Performance of Blocking Probability and Delay Probability Using Channel Assignment Schemes

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Abstract
The rapid evolution of cellular technology and the augmentative user demand for advanced mobile services leads the industry to develop more efficient network structures. The increasing number of cellular users and the demand for broadband mobile communications drives to the research of new methodologies for the design of cellular networks and services. In cellular mobile communication system the existing dynamic channel allocation scheme suffer from high blocking probability and forced termination probability. To mitigate this problem, in this paper we evaluated the system in terms of total system performance such as blocking probability, delay probability.

Keywords
Blocking Probability, Delay Probability, and Dynamic Channel Allocation

I. Introduction
The entire service area of a radio environment is divided into several smaller areas called cells. Each cell has a base station located in its center. In order to make a call a mobile user has to establish a radio link to the base station of the corresponding cell. The radio link associated channel can interfere with the same channel activated in another cell if the cells are not sufficiently spaced apart [1]. The minimum separation distance between the cells that keeps the interference level under a given threshold is the reuse distance. Channel allocation is one of the fundamental solutions due to the fact that it determines how the available bandwidth will be managed [2]. However, channel assignment presents a challenge because co-located wireless networks are likely to be tuned to the same channels. Some strategy must be applied to select the assigned channel. In contrast to traditional call-by-call DCA schemes, where the channel assignment is based only on current channel usage conditions in the service area, in this work we considered an interference aware DCA algorithm, in which the channel assignment is adaptively carried out using context information on the previous as well as the present channel [3].

II. Related Work
The available frequency spectrum is limited and the number of mobile users is increasing day by day, hence the channels must be reused as much as possible to increase the system capacity. Various channel assignment schemes namely Fixed Channel Allocation (FCA) and Dynamic Channel Allocation (DCA) schemes. In FCA [4-6] channels are allotted permanently to each cell based on predetermined estimated traffic where as in DCA [7-9] the channels are assigned on a call-by-call basis in a dynamic way and the entire set of channels is accessible to all the cells. DCA makes wireless networks more efficient, especially if the traffic load distribution is not known beforehand or varies with time. The advantage of dynamic channel assignment is the flexibility and the traffic or interference adaptability.

III. System model
In our model we use a 3 cell cluster system, i.e., channel may be used concurrently in cells that are two hops away from each other. For example, in fig. 1, we can use the same channel in both cells $c_{32}$ and $c_{34}$ concurrently [10]. In fig. 1, the cells $c_{23}$, $c_{24}$, $c_{32}$, and $c_{43}$ are neighbors of $c_{33}$. Within such a neighborhood, a group can be assigned to two cells at the same time as long as those cells are neighbors of each other [11]. However, within a cluster of three cells all of whom are neighbors of the others, a group cannot be assigned to two of them concurrently. Our model is extended for cluster size to N=4 and 8.

IV. Results
The Network model assumed for the simulation purpose is of cluster size N=4 and N=8. The number of channels allocated to each cell is 12 (k=12). The simulation results of blocking probability and delay probability is plotted with different cluster size for FCA, DCA and HCA as shown in fig. 2-3.
V. Conclusion

In this chapter Hybrid channel allocation technique is implemented, the blocking probability of HCA is more than DCA and less than FCA, as the traffic load increases which increases delay probability and decreases blocking probability, the delay probability in HCA is more than DCA but less than FCA. The main advantage of this method is that HCA reduces the blocking probability than FCA at lower traffic load and DCA at higher traffic loads.

References


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