NEW ADAPTIVE CHANNEL ASSIGNMENT SCHEME FOR CELLULAR NETWORK

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ABSTRACT:

Cellular networking is providing global information access to users while they moving. Blocking calls algorithms allow the users to move among heterogeneous wireless networks. In this paper, the authors have proposed an Adaptive Channel Assignment Scheme (ACAS) where the number of channels is adjusted automatically based on the average blocking rate measured in the past certain period of time. The blocking rate and the new call blocking rates are minimized. It is seen that the proposed scheme is far efficient than the Current Channel Allocation Scheme. The resource utilization of the proposed scheme is more efficient compared to schemes.

Keywords: Adaptive Channel, Fixed Channel, Current Channel Allocation Scheme, ACAS.

[1] INTRODUCTION

There is a worldwide growth of cellular telephony. Users are giving more importance to portability as a service feature. As users move from one location to another, require a communication path to provide sufficient buffers that prevents the change of bandwidth. Cellular systems deploy smaller cells in order to achieve high system capacity due to the limited spectrum. The frequency band is divided into smaller bands and those bands are reused in non-interfering cells [2].

In a cellular network the subscribers can roam anywhere in the region and remain connected to the Public Switched Telephone Networks (PSTN) via their wireless mobile devices. Mobile Stations (MS), Base Station (BS) and Mobile Switching Centre (MSC) constitute a cellular network. The base station covers each cell. It covers area of few kilometers in diameter. A base station serves each cell and a group of BSs is connected to MSC. A group of MSC is then connected to the MSC of other groups and then to PSTN. The MSC stores information about the subscribers located within the group and is responsible for directing calls to them [7].
Neighboring cells overlap each other to ensure the continuity of communications when the users move from one cell to another. Certain number of channels is allocated to each base station. A channel in the system can be thought of as a fixed frequency bandwidth (FDMA), a specific time-slot within a frame (TDMA), or a particular code (CDMA), depending on the multiple access technique used. BSs and MSCs take the responsibility of allocating channel resources to mobile stations [1].

Channel assignment strategies can be classified into fixed and dynamic schemes [3]. Where there are no separate channels exclusively for blocking calls, it is a fixed system. In fixed channel assignment (FCA) scheme, fixed numbers of channels are assigned to each cell and there are no channel reserved for blocking requests only. When a new call request or blocking request occurs, the base station will check to see if there is a channel available in current cell. The call will be allowed if there is a channel available and it will be dropped if no channel is available. So the new call requests are dealt with equal priorities. The cell doesn't service new call request. The channel assignment is done by First Come First Serve basis. The Quality of Service is not satisfactory because the blocking rate is same as new call blocking rate. The smart channels improve the probability of a successful blocking because they are reserved exclusively for blocking calls.

[2] PROPOSED SCHEME

In this paper, Adaptive Channel Assignment Scheme (SCAS) has been proposed in which the channels for block requests are dynamically allocated based on the observation of certain past period in the network. This scheme is aimed to utilize the available resources efficiently and also to balance the load in the network traffic.

The new call dropping rate determines the fraction of new calls that are rejected, while the blocking rate gives the fraction of admitted calls that terminate prematurely due to block call. Maximum resource utilization is the main objective of this research work. To get good resource utilization, less number of available channels is assigned to the block calls when the number of call requests is less under the low traffic load. If more channels are reserved for the blocked request in this condition, the resources are wasted because the channels are not utilized either for blocked requests or new call requests. At the same, time if the number of blocked requests is high then number of available channels is required to handle them. The balance of the new calls rejection rate and processed calls rate are monitored and maintained to get better resource utilization in cellular network.

[3] NEW ADAPTIVE CHANNEL ASSIGNMENT SCHEME (ACAS)

The selection of the number of available channels exclusively dedicated for block call is essentially important factor to get good Quality of Service. For different types of traffic load and mobility factor, different number of available channels is needed to be allocated. The number of available channels can't be fixed when the traffic load is changing with the time. This problem is addressed in the proposed scheme ACAS. The Adaptive Channel Assignment Scheme automatically searches the optimal number of available channels to be reserved for block calls at each BS.
NEW ADAPTIVE ALGORITHM

In the proposed algorithm we try to solve the mentioned problems as shown below:

\[
\text{If number of required channel } \leq \text{ number of available channel} \\
\text{Then apply uniform distribution} \\
\text{Fixed factor } = \text{ const} \\
\text{Else} \\
\text{If number of required channel } > \text{ number of available channel} \\
\text{Then apply non-uniform distribution} \\
\text{Fixed factor } = \text{ const } \times \text{ traffic load}
\]

NEW ADAPTIVE RESULT:

Results are directed to a text file and graph for the same is obtained using MATLAB simulation. Comparison of the results of the FCA scheme, static available channel scheme, and the adaptive available channel scheme has been made. The following are the initial parameters chosen for simulation.

The following graph depicts the comparative study of the three schemes, Fixed Channel Assignment without using available channels, Static available Channel Assignment and Adaptive available Channel Assignment.

Figure 1: Shows the simulated output of the FCA scheme where no available channels are allocated for block calls. It simply works on the basis of FCFS (First Come First Served). The output graph shows that the block call rejection rate is slightly higher than the new originating call rejection rate. Block calls should be given higher priority than the new originating calls. The
overall performance is also not satisfactory since both new call rejection and block call rejection ratio is comparatively high.

Figure: 2. Static Allocation Channels for Block Call

Figure 2: shows the simulated output of the static available channel allocation scheme i.e., fixed number of available channels exclusively allocated for block call. Here the number of block call rejection is reduced but the new call rejection is highly increased because the number of available channels allocated is high than which is actually required. Moreover in some cases if the number of available channels is less, then block rejection rate will increase and hence affect the throughput.

Figure: 3. Adaptive Channel Allocation Scheme

Figure 3: shows the simulated output of our proposed scheme - Adaptive Channel Allocation Scheme (ACAS). Here the channels are not allocated in a static fashion and they are allocated based on the traffic in the past certain period of time. The number of available channels gets dynamically adjusted and it is clearly seen from the graph that both new calls and block calls utilizes the channel properly and the call rejection rate is low for both. Hence there is tradeoff.

[6] CONCLUSIONS
A new Adaptive channel allocation scheme (ACAS) for cellular networks has been presented in this paper. Effective utilization of the available resources has been emphasized. The main problem faced in available channel allocation is the number of available channels chosen. The proposed algorithm adjusts the number of available channels dynamically according to the dropping rate of block calls in a certain period of time. It keeps the block call rejection rate below the given threshold and it also reduces the new call rejection rate by decrementing the number of available channels when it is observed to be more than needed. The QoS of the proposed scheme is satisfactory.

REFERENCES


Author[s] brief Introduction

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