

ENSURING BETTER QoS THROUGH CALL ADMISSION CONTROL BASED ON BANDWIDTH ALLOCATION SCHEME WITH PRIORITY IN WIRELESS NETWORK

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Abstract – In the handover concept blocking a new call is more advisable than the dropping a connection after it has already begun. There are several new multimedia applications are available now, so it becomes more important that wireless networks satisfy QoS requirements. We have to use efficient handover prioritization schemes to improve the network performance when user is switching between the access service network. Some advance schemes are discussed that have common characteristic reducing the call dropping probability at the expense of increased call blocking probability. In the adaptive bandwidth allocation scheme, when an available bandwidth is low, the scheme releases some bandwidth from the already admitted non real time calls for handling new and handover calls. But the problem is that all the users are treated in the same way. So as a proposed work we extend the multilevel bandwidth allocation scheme with priority. So mechanism proposes an order in which the bandwidth is taken from the non-real time call for giving to handover calls as a high priority to handover call.

I. INTRODUCTION

Handover mechanism is extremely important in mobile network because of the cellular architecture employed to maximize spectrum utilization. The number of cell boundaries increases because smaller cells are deployed in order to meet the demand of increased capacity. Each handover require network resources to route the call to next base station. If handover does not occur at right time the QoS may be drop below an adequate level and connection will be dropped. The purpose of the handover procedure is to preserve ongoing calls when the mobile station moving from one cell to another. There are diverse of traffic are found in wireless networks. They are classified in different categories. The non-real-time traffic services are bandwidth adaptive and normally, they do not need Quality of Service (QoS) guarantees. In a system, more calls can be accommodate by reducing the allocated bandwidth for the existing non-real-time traffic calls and by reducing the requested bandwidth for the oncoming non-real-time traffic calls. However, the reduction of same amount of bandwidth from the non-real-time traffic calls to accept a handover call and a new call cannot reduce the HCDP significantly even though it reduces the call blocking probability. A multi-level bandwidth allocation for the non real-time traffic calls scheme results negligible HCDP without reducing the resource utilization. This scheme can accept more handover calls over new calls. Also the minimum required bandwidth to accept a non-real-time handover call is less than that of a non-real-time new call. Consequently, this scheme can accept more handover calls. Even though the scheme blocks more new calls, the bandwidth utilization is not reduced. Compared to the adaptive bandwidth scheme, hard QoS scheme needs absolute reservation of network resources for specific traffic. Hard QoS scheme without guard channel cannot reduce the HCDP effectively. However, the guard channels in the hard QoS scheme increases the new call blocking probability and also reduce a measurable amount of bandwidth utilization.

II. HANDOVER PRIORITIZATION SCHEMES

Different ideas and approaches are proposed to reduce the handover dropping probability. One approach is to reduce the handover failure rate is to prioritize handover call over new calls ^[6]. Handover prioritization schemes have a significant impact on the call dropping probability and call blocking probability. Such scheme permits high utilization

of bandwidth while guaranteeing the quality of service of handover calls. Basic method of handover prioritization schemes are guard channels (GC), call admission control (CAC) and handover queuing schemes. Sometimes these schemes are combined together to obtain better results.

A. Guard Channel Prioritization Scheme

The guard channel scheme ^[6] was introduced for mobile cellular systems. However the guard channel scheme is still used in telecommunications with the name of Cutoff Priority Schemes. Guard Channel scheme improving the probability of successful handover by simply reserving a number of channels exclusively for handover in each cell. The remaining channels can be shared equally between handover and new calls. GC are established only when the number of free channels is equal to or less than the predefined threshold g as shown in figure 1.

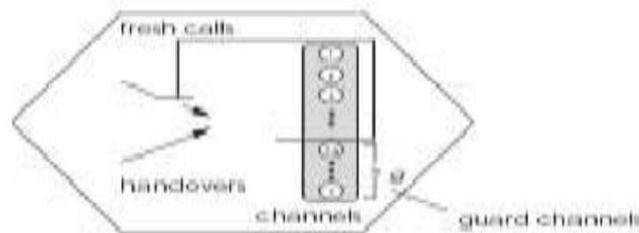


Fig 1: Guard Channels for Handover Request ^[6]

In this situations fresh calls are bypassed and only handover request are served by the cell until all channels are occupied. The GC scheme is feasible because new calls are less sensitive to delay than the handover calls.

