Cellular mobile system capacity influenced by handoff protection strategies

Sociology, Communication

ABSTRACT:

Today, there is a large number of mobile user groups and In that, the need of service of mobile user group plays a great dispute on the utilization of bandwidth. The radio frequency spectrum is an inadequate resource, to improve service quality and system capacity radio spectrum should be carefully planned. Research is carried out to improve system capacity and service quality. Admission capability is highlighted by the system capacity and the service quality relates to the connection continuity. This proposal reveals the impact of protection, which is used to improve the strength of the capacity of cellular mobile systems. Traffic model is established by using the mobility characteristics of the real world. The relation between admission capability and channel reservation is given by the markov’s approach. The proposed dynamic reservation scheme is proposed to provide handoff coordination between the service quality and system capacity.

INTRODUCTION:

The evolution of cellular mobile systems began with the first generation (1G) cellular systems introduction, and pass on through second generation (2G) and continuing third generation (3G), featuring the development into the fourth generation (4G) systems. This generation systems are divided based upon the coding, modulation, and multiple access techniques which are used.

First public mobile telephone system (MTS) began operation in 25 American cities. In this system contains an efficient transmitter on tall building with in the city and the permanent single channel is assigned to mobile cellular

phone for sending and receiving data through the concept of push-to-talk. Late 1960s, improved MTS(IMTS) implemented and dual channels for sending and receiving the data. In the starting of cellular mobile systems there very few number of users. In New York, 12 calls only simultaneously supported over 1000 square mile area.

In 1968, Bell laboratories demonstrated the concept of cellular system. In the cellular concept contains 2-waycommunication. This type of communication used hexagonal , N-cell frequency reuse pattern by using the intracellular mobile stations (MS), which are controlled by a base station (BS). The factors which improve the capacity of cellular system are handoff, frequency reuse and sectorization . By decreasing the power of BS in the cell, in another BS the particular frequency can be reused which is remotely far away. Handoff between stations intensively increases the flexibility provided to the customer. This in turn improves the capacity and user access area is also expanded.

signal processingtechnologyand very large scale integration (VLSI) were developed in 1980s, which paved the route for the digital era. In this generation digital signal processor are used for the 2G cellular. ASICs are used, which reduced the size of mobile phones and new signal processing features. Second generation systems are of digital nature, which offered elementary data services and improved voice quality compared to that of previous generation. 2G systems were designed for the improvement of communication. In 1G radio signals are analog where as in 2G systems radio signals are digital.

2G systems are mainly developed into the CDMA and TDMA systems based on the type of multiplexing is used. in less popular areas digital signals are not reaching the tower. In digital signal call completely fails to connect when the signal strength is less, where as in analog systems it used to gradually drop.

3G is the generation of mobile phones and telecommunications. In 3G different countries used different types of radio interfaces. Mainly used radio interface is W-CDMA, FDMA is also used in this generation. 3G has various application such as mobile tv, video demand, video conferencing etc. In this generation the users increased enormously, the demand for channels also increased. The main impact on the system capacity and quality of service provided by the service provider. Researches where conducted to increase the system capacity and to decrease the call failing during the handoff.

The main issue of the mobile system is the design. Radio spectrum is limited, which must be shared by several users. Each is cell is allocated with the portion of the total frequency of the spectrum. Users in the particular cell can use the channel allocated to that cell. Different cells can use the same channel separated by the minimum distance between the cells because to reduce the co-channel interference. There are three types of channel allocation techniques, they are fixed channel allocation, dynamic channel allocation, hybrid channel allocation.

1. BACKGROUNDS:

In cellular systems, the number of mobile systems under a base station is random and time varying. The users of mobile systems move between cells,

so there will be variations in the number of users under the particular base station. So there are lots of variations which causes the traffic and handoff of mobile systems. In the third generation mobile communication systems there is lot of research work is carrying. The objective of the research is to offer personalized and integrated services for the mobile users with the service quality than that of fixed users. In the third generation there is lot of demand for the personal communication, there is explosive growth of the user community because its available for affordable price. Increase in the mobile customers and the need of diversity will be a great challenge to utilize the bandwidth. The radio spectrum is limited it should be carefully planned for the usage.

