

Figure: PSK waveform with ICI

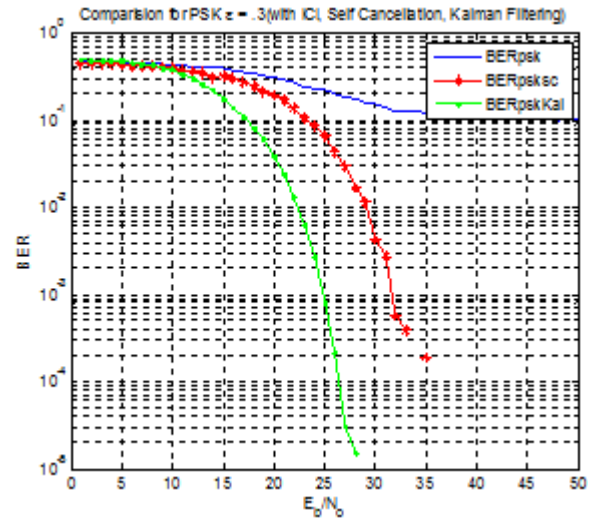


Figure: Comparison for PSK with different Schemes.

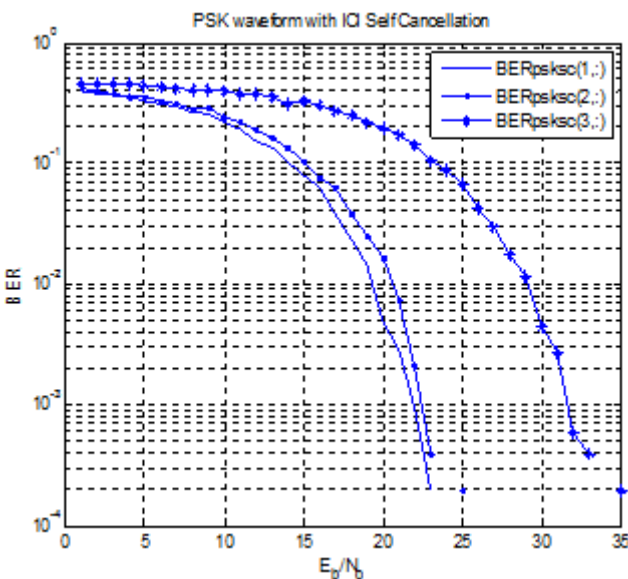


Figure: PSK waveform with ICI self Cancellation

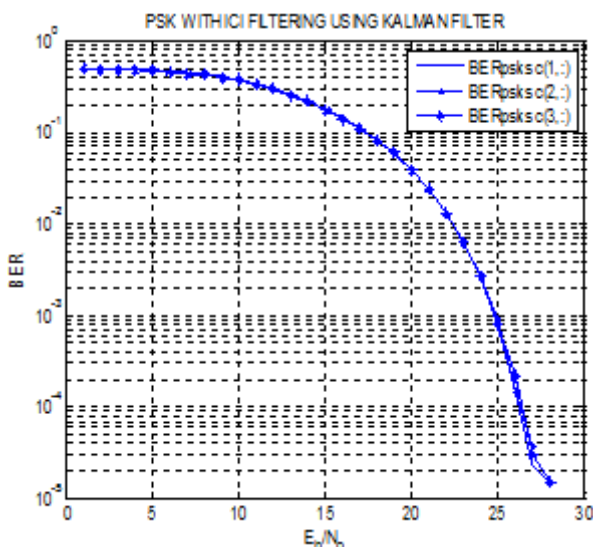


Figure: PSK with ICI filtering using Kalman Filter

7. Conclusion

In this paper, the performance of OFDM systems in the presence of frequency offset between the transmitter and the receiver has been studied in terms of the Carrier-to-Interference ratio (CIR) and the bit error rate (BER) performance. Inter-carrier interference (ICI) which results from the frequency offset degrades the performance of the OFDM system. Two methods were explored in this project for mitigation of the ICI. The ICI self-cancellation (SC) scheme was proposed in previous publication. The extended Kalman filtering (EKF) method for estimation and cancellation of the frequency offset has been investigated in this project, and compared with basic OFDM and self cancellation. The choice of which method to employ depends on the specific application. For example, self cancellation does not require very complex hardware or software for implementation. However, it is not bandwidth efficient as there is a redundancy of 2 for each carrier. On the other hand, the EKF method does not reduce bandwidth efficiency as the frequency offset can be estimated from the preamble of the data sequence in each OFDM frame. However, it has the most complex implementation of the other methods. In addition, this method requires a training sequence to be sent before the data symbols for estimation of the frequency offset. The preambles are used as the training sequence for estimation of the frequency offset.

In this paper, the simulations were performed in an AWGN channel. This model can be easily adapted to a flat fading channel with perfect channel estimation. Further work can be done by performing simulations to investigate the performance of these ICI cancellation schemes in multipath fading channels without perfect channel information at the receiver. In this case, the multipath fading may hamper the performance of these ICI cancellation schemes. Kalman filtering is the efficient scheme in reduction of ICI. Other schemes are compared with all the other techniques and we conclude that ICI reduction is done well in kalman filter scheme.

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