

Employing a Suppression Filter for MC-CDMA Overlay

Prof.Dr.Ahmed E. EL-Mahdy, Dr.Ashraf Samy, Dr.Ahmed Mostafa Elbakly

Abstract— In this paper, the performance of multicarrier direct sequence code division multiple access (MC-DS-CDMA) system equipped with a suppression filter is analyzed. A suppression filter is used in the MC-DS-CDMA receiver for suppressing narrowband interference (NBI) over a Rayleigh fading channel. The NBI is assumed to be multi binary phase shift keying narrow band (BPSK NB) signals which exist in all subcarriers of the MC-CDMA system. The effect of suppression filter coefficients, MC-DS-CDMA system parameters, and the NBI parameters on the performance of the system is studied. The analysis shows that, the suppression filter can improve the MC-CDMA system performance significantly, and then increases the MC-CDMA system capacity. It is shown that, increasing the number of taps to be more than nine taps increases the complexity of the filter and does not add any performance gain to the system. The system with a suppression filter has better performance than the system without a suppression filter at a range of values of the ratio of the offset of the interference carrier frequency existing in a subband to the half spread spectrum bandwidth of this subband, (q), which varies from zero up to a greater value of (q) at which using the suppression filter is useless. This value of q at which the system with and without a suppression filter have the same performance depends on the level of the signal to interference power ratio.

Index Terms— multicarrier CDMA; narrowband interference; suppression filter

