ABSTRACT

The development of wireless cellular communication systems has evolved from the first-generation (1G) of analogue stage to second-generation (2G) and third-generation (3G) of digital stage. Now, due to market oriented demands, it has stepped into fourth-generation (4G) of broadband stage. The above features are imposing technical challenges on system design and stimulating various research topics on capacity, complexity and performance. In order to increase the capacity of wireless networks, various multiple access schemes have been reported in the literature. The credit of most competent multiple access schemes in 3G systems goes to code division multiple access (CDMA) scheme which offers improved bandwidth-efficiency than time division multiple access (TDMA) and frequency division multiple access (FDMA) schemes, However, it is difficult to achieve highly performance due to the requirement of more complex technologies including complex power-control and multiuser detection techniques.

The performance of the CDMA scheme is mainly limited by multiple access interference (MAI) and inter-symbol interference (ISI). The requirement of an alternate mechanism for user separation has been solved by using an Interleave-Division Multiple-Access (IDMA) scheme, in which, most of the above stated problems do not exist due to the application of user-specific interleavers which have low cross-correlation amongst them. The interleaved data resulted from user-specific interleavers demonstrates better orthogonality amongst each other in the channel. In addition, memory is required at receiver end to save look up table, hence a proposed Permutation Polynomial Interleavers have been used to reduce the memory requirement which store look up table at transmitter and receiver ends. Also this system is tested on a MATLAB simulator to show the system performance in different channels such as Rayleigh fading.

Due to weakness of performance in bit error rate (BER) imposing technical challenges on system design and stimulate various researches to work on topics related to capacity, complexity and performance of the communication systems in different channels. There are also other research topics in wireless systems including optimum channel coding, detection, and diversity mechanisms. For immediate solutions for the problems mentioned above, near-capacity-achieving forward error correction (FEC) codes are developed to enhance bit-error rate (BER) performance while improved detection algorithms are designed. Hence, Unequal Error Protection

Code Interleave Division Multiple Access (UEP-CIDMA) is designed in different channels. The performances of the proposed techniques have been simulated using MATLAB simulator version R2008a verifying and satisfying results were obtained.