A Review on Multihop Wireless System Based On Handoff And Blocking Probability

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Abstract-*Reuse dividing (RP) is a direct methodology that can be used to extend the movement limit in a cell framework. With RP, a cell is separated into a few concentric locales, each related with an alternate group estimate. In this article, a development or activity display is created to dismember the impact of flexible customers on a two-district RP framework utilizing settled channel task. The impact of client speed and cell estimate on the new call blocking likelihood, Pb, and the call dropping likelihood, Pd, is examined. An easier model that can be utilized to assess Pb and Pd now and again is depicted. The impact on framework limit of saving a few channels for handoff calls is likewise considered.*

Keywords*-*Cellular System, Blocking Probability, Fixed Channel Assignment, Handoff, Reuse Partitioning.

I. CELLULAR SYSTEM

The concept of cellular mobile systems developed with the advent of mobile radio systems. The cellular system consists of three main components: Mobile Switching Center (MSC) , Cell Site (Base Station Equipment), and Mobile User Equipment. The three components work together to provide cellular service. The system can be visualized functionally as seen in Figure 1. The MSC coordinates all cellular system activities between mobile users, cell sites and the Public Switched Telephone Network (PSTN). These activities include establishing connections, assigning channels, verification of users and handoff coordination to name a few. The MSC incorporates the features of a regular telephone switching center with added capabilities to handle the activities throughout the system. The MSC software controls the necessary signaling needed to perform the activities which are sent to the cell sites and the mobile users. Cellular systems operate in the frequency region of 825-890 MHz with a difference of 45 MHz between transmitting and receiving frequencies.

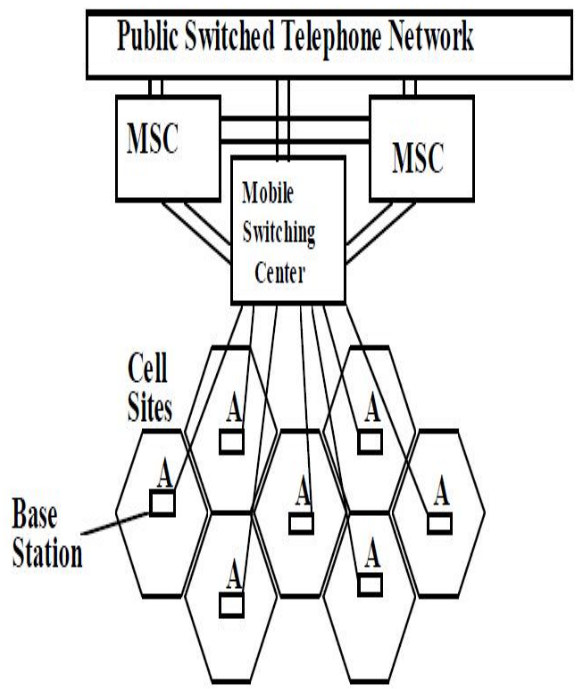

Figure 1: Cellular System Architecture.

In the cellular system, the MSC provides connection to the PSTN via land lines and to the cells sites and other MSC's via land lines or microwave links. The cell site serves as the location for the base station equipment. The bas station equipment consists of antenna (about 30 to 91 m. or 100 to 300 ft. high), transmitters, receivers, combiners and a power supply. The cell site also has a computer processor equipped with software to handle the necessary functions it has to perform. The cell site has 16 about channels, 1 control channel for signaling and 15 voice channels. These channels are usually full duplex allowing two way communications and having two different frequencies ranges, one for transmitting and one for receiving. At the base station, it is possible to have an amplifier for each channel that feeds into a single combiner for a transmitting antenna or a single amplifier for all channels that use a single transmitting antenna. The first scenario is known as a channelized scheme and the latter scenario is known as a frequency division multiplexed scheme as seen in Figure 2. The dashed lines in each scheme are control channels.

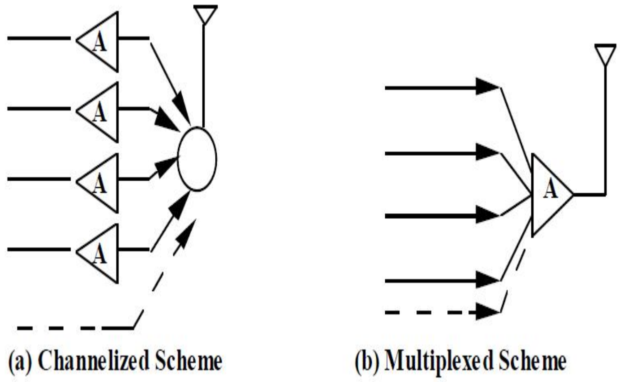

Figure 2: Channel Schemes.

