

Call Admission Control Mechanism for optimal QoS in Next Generation Wireless Networks

Ramesh Babu H.S.¹, Gowrishankar², Satyanarayana P.S.³

Department of Information Science and Engineering, Acharya Institute of Technology¹

Department of Computer Science and Engineering, B.M.S. College of Engineering,²

Department of Electronics and Communication Engineering, B.M.S. College of Engineering,³

Bangalore, INDIA

rameshbabu@acharya.ac.in¹, gowrishankar.cse@bmsce.ac.in², pssvitala.ece@bmsce.ac.in³

Abstract— The Next generation wireless network (NGWN) will be heterogeneous in nature where different radio access technologies (RATs) operate together. The mobile terminals operating in this heterogeneous environment will have different quality of service requirements to be handled by the system. The radio resource management is one of the key challenge in NGWN. Call admission control is one of the radio resource management technique plays instrumental role in ensure the desired Quality of Service (QoS) to the users working on different applications which have diversified nature of QoS requirements from the wireless networks. The call blocking probability is one such QoS parameter for the wireless network. For better QoS it is desirable to reduce the call blocking probability. In this customary scenario it is highly desirable to obtain analytic Performance model. In this paper we propose a higher order Markov chain based performance model for call admission control in a heterogeneous wireless network environment. In the proposed algorithm we have considered three classes of traffic having different QoS requirements and we have considered the heterogeneous network environment which includes that can effectively handle applications like voice calls, Web browsing and file transfer applications which are with varied QoS parameters. The paper presents the call blocking probabilities for all the three types of traffic both for fixed and varied traffic scenario.

Keywords: call admission control, Call blocking probability, QoS, Heterogeneous Networks.

1. INTRODUCTION

This The recent advances in the wireless networks and mobile devices are inclined towards emerging of ubiquitous computing where the user and application running in the mobile terminal (MT) can enjoy seamless roaming. It is well known that the basic problem in the wireless networks is the scarce of the radio resources. The efficient radio resource management is very essential. The admission control is one of the radio resource management technique this plays dominant role in effectively managing the resources. The admission control in the wireless networks will reduce the call blocking probability in the wireless networks by optimizing the utilization of the available radio resources. The mobile communication environment is featured by moving terminals with different QoS requirements in this current scenario the

need of guaranteed QoS. The future users of mobile communication look for always best connected (ABC) anywhere and anytime in the Complementary access technologies like Wireless Local Area Networks (WLAN), Worldwide Inter operability for Microwave Access (Wi-Max) and Universal Mobile Telecommunication Systems (UMTS) and which may coexist with the satellite networks [1- 3].

The mobile communication networks are evolving into adaptable Internet protocol based networks that can handle multimedia applications. When the multimedia data is supported by wireless networks, the networks should meet the quality of service requirements. One of the key challenges to be addressed in this prevailing scenario is the distribution of the available channel capacity among the multiple traffic that are operating with different bandwidth requirements ensuring the QoS requirements of the traffic.

The existing admission control strategies can handle the resource management in homogeneous wireless networks but are unable to handle the issue in heterogeneous wireless environment. The mobility of the terminals in the mobile communication environment makes the resource allocation a challenging task when the resources are always in scarce. The efficient call admission control policies should be in place which can take care of this contradicting environment to optimize the resource utilization.

The design of call admission control algorithm must take into consideration packet level QoS parameters like minimum delay, jitter as well as session level QoS parameters like call blocking probability (CBP) and call dropping probability (CDP). The CBP is the probability of denial of accepting the new call and CDP the likelihood of dropping the call by a new access network due to decline of the network resources to an unacceptable level in other words the networks is exhausted with the available resources at which it drops the handover calls. In mobile networks the admission control traffic management mechanism is needed to keep the call blocking probability at a minimal level and another RRM strategy vertical handovers plays crucial role in reducing the and call dropping probability in an heterogeneous wireless networks.

The further sections of the paper are organized as follows. The section II discusses on the motivation and related work. Section III focuses on the proposed system model for the call admission control based on multi dimensional Markov chains.