Using the Cyclic Prefix for Blind Equalization in OFDM

Tareq Y. Al-Naffouri

Department of Electrical Engineering

KFUPM, Dhahran 31261

Saudi Arabia

e-mail: naffouri@kfupm.edu.sa

A Fast Track Project Proposal

Abstract

OFDM modulation combines the advantages of high achievable rates and relatively easy implementation. However, for proper recovery of the input, the OFDM receiver needs accurate channel information. In the data-centered blind estimation, cyclic prefix will not be discarded contrary to the conventional OFDM system. Blind maximum-likelihood data recovery will be performed in OFDM transmission from the output symbol and its associated cyclic prefix only. This approach relies on decomposing the OFDM channel into two subchannels (cyclic and linear) that share the same input and are characterized by the same channel parameters. This fact allows us to estimate the channel parameters from one subchannel and substitute the estimate into the other, thus obtaining a nonlinear relationship involving the input and output data only which can be exhaustively searched (in the worst case scenario) for the maximum likelihood estimate of the input data. The project proposes several modifications of this scheme such as modifications that incorporate a priori information about the channel impulse response (e.g. the channel length and frequency correlation) and modifications that attempt to reduce its computational complexity. The project will be carried out in 12 months and it will cost SR 50,100.