The base station antenna has several set ups, the most common being an omnidirectional combination of antennas, with two antennas for receiving and one for transmitting. Depending on the placement of the antennas, cells are considered center excited, edge excited, or umbrella cells. The center excited cells use the omnidirectional configuration discussed above. Edge excited cells use directional antennas placed in the corner of a cell site, which is best for co-channel interference. The umbrella cells use tilted beam pattern antennas that provide a shadow effect ofthe cell site area. The amplifier(s) in each scheme provide enough gain to each channel frequency. The combiner then serves the function of combining all individual channels and sending them to the transmitting antenna. The receivers atthe base station receive the incoming electromagnetic signals and convert them to perceptible forms.

II. CELL REUSE PARTITIONING

The mobile cellular communication services industry is expected to continue growing rapidly in the next decade. The main limitation to supporting a large number of subscribers is the shortage of available radio frequency spectra. The system capacity, i.e., the number of subscribers per unit area that can be supported at some minimum quality of service level, is an important parameter. One method to increase the capacity of cellular systems is to reduce the cell size. However, this solution results in an increase in the number of base stations (BS), and hence, cost. An alternative method is reuse partitioning (RP) [2], which uses multiple reuse distances. In a conventional mobile cellular system using fixed channel assignment (FCA), a single cluster size is used [3]. The aim is to achieve a minimum target carrier-to-interference ratio (CIR) at any point in the cell. For a system that does not employ power control, the received signal power for a mobile station (MS) close to its BS is higher than that for a more distant MS. As a consequence, the signal from a nearby MS can tolerate a higher interference level and the channel reuse distance may be smaller. In RP, this characteristic is exploited to increase the system capacity. RP is implemented by dividing the cell into two or more concentric regions as shown in Figure 3.

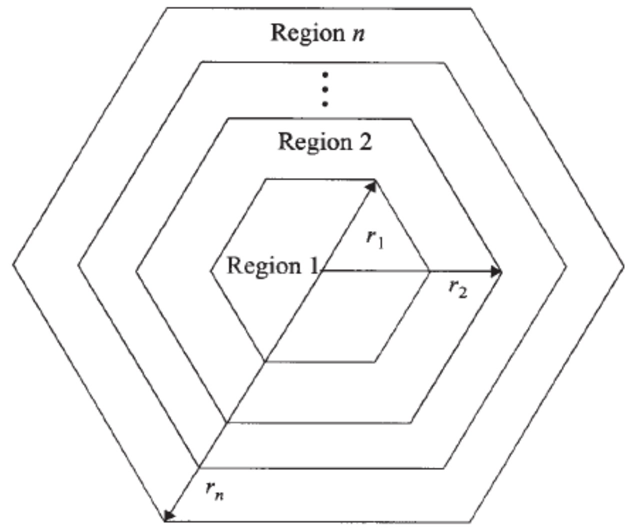

Figure 3: Frequency Reuse Partitioning.

Each region has a different cluster size (and therefore a different reuse distance) and is assigned a set of channels according to the FCA scheme. The capacity can be improved by allowing calls in an inner region to use (i.e., overflow into) channels allocated to higher-numbered regions [4].

The call blocking probability of RP with FCA, hereafter referred to as fixed reuse partitioning (FRP), for stationary users has been examined in [4] and [5] by computer simulation. The results show that RP can increase the capacity compared to conventional FCA with a single reuse distance. Other studies of FRP assuming stationary users include [6] and [8]. In [9], the performance of an overlapping coverage scheme with RP for mobile users is studied. However, because the inner and outer RP regions correspond to the non-overlapping and overlapping regions, respectively, the effect of RP cannot be separated from that of overlapping. In this article, an analytical traffic model is developed to study the impact of mobile users on the new call blocking probability, P_b, and the call dropping probability, P_d, in a two-region FRP system. This model allows P_b and P_d to be evaluated numerically. A simplified model that allows the derivation of approximate closed-form expressions for Pb and P_d in certain cases is also presented. The effect of a cutoff priority scheme for handoff calls on capacity is considered, with the capacity defined as the total offered traffic that can be supported in a cell at a certain value of grade of service (GOS) as given by [10].

$$GOS = (1-\alpha)P_b + \alpha P_d$$

Where α ϵ [0,1] is the GOS parameter and indicates the relative importance of P_b and P_d in a given system. This article is organized as follows. The traffic model for a two-region FRP system is formulated. The channel assignment scheme is described, followed by the performance analysis of the two-region FRP system for both stationary and mobile users.

