

Decreasing Call Blocking Rate by Using Optimization Technique

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Abstract- In Cellular networks, blocking occurs when a base station has no free channel to allocate to a mobile user. When a user moves from one cell to another then sometimes handover does not exist and call blocking occurs. Handover is the process when call transfers from one cell to another. In case of complete Handover blocking does not takes place. There are some techniques to remove call blocking such as Handover Prioritization Schemes, Auxiliary station, Guard Channel Prioritization Schemes, Call Admission Control Prioritization Schemes, Handover Queuing Prioritization Schemes. The main goal of this research paper is to investigate the handover research issues and developing schemes which can handle handovers traffic in order to support on-going calls when mobile users are switching between base stations.

Index Terms- Cellular system, Handoff, Blocking Probability, Queuing

I. INTRODUCTION

Cellular network is a radio network distributed over land areas called cells and each cell is serviced by a station called base station. Each cell is represented by hexagonal shape, each cell use different set of frequencies from its neighboring cells. Normally a practical cell is considered to be a circle but to think on it ideally the boundary portions of any radial cell cannot be captured easily due to the gap after integration of more than one cell. So on part of this a hexagon is assumed to be the largest area covering the practical cell and capturing the gaps after integration of cells too[1].

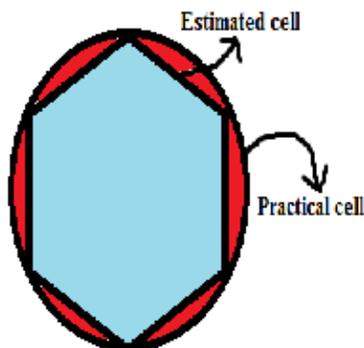


Figure-1 Single cell

In cellular network blocking occurs when base station has no free channels to allocate mobile users. One distinguishes between two kinds of blocking, the first is called new call blocking which refers to blocking of new new calls, and the second is called handoff blocking which refers to blocking of ongoing calls due to the mobility of the users. [3][8]

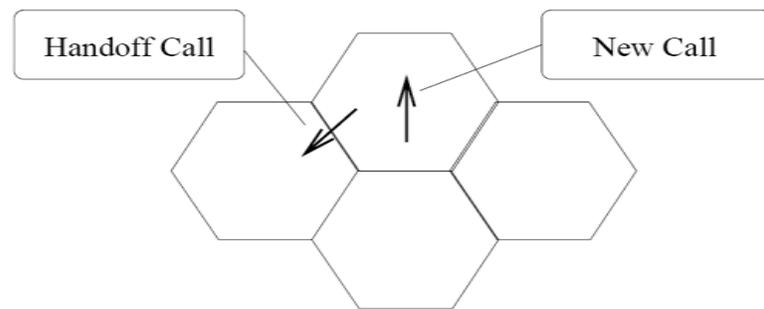


Fig.2.New call and handoff call

The Global System for Mobile (GSM) communication has become a household term in our present world. This is due to the fact that communication in the life of man is so important and the use of the GSM network is not being limited to the rich alone but to all human beings be it rich, poor, old or young. This accounts for the ever-growing demand for GSM communication by people in the real sense of it as reported by the GSM association which could make congestion invertible [2][7]. When congestion occurs call blocking occurs.

Call blocking can be reduced using techniques such as using auxiliary stations [7], Guard channel prioritization scheme, Call admission control prioritization scheme, Handover queuing prioritization schemes. This paper presents the survey of these four techniques and find out which technique is efficient today.

