USER PAIRING AND RESOURCE ALLOCATION FOR UP-LINK MIMO SYSTEM

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Abstract : **In this paper introduces a new scheme for dynamic user grouping for SC-FDMA uplink MIMO system for multiple cells. For dynamic grouping of many cells, the minimum mean square error (MMSE) equalization and delta modulation (DM) with a consensus of bit error rate is done. By dynamic grouping of users, high spectral efficiency is achieved. A new effective iterative Hungarian algorithm (IHA URP) for resource allocation optimization is proposed to minimize complexity. Problems are optimized by breaking the large scale problem into a series of small scale sub-problems, which reduces the system complexity. This approach gives high spectral efficiency compared with existing approach. As the numbers of cells, users and resource block increases, the search scale grows,the common branch and bound algorithm is unable to solve the problem efficiently. For aiming better efficiency,Resource Allocation method which minimizes Bit error rate and symbol error rate effectively is implemented**

***IndexTerms*— Equalisation, Hungarian algorithm, MIMO system, resource allocation, spatial multiplexing.**

I. INTRODUCTION

MIMO technologies have been widely used to maximize the spectral efficiency of the 4G communication system.Because of the high cost and large size, the application of MIMO uplink is limited by difficulty in implementation. In order to overcome this, virtual MIMO system is implemented with multiple users each with single antenna allotted with same frequency and time slot.
User MIMO channel capacity is calculated using suboptimal pairing algorithm and scheduling is done using Shannon capacity.In resource allocation, subcarriers are allocated orthogonal to each user to avoid inter symbol interference. The existing system applies only on single cellwhich neglects the inter-cell interference. Due to densely located base station,cells are interconnected to each other and have a centralized network which uses frequency reuse method for resource allocation. As the cells are grouped together, inter-cell and intra-cell interference are considered as co channel transmission of user groups .The optimization problem is determined by Hungarian algorithm in place of BNB algorithm to reduce complexity. Hungarian algorithm breaks the problem into numerous number of alternate problems by bipartite partition method.

II.PROPOSED SYSTEM

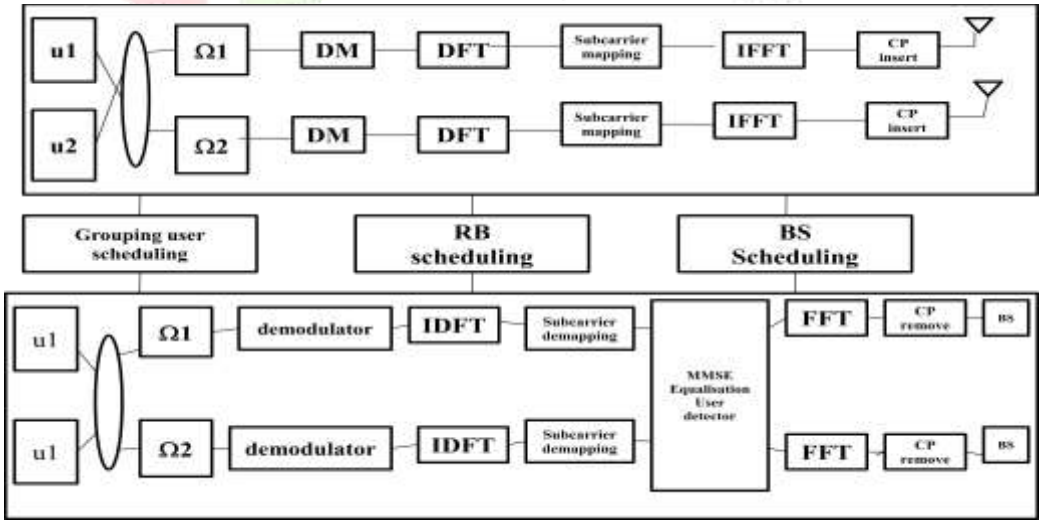


Fig 1.Block diagram for the uplink SC-FDMA MIMO system

In the proposed system, users in the cells aregrouped dynamically with consideration of bit error rate. For obtaining the better quality and less fading channel, dynamic grouping of users is designed based on the average mean squared equalization and delta modulation with bit error rate.SC-FDMA system is implemented to reduce peak to average power ratio to counteract frequency fading and phase distortion. To improve the performance of a cluster consisting of many cells, spatial multiplexing is carried out between the inter-cell or intra-cell co channel users to increase spatial multiplexing gain. The proposed Hungarian algorithm uses the greedy strategy to increase the search area and increases the processing speed by parallel processing

Users are grouped together in the cell and base stations are co-ordinate with the central processing unit with backhaul microwave link. The channel state information is exchanged between different base stations located within the cluster. The cells in the cluster have same number of resource blocks and users pair with each other within the cluster.

