적응제어 기법을 사용하는 셀룰러 네트워크에서의 호수락제어 연구

노성기, 예병호
전자통신연구원
sknoh@etri.re.kr, bhyae@etri.re.kr

Abstract— **Adaptive modulation control (AMC) has been proposed as the next generation modulation method for increasing network performance in cellular networks. Adaptive modulation is a powerful technique to improve the spectral efficiency in wireless transmission over fading channels. Similarly, it is possible to apply the adaptive modulation technique to Call Admission Control (CAC) scheme in order to enhance network performance and satisfy Quality of Service (QoS) requirements. In this paper, we investigate a novel call admission control (CAC) mechanism in the cellular networks using AMC. First, we build the system model in which takes into account to both CAC and AMC. Second, we verify that the CAC model can offer better performance by using adaptive modulation technique. Finally we prove our claim by numerical analysis.**

I. INTRODUCTION

4G wireless mobile networks do not just define a standard, they are expected to support a convergent environment in which radio access methods will be able to interoperate to provide communications sessions. Furthermore, they must support interactive multimedia services such as teleconferencing and wireless internet as well as audio and video services. For this services, providing QoS guarantees with various communication environment such as fairness, effective cell capacity and adaptive modulation control has been known as one of the most challenging issues.

The modulation method in communication systems have been introduced to meet finite frequency spectrum and efficient power control. The modem composed by the modulation method has power margin to satisfy time-based variable channel requests. The technique to transmit data efficiently using this power margin is called adaptive modulation, which is to enhance QoS and system throughput by changing the modulation method adaptively according to the instantaneous propagation conditions, interference scenarios, and traffic or data rate requirements. That is, adaptive modulation techniques do not require additional resources such as power and bandwidth according to variable traffic environment. Many previous adaptive modulation schemes have been suggested to maximize the data rate and match transmission parameters to time-varying channel conditions related to variable-power and variable-rate [1]-[2].

A CAC scheme deals with the problem of whether or not a call is accepted into the network while taking QoS constraints into account in a given cell capacity. Thus, the objective of CAC scheme is to minimize handoff-call-dropping probability (CDP) and new-call-blocking probability (CBP), and to maximize the utilization of the assigned cell capacity at the same time. Generally, reserved guard channel schemes in which a certain number of channels from overall cell capacity have to be reserved solely for the use of handoff and new calls for different services have proposed to minimize CDP and CBP [3].

This paper evaluates the performance of new CAC algorithm using the advantages of practical AMC environments. Without AMC schemes, the system allocates new different frequency channel to user when the quality of the communications channel degrades. If the new channel belongs to the same base station, this is referred to as an intracell handoff. If we use AMC techniques, the system can reuse the same frequency channel under worse channel degradation. This leads to decreasing intracell handoff as well as increasing the utilization of system resources. In this paper, we analyze the joint effects of CAC and AMC techniques considering the user distance and signal strength.

The rest of this paper is organized as follows. We introduce the traffic model and user mobility characteristics in Section 2. We present an analytical procedure to solve the two-state markov chain in Section 3, and suggest the CAC algorithm and adaptive channel reservations policy in Section 4. Numerical results are discussed in Section5, and finally draw concluding remarks in Section 5.

II. SYSTEM MODEL

A. Channel Allocation Scheme

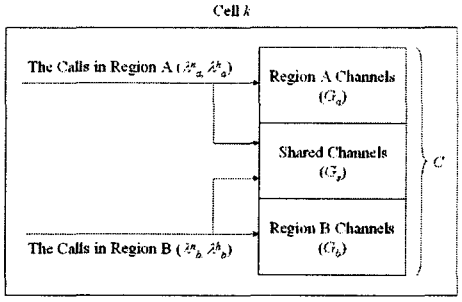

Fig. 1. System Model for a cell k.

The base station architecture is illustrated in Figure. 1. We