III. TRAFFIC MODEL

In analytic model, a two-region FRP system with hexagonal cells and omnidirectional antenna base stations is assumed. An example with an inner region cluster size, N_A = 3, and outer region cluster size, N_B = 7, is shown in Figure 4. With a reuse cluster size of N_A, we have [3]

$$d_A / r_B = (3N_A)^{1/2}$$

where d_A is the reuse distance associated with inner region and r_B is the radius of the cell as shown in Figure 4. Because the targets CIR for both inner and outer region calls are the same, we have

$$d_A / r_A = d_B / r_B = (3N_B)^{1/2}$$

where r_A is the radius of the inner region. From above equations, it follows that

$$(r_A / r_B)^{1/2} = N_A / N_B$$

Note that N_B = N, the cluster size for the conventional FCA.

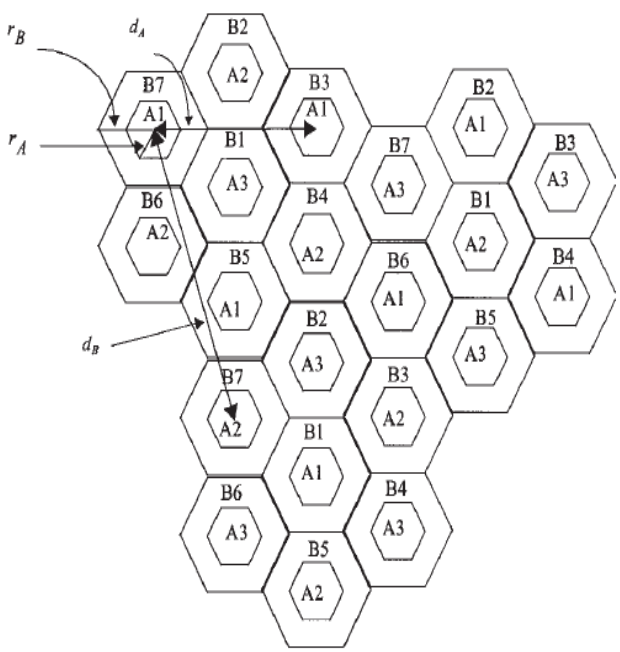

Figure 4: Cellular Grid with Cluster Sizes N_A = 3 and N_B = 7.

IV. HANDOFF

During the call, the mobile user will probably move through-out several cells. As the mobile user travels from cell to cell within the cellular network, the call will be transferred be-tween base stations within the network. This process is known as handoffs. The process is initiated when the signal strength of the mobile users call fall below a certain threshold level, usually around 32 dB.

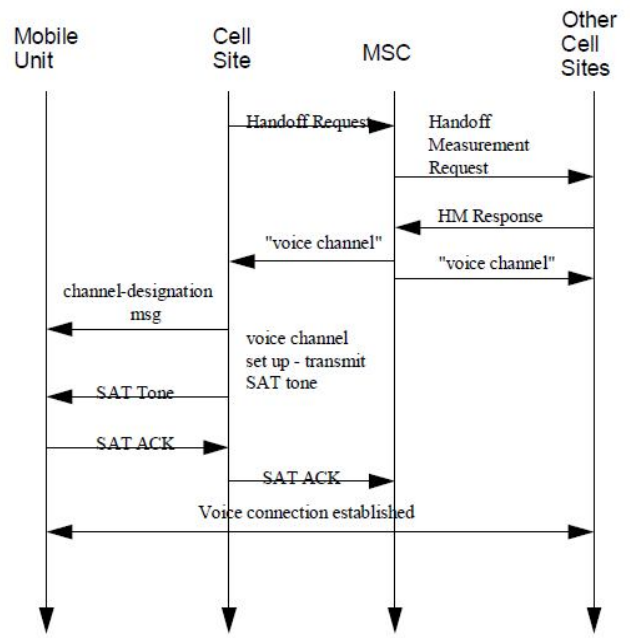

Figure 5: Mobile Call Handoff.

