

# A TWO-THRESHOLD GUARD CHANNEL SCHEME FOR MINIMIZING BLOCKING PROBABILITY IN COMMUNICATION NETWORKS

H. Beigy and M. R. Meybodi

Department of Computer Engineering, Amirkabir University of Technology, Tehran, Iran  
beigy@ce.aut.ac.ir, meybodi@ce.aut.ac.ir

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**Abstract:** In this paper, we consider the call admission problem in cellular network with two classes of voice users. In the first part of paper, we introduce a two-threshold guard channel policy and study its limiting behavior under the stationary traffic. Then we give an algorithm for finding the optimal number of guard channels. In the second part of this paper, we give an algorithm, which minimizes the number of channels subject to hard constraints on the blocking and dropping probabilities of calls. Finally, we propose an optimal prioritized channel assignment for multi-cells cellular networks with two classes of voice users.

**Key Words:** Call Admission Control, Guard Channels, Two-Threshold Guard Channels, Wireless Networks

چکیده: در این مقاله مسئله کنترل پذیرش درخواست ها در شبکه های سیار سلولی با دو دسته کاربران صوتی بررسی می گردد. در بخش اول این مقاله، سیاست کانال اختیاط در آستانه ای ارائه و رفتار آن برای ترافیک های ایستا بررسی می گردد. سپس الگوریتمی برای پیدا کردن مقادیر بهینه در آستانه ارائه می گردد. در بخش دوم این مقاله، الگوریتمی ارائه می گردد که تعداد کانال های مورد استفاده در یک سلول را با توجه به محدودیت احتمال رد و قطع درخواست ها کمینه می نماید. در انتها یک الگوریتم انتساب کانال اولویت دار برای شبکه های سلولی دو دسته کاربران صوتی ارائه می گردد.

## 1. INTRODUCTION

In cellular networks, geographical area covered by mobile network is divided into smaller regions called cells. Each cell has a base station (BS), which is located at its center. A number of base stations are connected to a mobile switching center (MSC), which acts as a gateway of the mobile network to the existing wired-line networks. In order for a mobile user to be able to communicate with other user(s), a connection usually must be established between the users. When a mobile user needs a connection, sends his request to the base station of the cell residing it. Then, the base station determines whether it can meet the requested quality of service (QoS) requirements and, if possible, allocates a channel to the incoming call and establishes a connection. When a call gets a channel, it will

keep the channel until its completion, or until the mobile user moves out of the cell, in which case the used channel will be released. When the mobile user moves into a new cell while its call is ongoing, a new channel needs to be acquired in the new cell for further communication. This process is called handoff and must be transparent to the mobile user. During the handoff, if no channel is available in the new cell for the ongoing call, it is forced to terminate (dropped) before its completion. The disconnection in the middle of a call is highly undesirable and one of the goals of the network designer is to keep such disconnections low.

Introduction of micro cellular networks leads to efficient use of channels but increases expected rate of handovers per call. As a consequence, some network performance parameters such as blocking

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TRANSACTIONS B: APPLICATIONS

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