The research work on radio channel allocation mainly focuses on the admission capability and connection continuity. It gives out the compressed channel exploitation , which in turn maximizes the number of channels. If there is any special variation in requirement of the service, full admission capacity can’t be achieved by fixed channel allocation [1]. We are considering the dynamic channel allocation (DCA)[2]due to this service request imbalance. In DCA, channels are allocated according to the service requests distribution and load sharing also improve the user admission capacity.

1. 1 PROBLEM DESCRIPTION:

The initial connection requests to start new calls are considered to improve the user accommodation capability. Accommodation capacity is based upon

the admission capability of new user. Since the user moves around, its needed to establish the connection many number of times with in a single call duration. The user accommodation capacity also depends upon the connection continuity. Impulsive call break takes place when a cellular mobile user transfers from its serving cell into a new one [8], but it is not sure that channel is assigned in the different cell to remain in connection. Protecting the connection continuity is studied extensively. The basic techniques which are used to establish connection continuity for mobile users include guard channel[3], predictive channel reservation and handoff queuing. The other techniques of handoff protection are subrating, channel sharing and channel carrying [4].

Handoff protection strategy acquire pessimistic effect on the new user admission. The intake of new users in to the system are reduced by the priority based handoff protection schemes such as guard channel, handoff queuing, and predictive channel reservation. particular portion of the available channels are confined to only the new users by the Guard channel , so guard channel elimination on the new user admission is apparent. Smaller impact on the new user admission is the advantage of handoff queuing over the guard channel. Assume, both handoff queuing and guard channel techniques contains the equal number of nominal channels, the over lapping cell structure infatuated by handoff queuing, which leads to the higher channel density than guard channel. So the minimum impact of the channel queuing can be attributed to the increase number of nominal channels. To differentiate these techniques, let us observe the case which is similar

channel set is deployed to envelop the same service area with implementation of the two strategies respectively. The cell Overlapping layout demands a huge amount of the reuse factor in order to continue the co-channel interference distance, compared to that of guard channel strategy only fewer nominal channels per cell present in the handoff queuing strategy, since the other technique does not need the cell overlapping structure. Both the number of guard channels and non-guard channels may be equal. Equal level of handoff protection can be achieved by substituting guarded channels for handoff queuing. Due to exchange problems in handoff queuing , new call admission capability and handoff protection cont be realized. though reservation channels are not properly used, new users are blocked by the predictive channel reservation.

New user admission capability consists of some disadvantages because of handoff protection. In order to over come these constrains researches investigated chances for better providing handoff protection. In [5] Oh and Tcha introduced the division of nominal channels to protect and unprotect channel sets in order to minimize the handofffailure. Therefore a predefined grade of service satisfies the expected results for the above proposed division of nominal channels. The functioning of handoff protection and new user admission is affected due to adding or removing the guard channels. If the handoff requests are less then the new users access guard channel because of dynamic channel allocation[7].

2. Current status and development of research:

2. 1 Literature survey:

If an user being engaged in a call connection, then he said to be active. The number of factors influence the active time that include walking or driving, speed, impediment and delay at street intersections, traffic density around, shopping intensions and so on. For this dwelling time negative exponential function is good approximation to the probability distribution through the assumption of various factors. when an active mobile user found to be approaching cell boundary, then the Channel reservation for handoff is conducted. The speed and position of active mobile user are monitored to calculate the remaining time left connection with the particular current cell. If the remaining time falls below threshold is known as channel reservation interval (CRI). After confirming the the intention of transfer of the call to the new cell, target cell receives the request for the channel reservation. if there is any ideal channel in the target cell then it is reserved and it is known as locked which means temporarily it cont be used by any other. If in the target cell does not contain any free channels then the reservation request will be in a queue. After channel is emptied in the target cell, the request queue searches to find any requests which are to be processed. The request leaves the queue by assigning it to the free channel.

