On the performance of IP micro mobility protocols

Alexandrosz Burulitisz, Róbert Maka, Balázs Rózsás, Sándor Szabó, and Sándor Imre

Due to the growing number of mobile communication systems, there is a demand for IP-based mobile networks [1]. Mobile IP provides mobility support in IP-based networks, but in wireless environment new architecture is needed to support the fast and frequent handovers. The idea of mobile IP is based on the home agent - foreign agent model, where the home agent forwards the packets, addressed to the given mobile computer, to the foreign agent that delivers them to the mobile. Registration at the home agent costs a lot of time, if the mobile is far away from its home network. In mobile networks with small cell sizes, the frequent handovers trigger frequent reregistrations and can lead to frequent disconnection. Micro mobility protocols are the solutions for this problem [2]. These protocols improve the performance of mobile IP by hiding user movement inside a well-defined area. There are several solutions to handle this problem, for example Cellular IP and HAWAII and HMIP [3,4]. At present time there is no standard for micro mobility protocol, that is why the investigation and comparison of the performance of the different proposals is important. We have analyzed and compared the performance of three micro mobility protocols. We gave a theoretical model for performance evaluation of HAWAII, CIP and HMIP protocol based network, and we gave analytical results on the number of the protocol messages and other traffic parameters (e.g. delay time). Besides the mathematical calculation, we analyzed the performance of these protocols - in the function of the number of mobile users, the coverage area of a domain, etc. - using the NS simulator with the Columbia IP Micro-Mobility Suite extension. In this article we present our results on analyzing the IPv4 micro mobility protocols. The monitored parameters of a test network were the mobility related protocol messages, successful handovers and delay. Some analytical results (the number of administrative messages in the function of number of terminals) can be seen in figure 1, and the verification by the NS simulator program is depicted in figure 2.

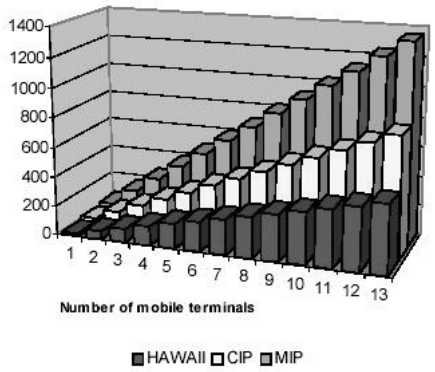

Figure 1. Analytical results

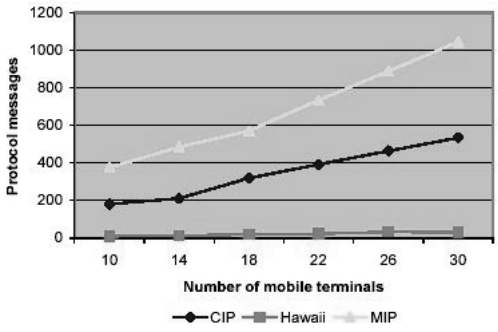

Figure 2. Simulation results

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