On the Capacity of IP Micromobility Domains

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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 fast and frequent handovers. The idea of mobile IP is based on an entity called home agent, which forwards the packets addressed to the given mobile computer being in a foreign network. 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 re-registrations 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 HMIPv6 [3],[4]. For packet delivery they usually use a tree topology of routers.

Mobile users moving in large groups can overload certain parts of the network. Whenever a router receives too many packets it will drop the packets above its capacity. The principal idea of our solution is to use also the less loaded routers of the domain in the case of congestion. To achieve this, we add alternative routes (additional links) to the micromobility domain's router tree (can be seen in Figure 1). These links mean additional connections beside the branches of the tree. The advantage of this solution is the effective utilization of network resources and we can serve the same number of users with less of the link's capacity. We analyzed the performance of these protocols - in function of the number of mobile users, the speed of mobiles - using the OMNET++ simulator.

OMNeT++ [5] is a discrete event simulation system. Using this simulation we compared our method and the basic Cellular IP protocol. In our presentation the results will be shown as well as the structure and some design principles of our suite. Our future plans are the further development of the simulation and also give some analytical results on the effectiveness of our method.

References

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