Abstract

The convergence of heterogeneous (different) wireless networks combines existing wireless networks. An effective combination of different wireless networks should enable them to complement each other and provide high-speed data rate, wide area coverage, and quality of service (QoS) guarantee.

In Next Generation Wireless Systems (NGWS), seamless handover between different wireless access networks plays a vital role which represents the transfer of an ongoing call from the current cell to the next adjacent cell as the mobile moves through the coverage area. Usually handover calls are given higher priority than new calls since it has a significant impact on the network performance. One of the major challenges for seamless mobility is the creation of a vertical handover protocol: a handover protocol for users that move between different types of networks.

One of the most important issues of the vertical handover problem is the strategic that helps to decide when to perform the handover between different wireless networks that are available in the environment. A decision for vertical handover may depend on several issues related to the current network that the mobile node is already connected to and the network that it is going to handover. Vertical handover decision involves a tradeoff among many handover metrics, such as: 1) Network conditions, 2) System performance, 3) Application types, 4) Power requirements, 5) Mobile node conditions, 6) User preferences, 7) Security, and 8) Cost.

In this thesis, the performance of vertical handover is studied using the integration of third generation (3G) cellular and wireless local area

networks (WLAN) as an example. Internetworking 3G technologies with wireless LAN technologies is an emerging trend in the wireless domain. Its development was aimed at increasing the 3G network's capacity and optimizing performance. In this handover process, WLAN network should be given high priority.

There are several handover initiation strategies, in this thesis the effect of application-based signal strength threshold (ASST) and path loss exponent on an adaptive lifetime-based vertical handover (ALIVE-HO) strategy is studied in terms of 1) Number of handovers, 2) Aggregated throughput, and 3) Packet delay. Therefore the vertical handover performance can be optimized in wireless and mobile networks. The thesis presents an analytical framework to evaluate the converged system performance, and a simulation model is developed to evaluate the performance of the vertical handover algorithm using MATLAB.

The present work is done for different channel conditions as well as different mobility schemes. The obtained Results show the effect of 1) Mobility rate, 2) ASST value, 3) and path loss exponent value on the number of handovers, the aggregated throughput, and the packet delay.