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Call Admission Control for Wireless Cellular Network – A Review

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ABSTRACT:

The increasing demand for multimedia services combined with the resource constraints of the wireless networks indicate the need of efficient admission control schemes to achieve a complete resource management combined with adequate quality of service(QoS) levels for end users. QoS provision in wireless networks is closely related to the exploitation of available network resources and the maximization of the number of users. Call Admission Control(CAC) is one of the key issues in wireless mobile communications, concentrating great interest in research work about QoS. CAC algorithms are employed to ensure that the admission of a new call into a resource limited network does not violate the Service Level Agreements concerning ongoing calls.

INTRODUCTION

Today a number of mobile subscribers are grabbling with the issue of frequent call disconnections or 'call drop'. Dropped call is the common term used for describing any unexpected termination of a wireless mobile call. Consequently there has been increase in the consumer complaints regarding frequent call drops. While the subscriber base in the country is growing very fast the mobile telecom infrastructure is not growing at the same pace and immense pressure is being put on to the existing facilities, leading to a dip in the quality of services provided.

Wireless Cellular network is designed to provide voice or message communication between two mobile stations or one mobile station and one fixed station. A geographical area which is controlled by a base station is known as cell. Each cell has its own antenna to transmit and receive signals. A base station is a part of a large region which is controlled by a mobile switching center. The mobile switching center is responsible for providing communication between base station and mobile station.

PROBLEM STATEMENT

To design an efficient admission control schemes to achieve a competent resource management combined with adequate quality of service levels to end users.

LITERATURE SURVEY

[1]-To guarantee better Quality Of Service, dynamic grouping bandwidth reservation scheme is proposed. It is based on the probalistic resource estimation. Several reservation time sections according to the mobility information of mobile hosts of each base station are formed. The amount of reserved bandwidth for each base station is dynamically adjusted for each reservation group, so that call blocking and call dropping rate is reduced while increasing the bandwidth utilization.

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[2]-Coordinated multipoint transmission(CoMP) with Joint Transmission(JT) is used in cellular networks to improve data rate and cell edge throughput and to increase the system throughput. In CoMP-JT, since the user equipment is capable of receiving the desired signal from an adjacent cell as well as from its serving cell, it can achieve an improved signal to interference ratio. However this scheme entails exhaustion of resources in serving base stations.A call admission control scheme is proposed to improve the performance of CoMP-JT based cellular systems. In this CAC scheme, the CoMP-JT technique is applied to user equipments located near the edge of a cell. To establish an analytical model for CoMP-JT based cellular systems, a model for traffic analysis using a 2-D Markov chain and approximate the computation of the power sum of multiple lognormal random components in a multi cell environment. In the analysis, the call blocking probabilities for users, such as non-JT service and JT service users, and the resource utilization are obtained. These are used for some design criteria, such as the size of the edge zone, to maximize, to maximize the system throughput.

[3]-The current static model used for allocating the spectrum of frequencies and the increasing demand for network resources imposed by modern applications and services may lead to a resources imposed by modern applications and services may lead to a resources scarcity problem. Dealing with this problem demands optimized resource allocation. An alternative to provide optimization is by allowing resource sharing among network operators. Here an architecture is presented to encourage network operators to share their underutilized resources. A multilevel broker is proposed to control the resource sharing. This broker dynamically establishes a service level agreement that takes into account the quality of service requirements of resources renters and the cost of the resources. A performance evaluation shows that the implementation of the proposed architectures leads to better allocation of underutilized network resources.

[4]-Several schemes have been proposed for handover in wireless cellular networks. However during the complexity of handover in wireless environment, many simplified models and assumptions are made. Also the handover algorithms operating in real time have to make decisions without the luxury of repeated uncorrected measurements or the future signal strength information. It should be noted that some of handover criteria information can be inherently imprecise or the precise information is difficult to obtain.So a fuzzy logic based approach for handover for wireless cellular network considering the security parameter is proposed.

[5]-Recent trends in mobile cellular networks turn towards deployment of Small Cell Networks (SCNs), where the cell size gets smaller and thus the number of subscribers re served in a cell will be relatively smaller and should be considered finite. However almost works on cellular mobile networks consider an infinite population cell, resulting commonly in infinite queueing models, for which no analytical solution is available for performance measures and only numerical approximations can be obtained. In this paper a call admission control in a finite population micro-cell operating in a SCN with retrials of blocked new calls impatience of subscribers and multiple guard channels dedicated to handoff calls is proposed. For the numerical computation of the steady state probabilities of the corresponding continuous time Markov chain an efficient algorithm giving automatically the infinitesimal generator is developed and various performance measures are estabilished in network parameters and stationary probabilities. The guard

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channels number and retrials effect on the network performance in terms of blocking probability and dropping probability is also carried out via experimental results.