The base station then notifies the MSC that a call handoff will be necessary The MSC then sends out a handoff mea-surement request to the adjacent base stations for a measure-ment of the strength on a specific channel. In return, all the base stations send the signal strength level on the channel. The MSC then goes through a selection process to select the base station with the best signal level. Once the base station is selected, it is notified of the call transfer that is necessary and the channel it will be on. The MSC also forwards the same information to the base station that is currently carrying the call, which forwards the information about the new channel to the mobile unit. Once the mobile is tuned to the new channel the process is completed. This process may happen several times within a call due to the mobile user's movement. Since the handoff process is initiated by a drop in signal strength, base stations generally look for a consistent pattern of decrease in the signal strength around 10 dB per decade. The assumption made by the base station monitoring this pattern is that the mobile unit is moving toward the boundary of the cell. Figure 5 shows the process of a call handoff within the coverage of a single MSC.

Within the network, several things affect a call and its signal strength. The most common of these problems include:

- Propagation Path Loss
- Co-Channel Interference
- Multipath Fading
- Raleigh Fading
- Doppler Shifts

Propagation path loss is the dropping of the signal level due to the terrain and manmade noise (buildings, bridges, etc.). The main drivers of propagation path loss are the distance of the mobile unit from the base station and the frequency of the channel. Co-channel interference involves disturbances occurring from two mobile units operating on the same channel. Another type of channel interference is adjacent channel interference, which occurs when energy from a carrier spills over into another carrier. Solutions to deal with channel interference involve a method of channel schemes either multiplexed or channelized, which was previously discussed. Multipath Fading involves disturbances due to the multiple paths of the signals between the transmitter and the receiver as a result of the terrain and man-made noise. Raleigh Fading are rapid fluctuations in the signal strength that occur in statistical distribution known as Raleigh. Finally, Doppler Shifts are variations in the frequency of the received signal caused by the relative motion of the mobile unit. These problems all bear an effect on the signal strength of the mobile unit.

V. LITERATURE SURVEY

Mounir Hamdi et al in the paper entitled **"Proportional QoS over WDM Networks: Blocking probability"** proposedquality-of-service (QoS) guarantees on wavelength-division- multiplexing (WDM) net- works is an important and challenging issue for the next generation Internet. One of the important performance metrics in a QoS-capable WDM network is the call blocking probability. Recently, a proportional differentiation model has been proposed as an effective method, for scalable differentiated services provision. And this model provides the network operators the ability of quantitatively adjusting the quality differentiation between service classes. In this paper; we introduce this model into WDM networks with the aim of providing proportionally differentiated blocking probability to various traffic classes. An intentional blocking algorithm is proposed to implement this model at the wavelength level. In order to solve the link utilization degradation in this algorithm, we propose another intentional termination algorithm. Since the performance requirement from the network operator might be various, a hybrid algorithm is also given as a balance between the above two. These three algorithms are also suitable to TDM over WDM, where one connection only take part of the transmission capacity of one wavelength. Extensive simulation results demonstrate that our algorithms provide accurate and controllable differentiation on blocking probability between various traffic classes even in a busty traffic situation.

Suvendu Konai et al in the paper entitled **"New Call and Handoff Call Management Scheme for Reuse Partitioning Based Cellular Systems"** proposed blocking occurs when a base station has no free channel to allocate to a mobile user. There are two kinds of blocking. New call blocking refers to blocking of newly originated calls and the handoff dropping refers to blocking of ongoing calls due to the mobility of the users. From the user's point of view, the service of a handoff request is more important, as the forced termination of an ongoing call is more annoying than the blocking of new calls. In this paper, an adaptive guard channel based call admission control scheme is proposed which also deals with the problem of non-uniform traffic demand in different cells of the cellular network. A common set of channels are determined dynamically which can be used simultaneously in all the cells. Cell tiers with different radii are used to cope with the interference introduced by using same set of channels simultaneously in all cells. The adaptive guard channels alleviate the considerable amount of increase in the new call blocking probability due to guard channels while it can still protect handoff calls. The performance of the proposed scheme is presented in terms of call blocking probability, call dropping probability and channel utilization. Simulation results show that the proposed scheme can reduce the call blocking as well as call dropping significantly in highly congested cell.

