Expressing The QoS by Call Admission Control Technique for Next Generation MANET

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ABSTRACT—Rapidly increasing access of multimedia in the worldwide telecommunication networks needs to improve service quality for mobile networks and personal communications systems. It is now important to study and understand the different CAC policies to solve current issues for providing the improved Quality of Services. For reduction in the network congestion as well as in call dropping, CAC offer fantastic strategies by limiting the number of call connections into the networks. In this paper it is try to put a technique to enhance the QoS in customer's point of view. As they always demanding for more and more as well as time to time access for the network with as fastest as without interruption of services i.e. without any blocking and dropping of call request. It is possible to maintain the Radio Resource Management (RRM) by using Call Admission Control Technique.This paper trying to introduce a protocol that gives the priority to the handoff calls and also allowing the new call in the cell if channel status is greater than pre-defined protocol. To improve the QoS for Mobile Adhoc network (MANET) that would minimize the probability of new call blocking as well as minimize the probability of handoff call dropping during peak hours which is simulated and tested using MATLAB

Index Terms— Call admission control, QoS for Internet Service Provision, radio resource management, radio resource management, Handoff, call degradation.

1 INTRODUCTION

Next Generation systems and technologies are being actively researched worldwide. The speedy, advance of component technology; the pressure to integrate fixed and mobile networks [1]. The basic idea upon which work is being carried out, that necessitate the requirement of the mobile users will have to be evolved and should balance with those services and applications that will be available over conventional fixed or wired networks. The users will wish to avail him of the full range of broadband multimedia services provided by the global information highway, whether wired or wirelessly connected [2]. A latest generation of telecommunication technology has appeared about every five or ten years. The

authorities of these telecommunication networks face big challenges due to the severe quality of service (QoS) requirements. These challenges are further exasperated due to the typical mobile and wireless issues such as limited availability of resources, user mobility, fading, shadowing, noise etc.

In order to cope with these challenges, the next generation of wireless technologies will have to incorporate radio resource management (RRM) mechanisms that efficiently utilize the available resources. RRM plays a serious role in the provisioning of QoS in wireless systems. The performance of these techniques, in turn, reflects overall network performance. In old or i.e. present technology arriving new/handoff calls are either entertained or denied access to the network by the CAC technique based on call handoff dropping probability or cell overload probability. A CAC technique take over the amount of traffic entering the network and it is done by either managing the number of call connections into the network or reducing the overall network load thus enabling the network to provide the expected QoS to new/handoff call connections [3].

2 CAC TECHNIQUE

Following are the categories given for admission control as---

– Interference Based Admission

– Throughput Based Admission

– QoS Class Priority Based Admission

– Adaptive QoS-Based Admission

– Capacity Based Admission

In this paper presenting the traffic management techniques on the QoS priority based admission

As Admission Control plays such a basic role in optimizing capacity, while providing QoS [4] and maintaining network stability, the first step in establishing a Common RRM strategy for Heterogeneous Networks to develop a Common Admission Control. There is a technique that manages traffic as given below

In this Technique, the admission of new calls is limited to the wireless networks. The Technique works as follows:

If the number of new calls in a cell exceeds a threshold when a new call arrives, the new call will be blocked; otherwise, it will be admitted. The handoff call is rejected only when all channels in the cell are used up. The idea behind this Technique is that it is better to continue ongoing calls rather than to accept new customers in the future because customers are more sensitive to call dropping than to call blocking.

Let, λ =The arrival rate of new calls.

μ =the arrival rate of handoff calls.

1/μ= average channel holding time for new calls.

1/μh -- average channel holding time for handoff calls.

C = the total number of channels in the cell. It is assumed that the arrival process for new calls and arrival process for handoff calls are all Poisson and the channel holding times for new calls and handoff calls are exponentially distributed Here, the analytical results for the new call blocking probability Pnb are estimated [5,6]. In this section, developing the Markov model for a simplified version of proposed protocol. The proposed protocol is extremely complex and is not suitable for a any closed form solution using Markov chain. That is a call in state S is assigned a bandwidth. This assumption simply states that if the network is in state S > 0, no call can be admitted (even with its minimum bandwidth without borrowing) [5, 7, 8].

Let, Traffic Intensity for new calls ρ = λ /μ and Traffic Intensity for Handoff calls ρh = λh /μh

M = Cutoff threshold (Determined on the basis of on-going calls)

If the assumed channels are busy is less than m, the new call is accepted. The two-dimensional Markov chain is used to model the system. The following approximate model is used:

The new call arrival stream is Poisson with arrival rate ρ and with service rate (corresponding channel holding time for new calls) 1. The handoff call arrival stream is also Poisson with arrival rate ρh and service rate 1 ([12, 8, 13]). Let Pja denote the probability that there are j busy channels in steady state (j = 0, 1, 2 …C) for the approximate model. Then, the following stationary distribution for the approximate model is obtained:

$$P_j^a = \begin{cases} \dfrac{(\rho+\rho_h)^j}{j!} P_o & j \le m \\ \dfrac{(\rho+\rho_h)^m \rho_h^{\,j-m}}{j!} P_0 & m+1 \le j \le C \end{cases} \quad (1)$$

Where

$$P_0^a = \left[\sum_{j=0}^{m} \frac{(\rho+\rho_h)^j}{j!} + \sum_{j=m+1}^{C} \frac{(\rho+\rho_h)^m \rho_h^{\,j-m}}{j!} \right] \quad (2)$$

From this stationary distribution, the blocking probabilities are obtained for new calls and handoff calls as follows:

$$p_{nb}^a = \frac{\sum_{.j=m}^{c} \frac{(\rho+\rho_h)^m \rho_h^{\,j-m}}{j!}}{\sum_{j=0}^{m} \frac{(\rho+\rho_h)^j}{j!} + \sum_{j=m+1}^{C} \frac{(\rho+\rho_h)^m \rho_h^{\,j-m}}{j!}} \quad (3)$$

$$p_{hb}^a = \frac{\frac{(\rho+\rho_h)^m \rho_h^{\,C-m}}{C!}}{\sum_{j=0}^{m} \frac{(\rho+\rho_h)^j}{j!} + \sum_{j=m+1}^{C} \frac{(\rho+\rho_h)^m \rho_h^{\,j-m}}{j!}}$$

These equations are used to approximate the call blocking probabilities for the cut-off priority Technique. By using above equations, the call blocking probabilities is approximated for cut-off priority Technique.

