

ABSTRACT

One of the major problem which can seriously affect the capacity of CDMA system, is the presence of *multiple access interference (MAI)*. MAI appear when the *cross correlation* value between two *spreading codes* which not *orthogonal* each other, is not equal to zero. This problem occur when several transmitted signal experience the propagation phenomenon such as reflection and scattering caused by many object within the mobile radio environment which break the orthogonality among codes.

Multiuser detection is a method which is applied to improve the performance of the receiver in cellular network. This method reduces the MAI effect. There are a lot of kind of multiuser detection which can be classified into *Successive Interference Cancellation (SIC)*, *Parallel Interference Cancellation (PIC)*, *Decorrelator*, *MMSE*, etc. PIC is the simplest suboptimum multiuser detection in many application.

In this final project, the combination between decorrelator and PIC multiuser detection scheme is shown. PIC consist of several stage, the previous stage's result affect significantly to the decision in the next stage. The combination of decorrelator and PIC in the first stage can improve the performance of PIC receiver. This project also simulate DS-CDMA system with the number of user : 1, 3, 5 and 8 users. Particularly this project use two different condition, that is, synchronous and asynchronous, and with two different spreading codes, that is, walsh-hadamard, and m-sequence.

The simulation result show that the performance of combination between decorrelator and PIC is better, hence BER performance is 10^{-5} at 23 dB SNR, when on the other hand, for PIC and decorrelator is 10^{-4} and 10^{-1} each, with the similar SNR. When the project is done at synchronous and asynchronous condition, the improvement which is provided by the combination of decorrelator and PIC can only take effect for asynchronous condition. On the other side, by varying the number of user, we can conclude that the system performance is poor when we increase the number of the users.