ICI Reduction using Extended Kalman Filter in OFDM System

Abstract

Orthogonal frequency division multiplexing (OFDM) is emerging as preferred modulation scheme in modern high data rate wireless communication systems. A well known problem of OFDM system is sensitivity to frequency offset between the transmitted and received signals, which may be caused by Doppler shift in the channel or by the difference between the
transmitter and receiver local oscillator frequencies. This carrier frequency offset causes loss of orthogonality between sub carriers and the signal transmitted on each carrier are not independent of each other, leading to inter carrier interference (ICI)[1]-[4].

In this paper, the effects of ICI have been analyzed and two solutions to combat ICI have been presented. The first method is a self cancellation scheme, in which redundant data is transmitted onto adjacent subcarriers such that the ICI between adjacent sub carriers cancels out at the receiver. The other technique the Extended Kalman Filter (EKF) method statistically estimate the frequency offset and correct the offset using the estimated value at the receiver.

Reference

ICI Reduction using Extended Kalman Filter in OFDM System

- Sensitivity to Doppler Shift and Carrier Frequency Errors in OFDM Systems-- The Consequences and Solutions ; Yuping Zhao  Sven-Gustav Haggman Communications Laboratory, Faculty of Electrical Engineering, Helsinki University of Technology Otakaari 5A, FIN-02150, Espoo, Finland.

Index Terms

Computer Science                Communications

Key words

Extended Kalman Filter (EKF)  OFDM
ICI
AWGN
BER