3 SIMULATION MODEL

The simulation model and assumptions, which initially, the call request is generated in the cell, according to its distribution a lifetime of this call is selected and numbers of ongoing calls are checked. If numbers of ongoing calls are less than assumed threshold m, the new call will be accepted otherwise the new call will be blocked. Once the call permitted, system parameter is updated. If in case handoff is required, the signal strength is checked with handoff higher threshold. If received signal strength (RSS) is less than handoff threshold and at the same time if channels are available in targeted cell handoff request is accepted otherwise it is blocked. Thus new call blocking probability and handoff blocking probability is estimated.

3.1 For New Call Blocking Probability

The result is obtained for reduced new call blocking probability as the traffic is increasing with time. For example, for new call traffic load =30 Erlangs, Probability of New call Blocking is near equal to 0.71.

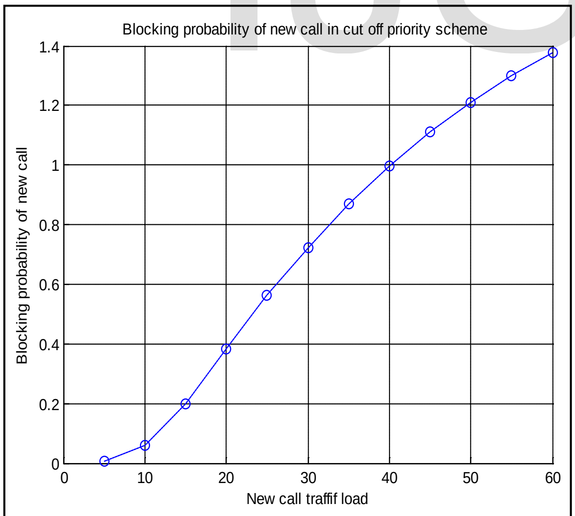

Fig. 3.1. New call blocking Probability versus New Call Traffic load

3.2 For New Call Blocking Probability

The result is obtained for reduced handoff call dropping probability as the traffic is increasing with time. For example, for handoff call traffic load =30 Erlangs, Probability of Handoff call Dropping is near equal to 0.

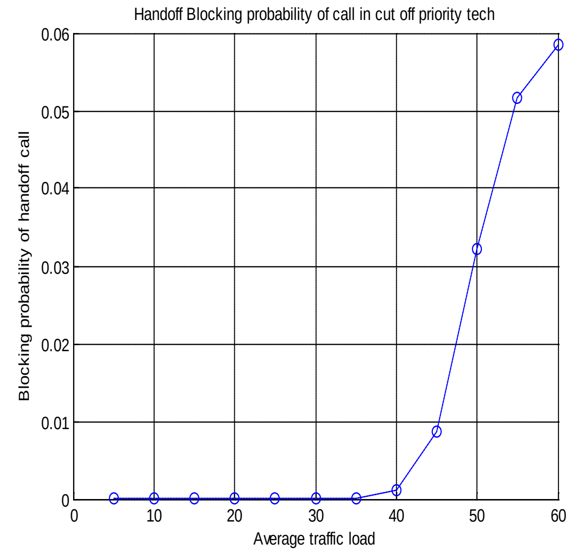

Fig. 3.2. Handoff call dropping Probability versus Traffic

3.3 Comparison

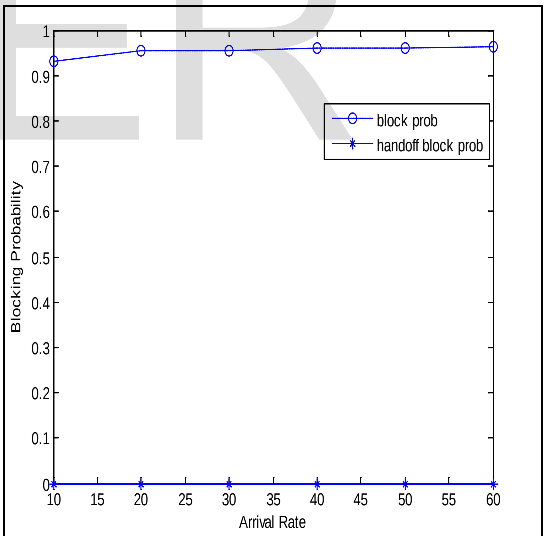

Fig. 3.3. Showing the comparison between new call blocking probability and handoff call dropping during Traffic load

The figure 3 is a combination of two programs of figure 1 and figure 2 which shows that handoff call dropping is minimum as compared to the new call blocking probability. For example, for traffic rate 30 Erlangs, the New call Blocking probability is nearly equal to 0.92 whereas the Handoff call Dropping probability is zero which show our algorithm is successfully executed by obeying our designed criteria.

4 CONCLUSION

Initially, the call request is generated in the cell, if the total number of ongoing calls is less than the threshold. Once the new call is accepted in the system, distance and velocity of call are updated. Locations and signal strength of call are monitored for every second. If the signal strength of new call is less than handoff threshold and guard channels are available in the target cell, handoff call is transferred from a source cell to target cell, otherwise, handoff call is blocked.

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