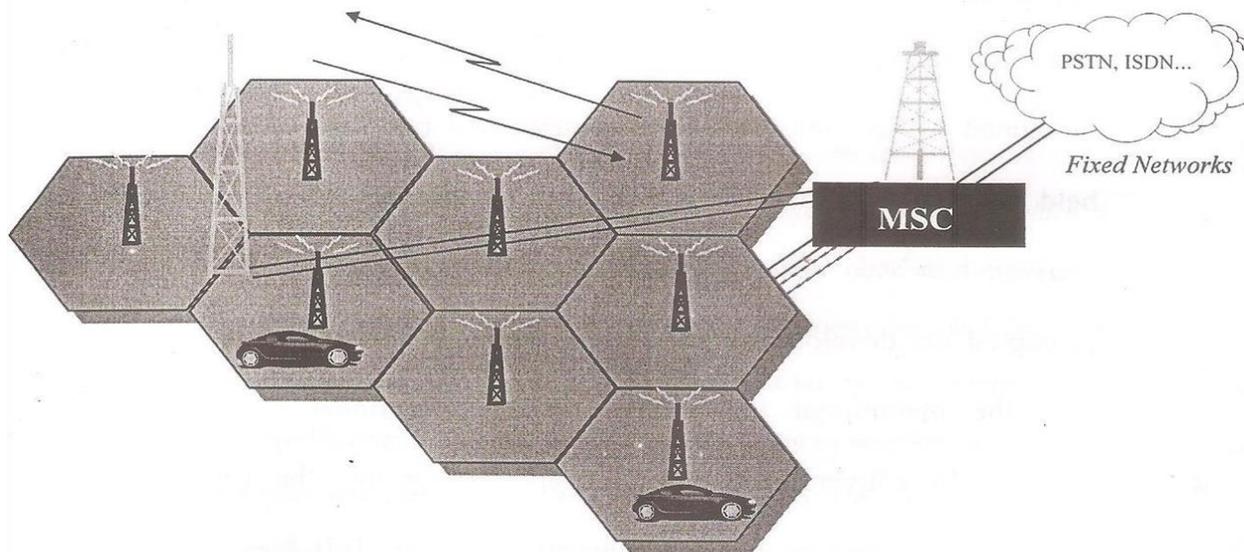
The Geographical area is divided into smaller areas in the share of hexagon. These hexagonal areas are called as cells. A base station (BS) is located at each cell. The mobile terminal (MT) within that region is served by this BS. Before a mobile user can communicate with other mobile user in the network, a group channels should be assigned. The cell size plays a major role in the channel utilization. A user has to cross several cells during the ongoing conversation; the call has to be transferred from one cell to another to achieve the call continuation during boundary crossing [4].

Here comes the role of handoff .Transferring the active call from one cell to another without disturbing the call is called as the process of handoff .

A typical Cellular network is shown in fig (3), a limited frequency is allocated .But it is very successfully utilized because of the frequency reuse concept. To avoid the interference while neighboring cells are utilizing the same frequency, the group of

channels assigned to one cell should be different from the neighboring cells.

If the MS is traveling while the call is in progress, the MS need to get a new channel from the neighboring BS to continue the call without dropping. The MSs located in the cell share the available channels. The multiple Access Methods and channel allocation schemes governs the sharing and allocating the channels in the cell, respectively [4].



The Cellular System

Fig.3.Cellular network system

II. REVIEW WORK

Handover-

Handover initiation is the process of deciding when a request to a handover. Handover is based on received signal strength (RSS) from the current base station and neighboring base station. The fig.4. Shows a mobile station is moving from the BTS (named BTS1) to another BTS (named BTS 2). The RSS of BTS1 decreases as the mobile station moves away and increases as the mobile station get closer to BTS2 as a result of the signal propagation. From the below fig we find various approaches to handover initiation [5].

III. PROPOSED SCHEME

GSM Handover Prioritization Schemes-

Different ideas and approaches are proposed to increase the handover and reduce the probability of dropping. One approach is to reduce the handover failure rate is to prioritize handover call over new calls. Handover prioritization schemes reduce the call dropping probability and call blocking probability. Such schemes permits high utilization of band width while guaranteeing the quality of service of handover calls. Basic methods of handover

prioritization schemes are auxiliary station, guard channels, call admission control (CAC), handover queuing schemes. Sometimes these schemes are combined together to get better result [7].

1. Using Auxiliary Station-

As above it is discussed that, in cellular system, blocking takes place whenever a base station has no free channel to allocate to a mobile user .Here two types of call blocking occurs first one is new call blocking and second one is handoff call blocking .New call blocking refers to new calls, and handoff call blocking which refers to blocking of ongoing call .

In a cell there is a base station ,whenever a call arrives to base station then it connect, but when there is large number of call arrives then some of them would be blocked due to congestion. To reduce these problems auxiliary stations are used, when call arrives and base station is not free then these newly calls are engaged by auxiliary stations and as soon as possible auxiliary station find that base station has free channel then it transfers call to base station and call would be connected.