III.COMMUNICATION SCHEME:

A single carrier frequency division multiple access is employed in this paper. In this system, for each user, the sequence of bits into mapped to a constellation of QAM symbols in the mapping block. The users are assigned with different Fourier co-efficient during DFT operation. In the demapping block, the original stream of bits is recovered by performing inverse discrete Fourier transform. Cyclic prefix are added to the data bits to remove inter symbol interference between the cells

IV.RESOURCE ALLOCATION METHOD:

In this method, adjacent resource blocks belong to one base station and can be assigned to one user group. As there are many resource blocks to allocate, allocation pattern number P is set. For resource allocation, allocation pattern matrix is set
by forming resource block against allocation pattern number.

Step1: Total users in the cluster are partitioned into many groups and each group contains many users. By applying permutation and combination user group subset is obtained. The binary value of data is added as index to allocation group subset.

Step2: The size of the complete user group is determined by the partition of complete user in the cluster and the number of receiving antenna.

Step 3: The size of the user group is compressed according to the resource block by the greedy algorithm.

Step4: The performance matrix of allocation pattern and user groups is constructed for each cell in the cluster.

Step5: Best match is found between the allocation pattern matrix and user group in the cluster.

After certain iteration, best match between performance matrix and user group is obtained. Sort operation is performed to get allocation result.

Users per cell	2 cells		4 cells	
	BNB	IHA_URP	BNB	IHA_URP
2	28.05	21.25	441.35	276.55
4	15.27	11.03	5438.21	680.65
6	28.11	13.76	16743.24	2478.77
8	54.12	26.44	134785.2	5410.38

Table I Running time comparison of BNB and IHA_URP algorithm

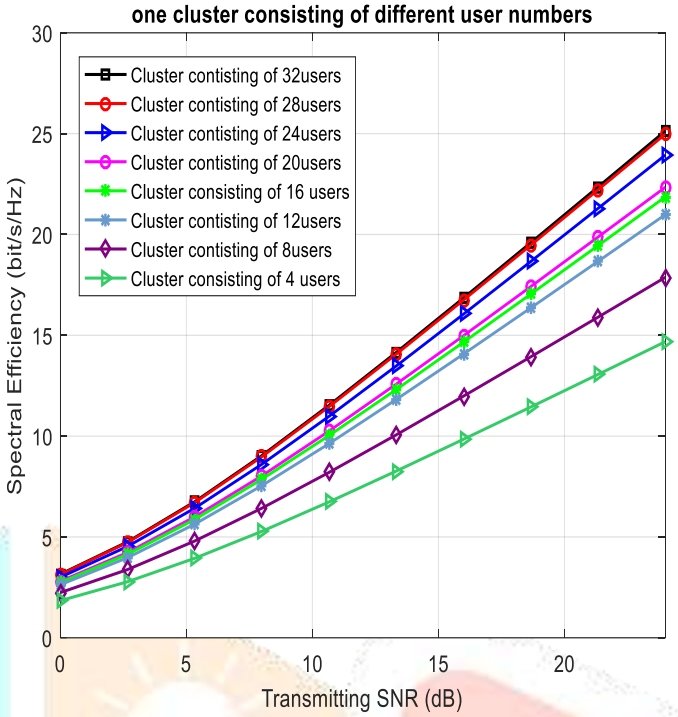
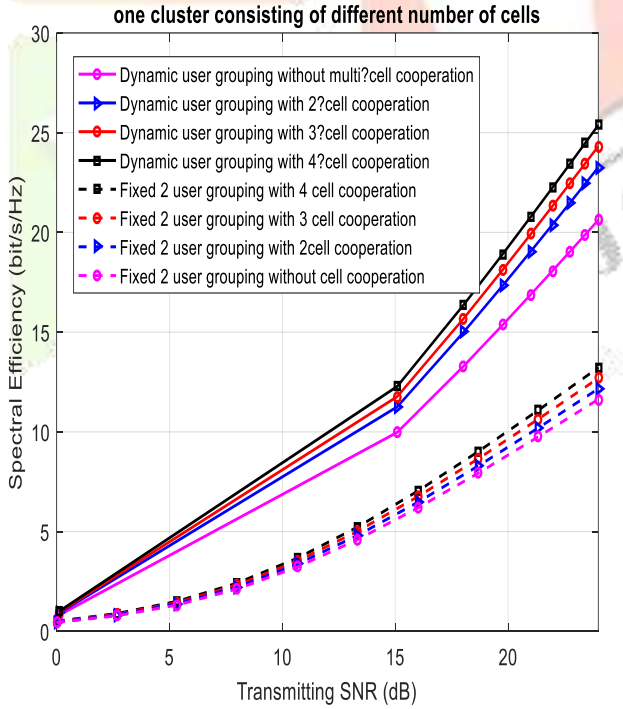


Fig IIComparison of Spectral efficiency of one cluster consisting of different user groups



FigIII Comparison of spectral efficiency of one cluster consisting of different number of cells.

V.CONCLUSION:

This paper proposes a new technique of grouping of users in the cluster and resource allocation optimization for uplink SC-FDMA MIMO system. New user grouping technique and resource allocation optimization is carried out with centralization of many cells to

achieve maximum output and spectral efficiency. Hungarian algorithm is employed to minimize complexity and efficient use of bandwidth. The simulation result illustrated the proposed algorithm attains better output and spectral efficiency than the existing algorithm.

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