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AN EFFICIENT RESOURCE ALLOCATIONSTRATEGY FOR FUTURE WIRELESS CELLULAR SYSTEM

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Abstract- In mobile communications an efficient utilization of the channels is of great importance .In this project we describe the basic principles for obtaining the maximum utilization and study strategies for obtaining these limits. In general a high degree of sharing is efficient, but requires service protection mechanisms to guarantee the Quality of Service for all services. In this we address the multi cell interference on overall radio resource utilization and propose a new strategy for resource allocation in multi cell systems. here we propose a concept of Load Matrix (LM) between the cell for allocation of radio resources. Simulation results verify that significant improvement in the resource utilization and to overall network performance.

Keywords: Resource allocation , MATLAB

INTRODUCTION : With growing demand for wireless communications, advanced mobile cellular systems have evolved in many countries including in Europe, America, Korea, Japan and China. The maximization of revenue per bandwidth is one key factor for emerging systems given the limitation of radio resources available. On the other hand, customers demand more bandwidth and higher data transmission rates in order to support multimedia contents and real-time services.

In order to achieve efficient resource utilization in all sorts of deployment scenarios and QoS requirements in the future wireless cellular systems, new resource allocation methods must be developed. In other words, resource allocation has to provide optimum or near optimum, for practical reasons, utilization of the available radio spectrum in the next generation of cellular wireless systems regardless of deployment scenarios and conditions. However, optimum point has to e found before considering the implementation practicality.Assessing the quality of resource allocation, one can distinguish two types of merits,

One is overall throughput i.e. summation of cell capacity achieved in the system. The other is fairness amongst users in terms of offered transmission opportunities, where the location of user is likely to be distributed in a uniform manner over the whole network and the network controller needs to maintain the service level agreement. The trade-off between throughput and fairness is very important in a scheduling algorithm.One of the main objectives in resource allocation and scheduling is to comprise available resources and constraint elements in an efficient way. It is shown in [5] that finding scheduling algorithms have different objectives. Their performance depends also on the deployed system and the environment characteristics. Some algorithms, for instance, aim for fairness in resources given to the user whereas others are more focused on generating higher throughput.

Modeling of communications : The modeling of a cellular communication system is usually divided into three types and they are as follows

1. Traffic – We can model a basic cellular network of N cells analytically by considering a state space in which each state is indexed by a vector $[i1; : : :; iN]$ where ik is the number of customers being served by cell k.New calls, call terminations and call handovers are modeled by Poisson processes with state-dependent intensities, causing single state transitions

2. Structure – This model is generally non-trivial to solve, due to the handover transitions, but it has been shown that it can be approximated by a model in which the effect of handovers have been transformed into an increase in the birth and death rates.

3. Strategy – This latter model, which has product form, can be solved and subsequently used to compute various performance measures (blocking probabilities for new calls and handovers, utilization etc.).The approximation is not exact, but can be considered as a worst-case scenario when dimensioning the cells of a mobile network.

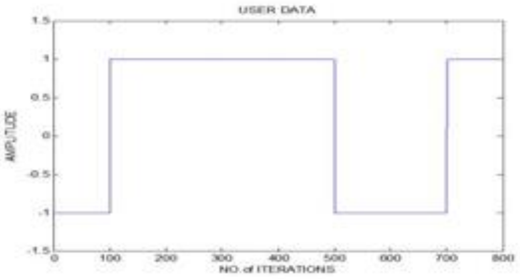
Traditional Schedulers: Three main scheduling algorithms are considered here as the basis for analyze namely Round Robin (RR), Max C/I and proportional Fair (PF). It is also worth noting that these schedulers are deployed here in decentralized manner same. RR is a fair and simple algorithm. Resources are allocated to users in a cyclic order offering fair resource sharing among them. However the property of not considering the radio channel condition produces very low throughput. On the contrast to RR, Max C/I is based on the channel conditions by allocating the available resources to the user with the best channel quality in terms of signal to interference (SIR) ratio, and therefore increases the total system throughput. As a result, the users close to BS are more likely to have always better channel condition and therefore consume the resources. Max C/I increase the cell capacity but suffer from poor fairness. PF increases the influence of previous transmission rates and allows trade-off between fairness and throughput: Recently proposed Score-Based (SB) scheduling algorithm analyses the user's traffic performance and allocates a transmission rate according to the score measured. It provides fairness according to rate statistics and increases robustness to the asymptotic channel condition. While in PF the prioritization of transmission rate is based on own average throughput, SB takes advantage of rate statistics but not necessarily the transmission rate itself.Uplink resource allocation methods can be categorized as centralized or decentralized in terms of the network location/node in which scheduling takes place. In Universal Mobile Telecommunications System (UMTS) for example, if the scheduler resides in Radio Network Controller (RNC), it is called centralized and if it resides in base station it is called decentralized.