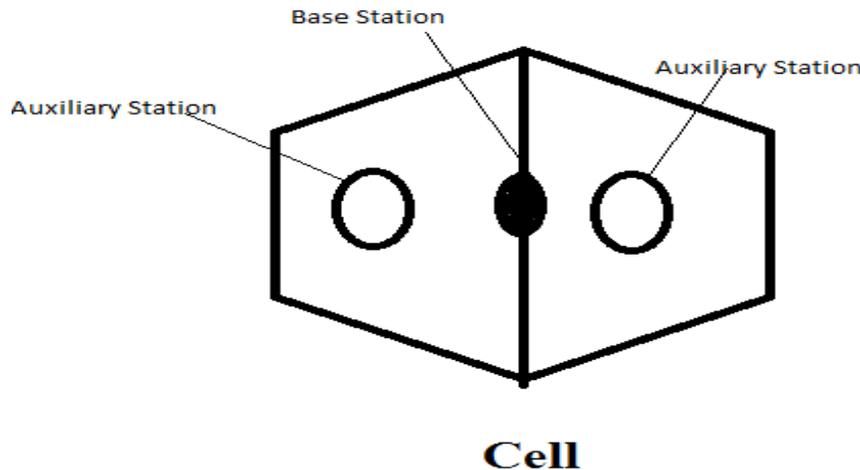


Fig.4.Auxiliary cell and base station

2. Guard Channel Prioritization Schemes-

Guard channel schemes were introduced in the 80's for mobile communication cellular networks. However, the guard channels schemes still used in telecommunications with the name of cutoff priority schemes.

Guard Channel schemes improve the probability of successful handovers by simply reserving a number of channels exclusively for handover in each cell [5].

Remaining channels are shared equally between handover and new calls. Guard channels are established only when the number of free channels is equal to or less than the predefined threshold.

In case if every fresh call is bypassed and only handover requests are served by the cells, all channels are then occupied. Guard channels are feasible because new calls are less sensitive to delay than the handovers.

To overcome the poor utilization of bandwidth, the dynamic guard channel scheme was proposed where the number of guard channels in a radio cell is according to the current estimate of handover arrival rate. The handover arrival rate could be derived from the current number of ongoing calls in neighboring cells and the mobility pattern so, to reduce the handover blocking probabilities close to the targeted objectives while limiting the new call blocking probability to a low level. The main characteristics of dynamic Guard Channel schemes is that it supports any number of classes of traffic each of which can have its own quality of service requirements in terms of channel needed and length of the connection.

The guard channel schemes reduce the probability of dropping handover, it can say that at the same time the reservation of channel for handover restricts fresh calls from being served and increases their blocking probability to a high level [6].

3. Call Admission Control Prioritization Schemes-

The area chosen for this proposed work is mobile communication, it is the fastest way to communicate all over the world, and it is the essential part of daily life. Compared to population growth, mobile users are greatly increasing day-by-day. In such case, by accommodating as many calls as possible in the network and maintaining a reasonably high level of network

utilization will lead to congestion so that traffic will occur. To overcome this problem, an efficient call admission control is proposed which limits the number of call connections in the network in order to reduce congestion [6].

The CAC admission control scheme refers to the task of deciding whether a new call is admitted into the network or not. In this scheme, CAC the arrival of new calls are estimated 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 handoff calls have to access to all channels. If a new call that is generated in a cell cannot find an idle channel, the call is dropped immediately. If there is no queue provided for the new calls to wait [5].

4. Handover Queuing Prioritization Schemes-

Queuing handover call prioritization scheme queues the handover calls, whenever all the channels are in BSC. When a channel is released in the BSC, it is assigned to one of the handover calls in the priority queue. The handover queuing technique reduces the call blocking rate, as new calls are not assigned a channel until all the handover requests in the queue are served. In the handover queuing schemes, when the received signal strength of the BSC in the current cell reaches a certain defined threshold, the call is queued for service in a neighboring cell. Then a new call request is assigned a channel if the queue is empty and if there is at least one free channel in the BSC.