B. Call Admission Control Prioritization Scheme

The call admission control scheme ^[6] refers to the task of deciding whether new call requests are admitted into the network or not. In the CAC the arrival of new call are estimated continuously and if they are higher than the predefined threshold level then some calls are restricted (blocked) irrespective of whether a channel is available or not to decrease the probability of handover calls. In the CAC both the new and handover calls have to access to all channels. If a new call that is generated in cell cannot find an idle channel the call is discarded immediately. There is no queue provided for the new calls to wait. The CAC scheme can be classified into different schemes that consider the local information like (the amount of unused bandwidth in cell where the user currently resides), remote information (the amount of unused information bandwidth in the neighboring cells) or local or remote information to determine whether to accept or reject a call. CAC based on knowledge of both network and user characteristics, keeps the track of available system capacity and accommodates new call request while ensuring quality of service for all existing users. Decisions in CAC are performed in each BSC in a distributed manner and there is no central coordination. The CAC scheme can be evaluate on the basis of Efficiency, Fairness, Stability and Flexibility.

C. Handover Queuing Prioritization Scheme

Queuing handover call prioritization scheme ^[6] queues the handover calls when all the channels are occupied in the BSC. When a channel is released in the BSC, it is assign to one of the handover call in the queue. The handover queuing scheme reduces the call dropping probability at the expense of the increased call blocking probability and decrease in the ratio of carried to admitted traffic since new call are not assign a channel until all the handover request in the queue are served. In the handover queuing schemes when the received signal strength of the BSC in the current cell reaches to certain define threshold the call is queued from service a neighboring cell. A new call request is assigned a channel if the queue is empty and if there is at least of free channel in the BSC. The call remains queued until either a channel available in the new cell or the power by the base station in the current cell drops below the receiver threshold. If the call reaches the receiver threshold and no free channel if found then the call is terminated.

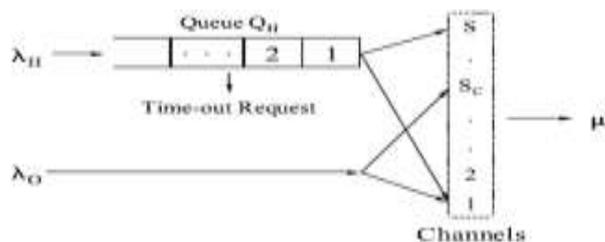


Fig 2: Priority Queue System Model for Handover Call ^[6]

Queuing handover is possible due to the overlap regions between the adjacent cells in which the mobile station can communicate with more than one base station. This makes provision of the queuing the handover requests for certain time period equal to the time of the mobile host existence in the overlapping area. Queuing is effective only when the handover requests arrive in groups and traffic is low.

First in first out (FIFO) scheme is the most common queuing scheme where the handover requests are ordered according to their arrival. To analyze this scheme it is necessary to consider the handover procedure in more detail. By assuming the FIFO queuing strategy and infinite queue size at the base station is assumed as shown in figure 2.

D. Cell Overlapping and Load Balancing Scheme

In order to improve the handover call prioritization scheme it is advisable to equalize the traffic load over the cells. Traffic reason and directed retry handover make use of this principal. First the new call to be served and if the receiver is able hear a neighboring cell and are not considered in this situation ^[6]. Traffic reason handover can be used to transfer traffic from one cell to another neighboring when they are closed to the congestion. The traffic reason handover idea is based on the neighboring cell having an overlapping service area. The overlapping service area arises naturally in GSM cellular system especially in small-cell high capacity micro cellular configurations. The small-cells are capture by subdividing a congested cell each with its own base station. The call arising in the common area (overlapping) of cells have access to channels more than one base station. By appropriate control strategy a cell may select the base station to establish a connection and contribute to efficient spectrum management.

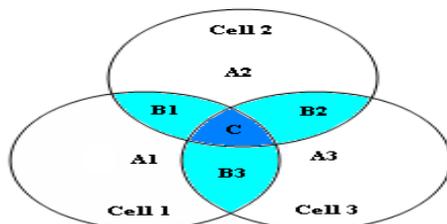


Fig 3: Areas A, B and C of three Cells ^[6]

According to the concept of cell radius when two or more adjacent cells overlap they form a set of individual regions which can be categorized into three types A, B, and C according to the number of cell they overlap as shown in figure 3. These regions can be assigned a channel from one of three cells. The importance of the regions and areas is to perform the channel allocation scheme based on either through the region or area. The number of channels for specific region depends on the size of the regions and specified channel can be used in that area. If we sum of the regions in one cell according to their overlap then they formed a cell area. The blocking probability of the cell can be calculated from those users who are able of choosing a channel from cells A, B, and C. This maintains the same lowest blocking probability and load balancing in every area. ^[6]

III.OVERVIEW OF PROPOSED WORK

A call (of any class of traffic) can be accepted only if the required bandwidth for that call is less than or equal to the unused bandwidth plus releasable bandwidth. The CAC policy for the proposed scheme, shown in Fig. 4, determines whether a call can be accepted or not based on the following rules. After the arrival of the (Nm+1)th call of class m, the input to the CAC algorithm includes: the total capacity (C) of the system, the bandwidth occupied by all the system calls ($C_{occupied}$), the call type (new or handover), and the amount of requested bandwidth (B_{mr}). A new call is rejected if $\beta_{m,a} \leq \beta_{m,n}$. It means that when this condition holds, the existing non-real-time calls are not allowed to release any bandwidth to accept a new call; i.e., only handover calls can be accepted. Whenever the requested bandwidth is strictly less than the total available bandwidth ($C - C_{occupied}$), the system accepts the call.