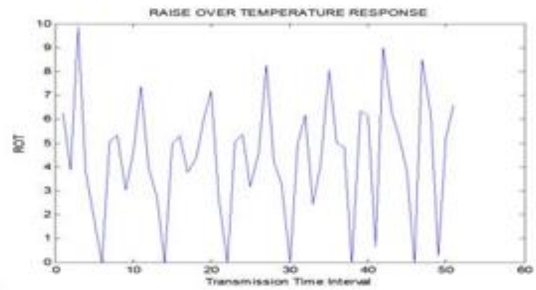
Load Matrix : On the contrary to traditional schedulers, Load Matrix Concept proposed in takes the intercell interference information into account in order to avoid RoT outage.LM uses a database containing the load contribution of all active users in the network. A centralized scheduler assigns radio resources to all active users in the network. We assume the averaged channel gains (over the scheduling period) from users to BS s are known to scheduler prior to rate assignment. One of the main challenges in resource allocation in a multicell system is the control of intercell interference. In uplink scheduling, the basic problem is to assign appropriate transmission rate and time to all active users in such a way that result in maximum radio resource utilization across the network whilst satisfying the QoS requirements of all the users. Amongst other constraints, another important factor in the resource allocation is the user's transmit power. For a network of M users and N cells the constraints to be satisfied are Constraint1: For each active user I in the network, its transmit power P_i must be maintained in an acceptable region.Provides a generic solution for resource scheduling that does not preclude an priority function and can e combined with any of them. However , priority function has major impact on overall system performance for any scheduling algorithm including the Lm. Here a priority function is introduced based on a user's load vector that includes intra and intercell impact on the network. It is evident that giving priority to a user with better channel condition increases the cell throughput but in a multicell network could have severe impact on the

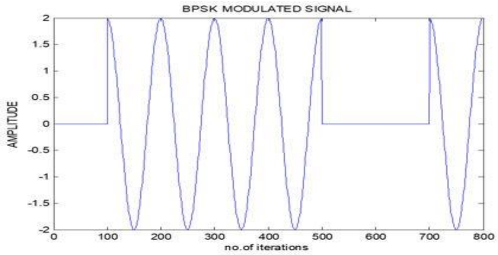
$$\text{priority}_i = \frac{G_{i,j}}{\sum_{n=1,n\neq j}^{N} G_{i,n}} \ \forall i \in \{1,\cdots,M\}$$

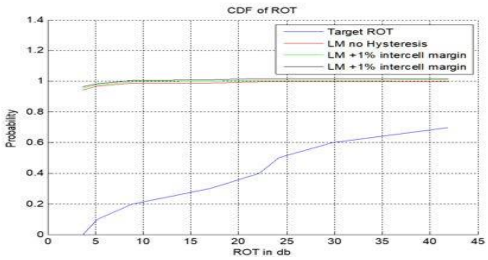
throughput of other cell's. Here it is considered by defining Global Proportional Priority function as Where $G_{i,j}$ is the total channel gain from under I to BSj averaged over the scheduling period. The LM approach tries to maximize network capacity through inter and intra cell interference management.

DESIGN The whole process is done with the help of a software called MATLAB.By using this software we can prepare the model by using our required concept for the project and with the help of code that we written in the model we can simulate it in the software by giving the inputs and can obtain the desired output. The design of this project cost is very less but the understanding the new concepts like RR algorithm and Load matrix concept is very hard and All these methods are low cost and simple and give us the desired output if applied in the correct sequence and in the correct way with appropriate parameters.









The above graphs and figures shows the output for the simulation of the code in the matlab software and the result shows us the efficient outcome because of load matrix concept.

CONCLUSION: The vulnerability of traditional resource allocation and scheduling schemes to intercell interference resulting in interference resulting in interference fluctuations is demonstrated in this project Such interference results in the capacity wastage and excessive packet delay performance the load matrix concept address this prolem specifically and provide an efficient resource allocation by jointly considering inter cell and intra cell interference before making decision on allocation radio resources.Extensive simulation results for the LM demonstrate its capability through considerable p[performance improvements over the bench mark scheduling algorithm in terms of both average packet really and cell throughput. The performance also shown to be very close to upper bound limits of interference outge. By incorporating a new concept separate margins for intra cell and inter cell interferences into the LM ,it was shown that better control over such interferences can provided resulting in high overall performances. As an example LM approach interference can always kept close to the specified target while average cell through put can be increased by ore than 30 % compared with a well known benchmark scheduling algorithm

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