A released channel remains to be free until next channel requests for it when an queue is empty. After sending the reservation request the mobile user can end this current call connection. In this situation the target cell receives reservation cancellation request from the user. After receiving a cancellation request the locked channel will be released by the the target cell after processing corresponding reservation request. We assume CRI to be

accurate enough that call completion is the single account for a mobile user not to show up at ending of the CRI. If channel has been reserved to take it over or blocked for mobile user, then the target cell handoff will be successful. Whereas in the previous cases the mobile user continues its call on the new channel until leaving or call completion while in the later on into termination [8], since new call is not prioritized, if a free channel exists then new user will be accepted or else it is blocked and cleared from the system. The following figure describes the working process of reservation admission in the flowchart.

Markov Approach

A markov model is implemented for analysis of the some of active channels and the number of reservation requests which are to be processed. Consider for each cell C number of channels are allocated and buffer size limit for requesting queue is S. The transition rates of the neighbouring channels are obtained as follows. Before channel reduction new calls and handoff calls are entertained, consider the gross arrival rate as the transition rate. When a handoff call reserves one channel for later use, immediately new call takes one channel for the later use. Whenever all channels have been occupied new call is rejected and reservation request is queued upto maximum length of S, which in result get a transition rate equal to the arrival rate of the channel reservation requests only.

Reservation of a channel extends the channel holding time from channel utilization interval(CUI) to channel occupation interval (COI). COI is also

assumed that it is exponentially distributed, the mean value of which is obtained by[8]

The expected value of the inactive period of a reserved channel before the utilization of channel is known as the dormant period, dormant period is stated dependent that longer dormancy can be expected and written as

[8]

The average dormant time on state n is given as

[8]

Let Fx(t) is considered as the cpd (Cumulative probability distribution) of the time interval before the (X + 1)th channel release. The Fx(t) can be written as

Fx(t) [8]

We canapproximate the sojurn of a request in the queue, which has to be exponentially distributed to give out a time independent request. The living rate that has the value equal to 1/Tcri. The state probabilities are given by

2. 2 EVALUVATION:

Traffic model supports assures mobility properties and certain geometry in real-world cell plan.

Where as manhattan model considers a classic city scenario which is regarded as by the association of buildings, big structures with streets.

In the manhattan model the connection distracts, when a mobile user roams

in the streets, a street corner and suffers a sharp signal strength path loss. Handoff protection with prudent channel usage decreases the user accommodation capacity.

In the markov approach, accommodation capacity is evaluvated by using the single over the entire system.

2. 3 OUTLOOK:

In this paper, we have discussed the impact of on capacity of the cellular mobile systems by the channel reservation. A user should receive un disrupted service through out the life time after admission which is known as capacity. By using the handoff protection, capability of new user admission increases to that of connection continuity. user accommodation capacity is weakened by handoff protection. Which indicates system capacity and service quality are conflicting objectives. So tradeoff is cont be eliminated. Our further research to be carried out on channel reservation with out degrading the system capacity

REFERENCES:

[1] S. Jordan and A. Khan, “ A Performance bound on dynamic channel allocation in cellular systems: equal load”.

[2] D. Everitt and N. MacFayden, “ analysis of multicellular mobile radio telephone systems with loss.”

[3] K. Yeung and T. S. Yum, “ Compact pattern based dynamic channel assignment for cellular mobile systems.”

[4] “ channel carrying: A novel handoff scheme for mobile cellular networks.”

[5] S. H. Oh and D. W. Tcha, “ prioritized channel assignment in a cellular radio network.”

[6] F. A. Cruz-Perez, D. Lara-Rodriguez and M. Lara “ fractional channel reservation in mobile communication systems.”

[7] Y. C. Kim, D. E. Lee, B. J. Lee, Y. S. Kim, and B. Mukherjee, “ Dynamic channel reservation based on mobility in wireless ATM networks.”

[8] Yi Xu, Quan Long Ding, Chi Chung Ko, “ impact of handoff protection strategies on cellular mobile system capacity.”