Shuguftha Naveed et al in the paper entitled **"MPLS Traffic Engineering – Fast Reroute"** proposed desirable features of any network is the ability to keep services running after a link or node failure. This ability is known as network resilience and has become a key demand from service providers. Resilient networks recover from failure by repairing them automatically by diverting traffic from failed part of the network to another portion of the network. The traffic diversion process should be fast enough to ensure that the interruption of service due to a link or node failure is either unnoticeable or as small as possible. At the time of failure, new path is taken by diverted traffic through a procedure called Re-Routing. Alternatively the path can be computed before a failure occurs through a procedure called Fast Reroute. In Traditional IP networks best path calculation is done using Re-Routing mechanisms that happen on-demand when a failure is detected, whereas in the proposed system MPLS Traffic Engineering we use Fast Reroute mechanism to provide backup tunnels that can be pre-programmed into the router. This way the best path calculation happens before the failure actually occurs. Fast Reroute protects paths from link and node failures by locally repairing the protected paths and rerouting them over backup tunnels at the point of failure allowing data to flow continuously. In case of a network fault, the fast switchover of protected traffic onto pre-established backup paths happen in a minimal time to minimize traffic loss.

Mahalungkar Seema et al in the paper entitled **"A survey on call blocking probability reducing techniques"** proposedcellular network or mobile network is a radio network distributed over land areas called cells, each served by at least one fixed-location transceiver, known as a cell site or base station. In a cellular network, each cell uses a different set of frequencies from neighbouring cells, to avoid interference and provide guaranteed bandwidth within each cell .When joined together these cells provide radio coverage over a wide geographic area. This enables a large number of portable transceivers (e.g., mobile phones, pagers, etc.) to communicate with each other and with fixed transceivers and telephones anywhere in the network, via base stations, even if some of the transceivers are moving through more than one cell during transmission. The Previously proposed schemes are reviewed here through which we can build such a scheme in future for cellular network which can easily improve the quality of service.

Mahalungkar Seema et al in the paper entitled **"Improved Call Blocking Probability Reducing Technique Using Auxiliary Stations"** proposed cellular networks, blocking occurs when a base station has no free channel to allocate to a mobile user, blocking can be new call blocking or handoff call blocking. One of the research challenges for cellular systems is the design of improved call admission control scheme which will reduce call blocking probability and improve the quality of service. The Previously proposed schemes are reviewed here through which we can build such a scheme in future for cellular network which can easily improve the quality of service.

Jitendra Joshi et al in the paper entitled **"Multi Protocol Label Switching with Quality of Service in High Speed Computer Network"** proposed the Multi-Protocol Label Switching (MPLS) contributing high scalability in computer network. In this research paper, we first briefly analyze MPLS and then have a discussion about the working methodology of an MPLS system. We also thrash out how to provide Quality of Service (QoS) in a network with MPLS. Putting these simultaneously and then demonstrate the Traffic Engineering in MPLS.

Nishant Kale et al in the paper entitled **"Efficiency investigation of mobile power sources with VSCF technology"** proposed comprehensive performance analysis of MPLS enable network and IP enable network. It states the behaviour of MPLS protocol with OSPF protocol .We have analysis these two on basis of throughput, packet loss, latency in the network with the help of network monitoring tool. We have used five Huawei NE20 Series router for testing network performance with MPLS and traditional IP routing. Results obtain in this testing show how service provider can befit from MPLS services with increasing network throughput and additional benefits obtain from MPLS.

VI. CONCLUSIONS

The effect of portable clients on a two-locale FRP framework was examined. Without any channels held for handoffs, the new and handoff call blocking probabilities can be approximated utilizing an item frame arrangement. With stationary clients, the limit can be expanded by around 30% contrasted with customary FCA. With portable clients, the capacities with regards to both FRP and FCA diminish with normal handoff rates. What's more, the limit change of FRP in respect to FCA is lessened as the normal handoff rates increment. It is discovered that despite the fact that organized handoff can decrease the call dropping likelihood, at times it might likewise debase the limit. The decision of the quantity of channels held for handoffs which expands the limit was additionally analyzed.

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