Otherwise, the system checks whether the call is new call or handover call. If call is new first check the requested bandwidth and occupied bandwidth. If it is equal to total bandwidth than assign the timestamp to that call. Then the system calculates the minimum required bandwidth to accept the call and the maximum available bandwidth if all the existing non-real-time calls release the maximum allowable bandwidth.

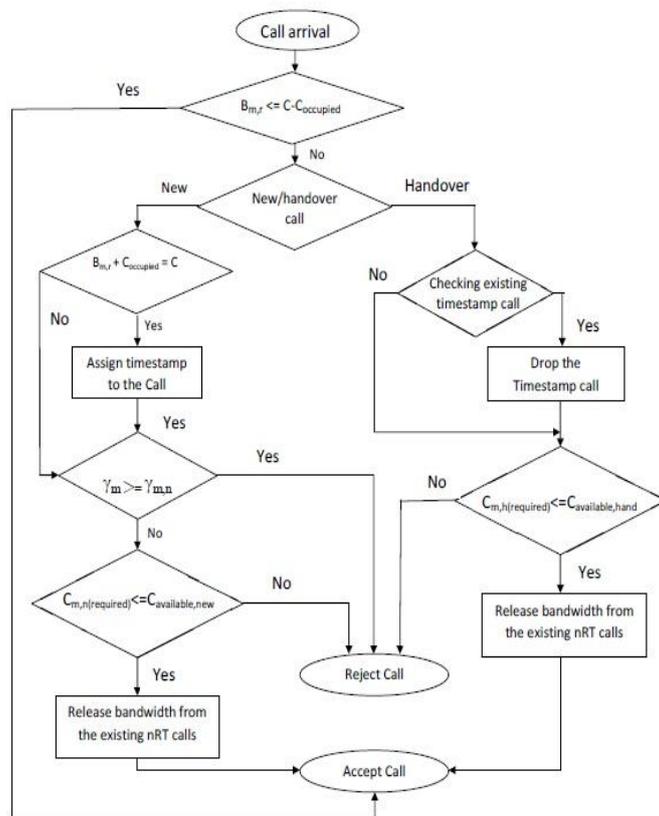


Fig 4: Flow Diagram of Proposed Work

For the proposed CAC, $C_{\text{releasable,new}} < C_{\text{releasable,hand}}$ to reserve more releasable bandwidth for handover calls, so that $PD < PB$. If the call is handover than checks any already existing timestamp call. If it available than drop that timestamp call. There is no timestamp call then determines whether it is possible to admit the call or not after reducing the requested bandwidth and releasing the bandwidth from the existing calls. If the condition is satisfied, the system releases the required bandwidth from the existing non-real-time calls to accept the call. In summary the proposed CAC policy results in higher priority to handover calls than to new calls.

IV.SYSTEM DESIGN & RESULT

System architecture is the conceptual design that defines the structure and behavior of a system. An architecture description is a formal description of a system, organized in a way that supports reasoning about the structural properties of the system. It defines the system components or building blocks and provides a plan from which products can be procured, and systems developed, that will work together to implement the overall system. Here the fig 5 shows the system architecture of proposed work. In the Configure module new call and handover call admission are there. We manually select one of these options. There are several base stations are there, according to its requirement we provide the bandwidth. The ASN (Access Service Network) control all the base station. Each ASN configure with the bandwidth adaptive CAC algorithm. All the ASN are control by the CSN (Central Service Network).In the statistics module we propose two options, new call blocking probability and handover call dropping probability. According to selection, how many no of calls blocked and no of calls handover that will display.

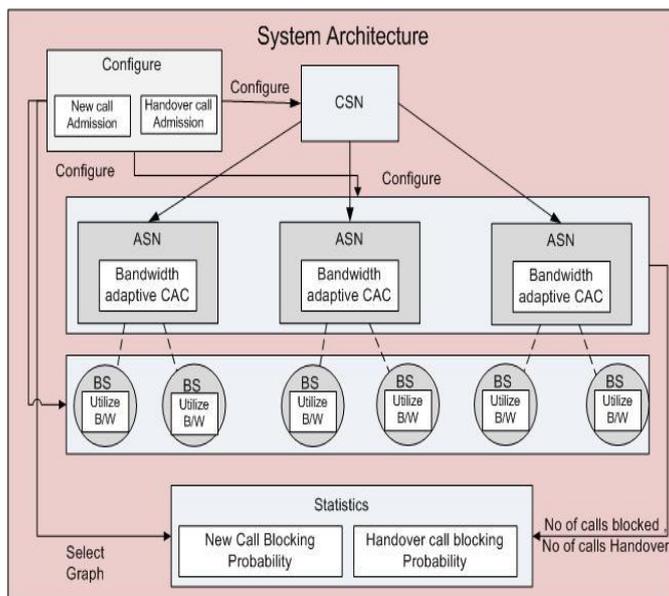


Fig 5: System Architecture

Outcome of proposed work:

In the fig.6 shows the new call blocking probability. New call blocking probability is comparatively higher than the traditional hard QoS scheme. We compare this new call blocking probability with respect to new call arrival rate.

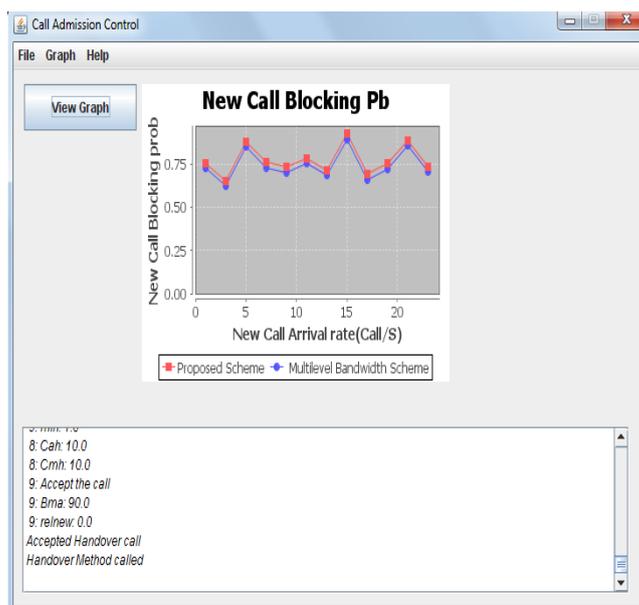


Fig 6: New Call Blocking Probability

In the fig.7 shows the handover call blocking probability. Handover call blocking probability is comparatively lower than the traditional hard QoS scheme. We compare this handover call blocking probability with respect to new call arrival rate.

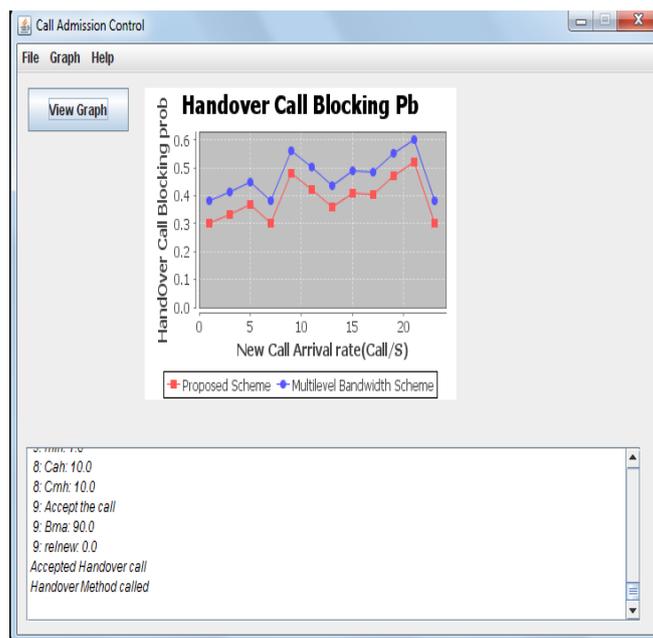


Fig 7: Handover Call Blocking Probability
V.CONCLUSION

There are several research works have been published for the new call blocking probability and handover call dropping probability. Most of the schemes are based on the notion of guard band, where a number of channels are reserved for the exclusive use of handover calls. Although schemes based on guard bands are simple and capable of reducing the HCDP, these schemes also result in reduced bandwidth utilization.

An adaptive multi-level bandwidth-allocation scheme allows reclaiming more bandwidth in the case of handover calls, thus increasing the probability of accepting a handover call, as opposed to new calls. The idea behind this scheme is that, when available bandwidth is low, the scheme releases some bandwidth from already admitted non-real-time calls, as to accommodate new and handover calls. More bandwidth is released to support handover calls over new calls. But the problem is that all the users are treated in the same way. So as a proposed work we extend the Multi-level bandwidth allocation scheme with consideration for the priority to handover call. And we also extend the multilevel bandwidth scheme with timestamp. Within that time period we have to handle request of new call or handover call. In this scheme more bandwidth is release to accept a handover call over new call. So the scheme results in lower priority for the new call. And more number of handover calls is accepted.

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