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A mobility management model based on users' mobility profiles for IPv6 networks

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Abstract

Fourth-generation (4G) mobile systems provide access to a wide range of services and enable mobile users to communicate regardless of their geographical location and their roaming characteristics. Due to the growing number of mobile users, global connectivity, and the small size of cells, one of the most critical issues pertaining to these networks is location management. In recent years, several strategies have been proposed to improve the performance of the location management procedure in 3G and 4G mobile networks. In this paper, we propose a new model called Seamless Mobile IPv6 (SMIPv6) to improve the performance of the handover component in location management schemes. This model improves handover by predicting user location based on Users' Mobility Profiles. The overall goals of SMIPv6 are to reduce both handover latency and signaling loads generated during the location update process. Simulation results show that the use of SMIPv6 produces a handover with low delay, as well as a significant drop of signaling overhead. Better results have been obtained by our protocol in all cases studied when compared to Mobile IPv6 (MIPv6) and Fast Handovers for MIPv6 (FMIPv6).

Keywords: Mobile IP; Handover; Mobility management; Profile-based location; 4G

1. Introduction

Cellular mobile networks have been evolving rapidly in the past few years. While the industry upgrades its 2G or 2.5G networks to 3G technology, the research community is already looking into fourth-generation networks and its intricacies. Each generation of networks brings in a wealth of solutions, technologies, and a number of new problems and research challenges. Third-generation (3G) mobile systems are designed to support high-speed multimedia traffics including data and voice, while fourth-generation (4G) networks will bring wireless systems to the All-IP Net-era. All-IP networks are networks that apply the IP technology end-to-end, from the mobile user to the gateway that connects it to the Internet. IPv6, the latest generation of the Internet Protocol, will be the glue that interconnects this heterogeneous world.

The latest trend in communications offers roaming capabilities through different access network while providing continuous data and voice services. Internet mobility support is more crucial now than ever before since many new mobile terminals (PDAs, cell phones, etc.) provide access to several types of IP networks (GPRS/WAP). The advent of UMTS and the various multimedia services it supports implies that user mobility must not only be supported but also well managed.

From a topological viewpoint, a Mobile Node (MN) moving from its current location to another one translates in a change of its point of connection. It is neither wise nor feasible to ask a mobile user to change its IP address each time he changes location. Moreover, networks must guarantee service and communication continuity while users roam within and between networks. Thus, a network's main goal is to provide MNs routing and mobility

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