A Novel Path Prediction Scheme to Improve Handoff efficiency in All-IP Wireless Network

Huamin Zhu, Kyungsup Kwak
Inha University
zhu@inhaian.net, kskwak@inha.ac.kr

Abstract ? **For fast handoff in all-IP wireless network, a novel scheme, based on path prediction and resource reservation, has been proposed to reduce the handoff latency by trying to eliminate the link setup time. Analytical results show that the proposed scheme offers shorter handoff delay and can improve the handoff efficiency.**

I. Introduction

It is clear that support for seamless mobility will be needed in order to provide good service quality for mobile users, particularly in pico-cellular environments where the rate of handoff and associated signaling load grows rapidly. Mobile IP [1] maintains Internet connectivity while MHs (Mobile Hosts) moving from one Internet attachment point to another. However, Mobile IP is not appropriate for seamless mobile because after each migration a local address must be obtained and communicated to a possibly distant location directory or Home Agent (HA). Micromobility protocols [2]-[5] complement Mobile IP by offering fast and seamless handoff control in limited geographical areas and IP paging in support of scalability and power conservation. These protocols have the benefit of reducing delay and packet loss during handoff, and eliminating registration between MHs and distant Home Agents (HAs) when MHs remain inside their local coverage areas. Eliminating registration in this manner is necessary for the wireless Internet to scale to support very large volumes of wireless subscribers. It is proposed in [6] that the main idea for fast handoff is to make sure that the new access router has everything ready and waiting for the MH before it arrives. In this paper, we try to achieve this purpose by path prediction and resource reservation [7].

The rest of the paper is organized as follows. In section II, network model is described for the all-IP wireless network. The proposed path prediction scheme is presented in Section III. Results are discussed in Section IV, followed by our conclusions in Section V.

II. Network Model

Our network model is on the basis of Cellular IP network [3], shown in Fig. 1.

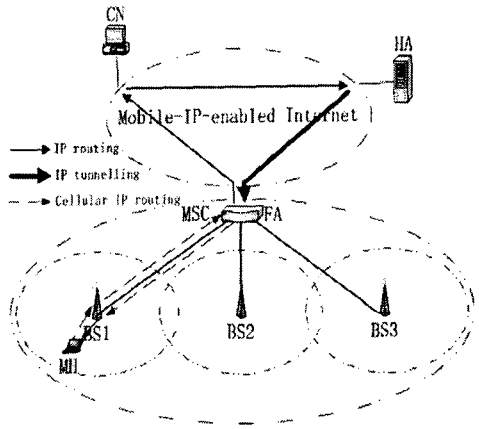

Fig. 1. The network model

This is a hierarchical network, the high layer of the network is the Mobile IP enabled Internet, and the low part is the local Cellular IP access network. In our network model, the MSC (mobile switching center) and all its BSs (base stations) form the local cellular IP access network where the MSC is the FA (foreign agent). We assume that handoff is taken in the local network in this paper. Let T_l be the handoff latency, which is the time that elapses between handoff initiation and the arrival of the first packet along the new route. We can get

$$T_l = T_{up} + T_{setup} + T_{down} \quad (1)$$

where

T_{up} : the packet transmission time from the MH to MSC

T_{setup} : the link establishment time

T_{down} : the packet transmission time from the MH to MSC