The calls would be queued until either a channel is available in the new cell or the power by the base station in the current cell drops below the receiver threshold signal. If the call reaches the receiver threshold and no free channel is found, then the call is blocked.

Queuing handover is possible due to the overlapping regions between the adjacent cells in which the mobile station can communicate with more than one base station (BS). Thus, queuing handover requests for a 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 .The handover of the mobile station depends on the system such as moving speed, the direction of the mobile station and the cell size. In the FIFO handover Prioritization scheme the probability of the blocking is decreased.

IV. ANALYSIS ON REVIEW WORK

All the handover prioritization schemes allocate channels to handovers more frequently than the new call to guarantee the users QoS because new call is less sensitive to delay than the handover calls. Using auxiliary station call blocking can be reduced as it is clear that from above discussion when auxiliary stations are used then whenever any new call arrive it firstly connect to auxiliary station (if base station is not free at this moment) and when base station became free then auxiliary station connect that call to base station and thus probability of call blocking can be reduced.

Call blocking can be reduced by allocating sufficient guard channels for handoff calls and thus ensure improved QoS to user. The guard channel schemes are established only when the number of channels exclusively for the handover in each cell to improve the performance of cellular network system. The guard channel prioritization schemes are established only when the number of free channels is less or equal to predefined threshold. The value of the threshold directly affects the probability of the call blocking.

resources must be available to support the mobile user else the user will suffer a forced termination of his call in progress. Therefore careful resource allocation along with call admission control is required to mitigate the chances of forced chances or blocking probability of a call.

In handoff prioritization and handoff schemes in cellular network provide improved performance whenever increased In a cellular network, a mobile user may visit from one cell to another cell in his life time. In each of these cells, call blocking probability. The call blocking probability denotes the possibility of new the channel request being denied into the network from the resources. In handover prioritization schemes an important issue is to limit the call blocking probability due to lack of the resources in in the targeted neighbor cell. Call blocking is the fundamental QoS parameter in cellular network. The other important effective parameter in prioritization schemes is effective channel utilization method which makes effective use of cellular network resources. In this paper both the prioritized and non prioritized handover schemes are presented. Different prioritization schemes and there extensive classification are presented as well.

Non prioritized scheme handle the both new call and the handover call equally and does not differentiate between them .In this situation the BSC does not differentiate between the channel request either for fresh call or handover call.

All the handover prioritization schemes allocate channels to handover more frequently than the new call to guarantee the users QoS because new calls are less sensitive to delay than the handover calls. In this literature survey it is shown that the giving priority to the handover in each cell to improve the performance of the cellular network.

V. FUTURE SCOPE:

The guard channel prioritization schemes are established only when the number of free channels is less or equal to predefined threshold. The value of threshold directly affects the probability of the call blocking.

Several other schemes to allocate channel for the handover request in the queue discipline have been proposed .For example queuing of new call arrivals is possible and is less sensitive regarding the queuing time than the case of handover .Queuing of the new call request shows more improvement than queuing of handover calls .In this scheme new call will be accepted if the number of free channels apart of those reserved for handover is enough for the new request otherwise the call will be placed in the queue.As soon as the channel is released by the completing a call or outgoing of the handover request than the new call is served immediately from the FIFO queue. Queuing of the new calls involves the concept of the guard channel and queuing schemes .

The performance analysis of queuing new call provide that the blocking of the handover calls decreases with the queuing probability of the new calls and increased in the total carried traffic because new calls will be ultimately served .

The handover prioritized schemes also achieves less force termination probability compared to other schemes.

Thus it is obvious from the above concept that the future scope of the handoff prioritization schemes are more than the other schemes.

TARGET RESEARCH APPROACH-

- Cellular technology
- Optimization techniques
- Handover management
- Base stations
- cells
- Call blocking probability
- BSC
- MSC
- Handoff
- Signal strength

VI. CONCLUSION

Handover is the process that transfers an ongoing call from one cell to another cell as the user's moves through the coverage area of cellular system. The main goal of the handover procedure is that when cell moves from one cell to another then call blocking does not occurs.

Here in this paper mainly four prioritization techniques are used but handover techniques are the best techniques because in handover prioritization schemes, queuing handover call prioritization schemes 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 .It can say that handover is the process that provides handover call and call blocking can be reduced.

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