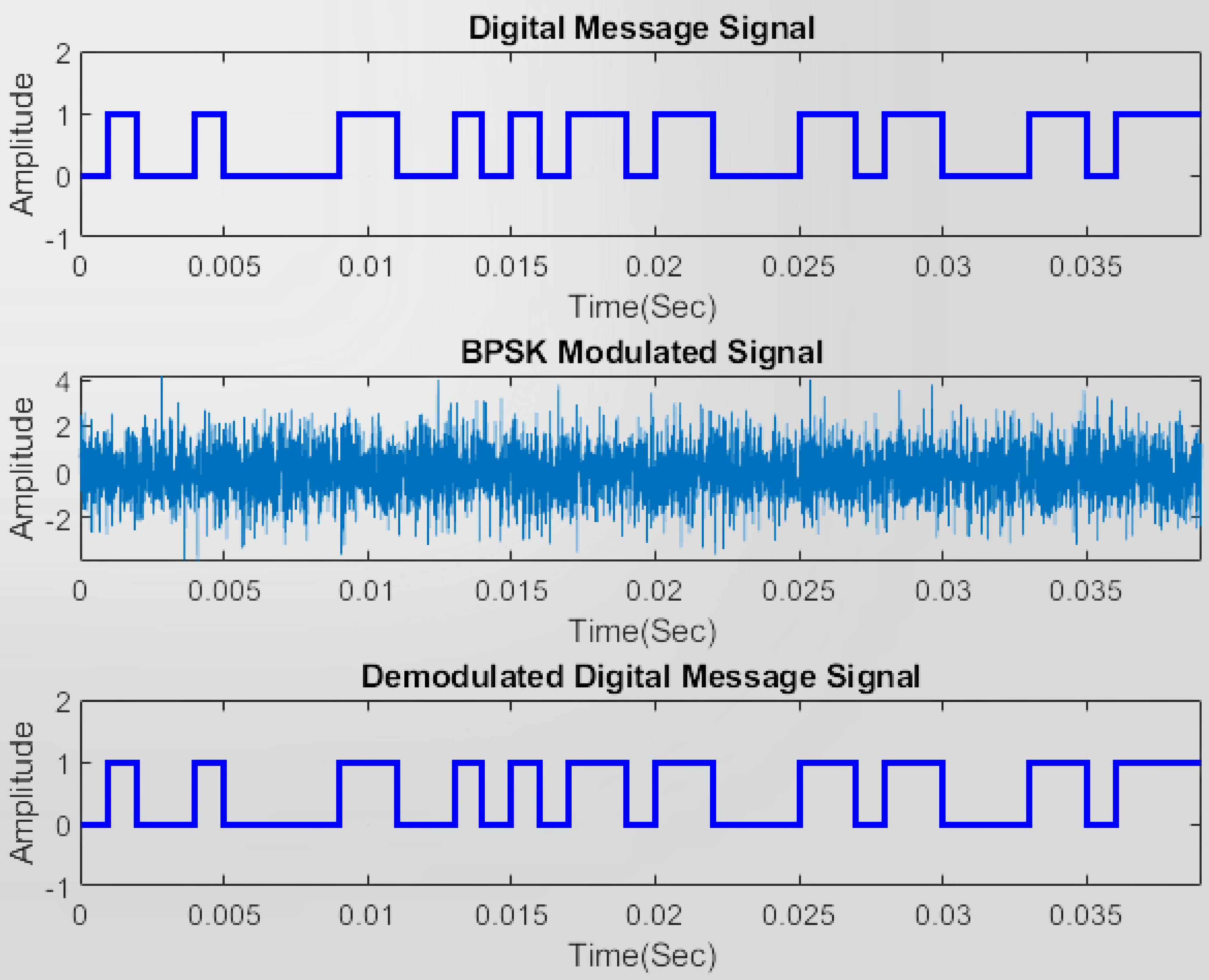



```
modulator = [];
for i = 1:1:N
    if (Bin(i)==1)
        y = sin(2*pi*Fc*t2+Pc1);    else
        y = sin(2*pi*Fc*t2+Pc2);
    end
    modulator=[modulator y];
end
```

Where:
Fc = Carrier Frequency
t2 = Time Period
Pc1 = Carrier phase for '1'
Pc2 = Carrier phase for '0'

The Results!!!

To the right, you can see the full graph of the simulation. The 'Digital Message Signal' is the binary conversion of the original message, followed by 'BPSK Modulated Signal' and then the 'Demodulated Digital Message Signal'. This shows that the message has been modulated and demodulated, and the data that has been received is the same as the information that was transmitted.



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