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A conservative approach to adaptive call admission control for QoS provisioning in multimedia wireless networks

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Abstract

In this paper, we propose a framework called conservative and adaptive quality of service (CAQoS) to perform the quality of service (QoS) provisioning on both real-time and non real-time traffic in the wireless network. Unlike most conventional schemes which gradually scale-down the bandwidth rates of ongoing connections to accommodate new connection/handoff requests, CAQoS introduces an early scaling-down of bandwidth for new connections based on designated provisioning model. The objectives of CAQoS are to minimize the need for frequent bandwidth reallocation and to achieve lower call blocking and handoff dropping rates, while maximizing the overall bandwidth utilization. The performance of CAQoS system is evaluated through simulations of a realistic wireless cellular-based environment. Simulation results showed that CAQoS met our objectives and outperformed the conventional schemes.

Keywords: Early bandwidth scale-down; Conservative bandwidth allocation; QoS provisioning model

1. Introduction

Bandwidth management is an important aspect of networking systems. This is particularly true in today's mobile network which is of limited bandwidth, but is used to support heterogeneous multimedia traffic. Effective and efficient bandwidth management scheme is required to perform the QoS provisioning of mobile connections. However, achieving an optimum QoS provision remains a challenge due to active user mobility, scarcity of bandwidth/resources, dynamic nature of wireless channel, and the computational complexity of the call admission control (CAC) algorithms.

One of the key mechanisms for QoS provisioning is the CAC, which manages system resources based on application QoS requirements. It plays an essential role on assuring the success of flow reservation scheme for connection handover across heterogeneous networks [1]. To maintain connections at an acceptable QoS level in a cost-effective manner, the base station/access point must meet the following requirements: (1) maximize the number of connections admitted into the network, (2) minimize the number of handoff call dropping, (3) ensure efficient bandwidth utilization, and (4) reduce the latency and overheads of both the call admission and handover computations. Most of the works in the literature [1–11,13,14] focused only on the first three requirements, and less emphasized on the admission overheads of their proposed algorithms.

The main contribution of this paper is to minimize the admission overheads of CAC (i.e. reducing the number of bandwidth reallocation of ongoing calls) as to achieve better admission and handoff rates with efficient bandwidth utilization. We believe that in an overloaded network, bandwidth reallocation will frequently be taken place (i.e. scaling-down bandwidth rate of ongoing connections) as to spare extra bandwidth for new/handoff connections. The process of checking through and revising the

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