[6]-The proposed model in this paper is based on Markov chain approach and describes the behaviour of the most prominent handover algoritms used in vehicular pico-cellular RoF networks. This paper extends this model with the notion of Call Admission Control policies, in order to increase its efficiency in corresponding multiusers scenarios. Finally the paper evaluates the performance of the dominant handover algorithms and verifies the increased performance by applying a proposed policy set.

[7]- Call admission control is one of the resource management functions which regulates network access to ensure QOS provisioning. However the decision for CAC is very challenging issue due to user mobility, limited radio spectrum and multimedia traffic characteristics. In this paper a fuzzy call admission control system is proposed considering security and priority parameters.

[8]-Call admission control schemes based on guard channel are widely used to protect handoff calls for seamless wireless services. In this paper a guard channel based CAC scheme where new call arrive in batches is proposed. A fixed number of guard channels are reserved for handoff calls. The main objective is to alleviate the new call blocking probability due to guard channels while it can still protect handoff calls.

[9]-Efficient handoff is an important issue in wireless cellular networks in order to provide Quality Of Service to the users and to support users mobility. A related important issue in the cellular networks is the call admission control{CAC). The design of the call admission control schemes is especially challenging given the limited resources and the mobility of users encountered in such networks. The goal of this paper is to do performance evaluation of some of the important schemes. The CAC schemes include Non-Prioritized Scheme(NPS), Guard Channel Scheme(GCS), Fractional Guard Channel Scheme(FGCS), Guard Channel Scheme with buffer(GCSB), Two level Fractional Guard Channel Scheme(TLFGCS), Dynamic Guard Channel Scheme(DGCS) and Adaptive Guard Channel Scheme(AGCS).

The NPS does not differentiate handoff and new request calls. When a new or handoff call arrives, the system will check if there is an available channel for it. If one is not available, the call will be blocked, else a channel will be assigned for a call. After the call has ended the channel will be released.

The GCS reserves some fixed number of channels called guard channels, for handoffs which give priority to the handoffs over new calls. When a new call arrives the system assigns a normal channel to the arrived new call, it it is available. Otherwise the new call is blocked. When a handoff arrives, the system assigns normal channel to handoff , if it is available. If normal channel is unavailable, the system assigns a free guard channel to it. If the guard channel is not available then the hand off is blocked.

In the FGCS, there are number off guard channels that give priority to handoff calls over new call. In addition the normal channels are given to the new calls with a certain probability associated with each channel occupancy.

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In the GCSB, some fixed number of guard channels reserved for handoffs over new calls. In addition there is a queue that holds upto some fixed handoffs instead of dropping them when all channels are occupied.

In TLFGCS provides efficient priority access for handoff calls over new calls in cellular system. There are two levels in this scheme, each has a different scheme itself.

In the DGCS, the wireless channels are dynamically reserved by using the request probability determined by the mobility characteristics and channel occupancy to guarantee acceptable quality of handoffs and to keep the new call blocking probability as low as possible.

OBJECTIVE OF THE PROPOSED RESEARCH

- To reduce the Call Drop rate in cellular networks - hence to improve the Quality of Service(QOS).
- To maintaine the call dropping probability at a predefined level independent of the traffic condition.
- To consider the issue of handoff and CAC, which takes care of both issues simultaneously.
- Handover have a key role in maintaining the Quality of Service. If an ongoing call is terminated, it will have more negative impact than a new initiated call being blocked.
- Other aim is to provide a framework in which all inputs are differentiated according to their classes in which they fall, to satisfy most of the QoS issues involved.
- To provide fair amount of attention to all type of calls weather low priority or high priority is also tried to be achieved.

METHODOLOGY OF THE PROPOSED RESEARCH

In this approach CAC and Handoff issues are resolved by awarding calls with some Priority Number by which each call will be recognized.

Another issue of collision in CAC and handoff will be resolved by priority and authority to access the channel.

Performance of this framework for CAC and Handoff is evaluated by calculating Call Dropping probability and Call Completion probability.

EXPECTED OUTCOME OF THE PROPOSED RESEARCH

- Will reduce the call drop rate.
- Importance given to handover so that to improve quality of service.

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- Will enhance the resource utilization
- Will resolve the CAC and handoff issues.
- Will improve the quality of service of telecommunication industries.

SUMMARY

Call Dropping is the major problem in cellular system. Study on call drop problem introduces the causes which are responsible for call drop or call disconnection. The issue of handoff and CAC will be taken care simultaneously. In this research , a scheme for reducing call drop will be proposed so that the quality of service of telecommunication industries will be improved.

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