An Approach to Improve the Radio Channel Bandwidth in Hierarchical Mobile IP Networks (HMIPv6-BI)

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Abstract:
We present a new method to improve the bandwidth of HMIPv6 networks called HMIPv6-BI. This approach proposes a modification to the Hierarchical Mobile IPv6 protocol. The goal of HMIPv6-BI is to minimize the Bandwidth usage of the Radio Link between the Access Router (AR) and the Mobile Node (MN). Currently, in HMIPv6 a tunnel is established between the Mobility Anchor Point (MAP) and the MN. By contrast, the principle used by HMIPv6-BI is to move the Tunnel End Point until the AR. In consequence, this method decreases the number of bytes traveling over the wireless interface due to the absence of the tunnel headers required in the original approach. Furthermore, HMIPv6-BI allows the usage of Multicast Tunnel (this approach is named TMCast+HMIPv6-BI) in order to reduce the Handover Latency. Finally, modeling and simulation results indicate that HMIPv6-BI provides better performance as compared to the standard approach.

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I. Introduction

Next generation networks will be based on the IPv6 protocol [1]. Currently, there are two protocols for mobile management. These are called MIPv6 [2] and HMIPv6 [3], and they are the most accepted solutions for resolving the macromobility and micromobility problems. Currently big efforts are being performed on improving several HMIPv6 protocol characteristics. Some of them are Handover Latency reduction and other QoS parameters over internet connections. For example, in [4] a robust mechanism for Hierarchical Mobile IPv6 is proposed, which, by means of a MAPs distributed environment, aims to improve the availability and performance parameters of mobile networks when MAP faults occur. Another proposal (given in [5]) is analyzing QoS in HMIPv6 networks for video transmission. In [6] an improvement for the Fast Handover protocol in HMIPv6 networks is proposed, in order to significantly reduce the delay and Handover Latency of mobile nodes. In [7], HMIPv6 is extended to support multicast sources and receivers. Another proposal is described in [8], which uses explicit multicast called Xcast, to improve deficiencies in the Mobile IP networks (v4 and v6). Xcast is applied in HMIPv6 networks in order to reach efficient routing during the Handover. On the other hand, [9] and [10] propose a scheme where the multicast routing is applied to sending data packets from the Correspondent Node to the IPv6 mobile nodes.

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