CHAPTER 1

INTRODUCTION

1.1 Background

A heterogeneous wireless network is an envisioned wireless system also called beyond third generation (B3G) or fourth generation (4G) system which is expected to integrate multiple wireless access networks over a common IP platform [6]. Networks such as wireless local area networks (WLAN/Wi-Fi), 2G/3G cellular networks (GSM/UMTS), wireless metropolitan area networks (WMAN/WiMAX), etc., tend to be integrated in the coming years allowing the best connectivity to users anywhere at any time. Furthermore, new mobile devices such as notebooks, smart phones, tablets, etc., allow users to switch between different wireless access technologies. This important mobility process is known as vertical handoff. Over the last few years, plenty of research efforts have been focused on this challenging mobility process in heterogeneous wireless systems [7].

The vertical handoff process can be divided into three main steps, namely: system discovery, handoff decision, and handoff execution. During the system discovery step, the mobile devices equipped with multiple interfaces have to determine which wireless networks can be used and the communication services available in each network [16]. These wireless networks may also advertise the supported data rates for different services as well as other relevant information. During the handoff decision step, the mobile device determines which network it should connect to. The decision may depend on various parameters including the available bandwidth, packet delay, packet jitter, access, cost, transmit power, battery status, and even the user's preferences. Finally, during the handoff execution step, the connection needs to be re-routed from the existing network in use to the

authentication and authorization of the user in the new network as well as the transfer of user's context information.

There are several parameters that can be considered for the vertical handoff decision .The quality of service (QoS) parameters of a particular connection such as bandwidth or delay bounds are usually specified by the applications. The level of security and amount of cost may be directly specified by the user itself. All this parameters are gathered by the mobile device during the system discovery step. The vertical handoff decision becomes a complex decision problem which requires considering multiple parameters.

1.2 Problem Statement

Uncontrollable development of wireless and mobile communication technology aims to provide the seamless continuous connection to access various wireless technologies and to maintain this connection with the best quality of service (QoS).

1.3 Proposed Solution

To achieve this goal for a mobile terminal (MT) when moving from one network to another, it is necessary to have a good decision making algorithm which decides whether this user need to move from one network to another and decides the best QoS for its service.

1.4 Methodology

In heterogeneous networks, Vertical handover can be initiated for convenience rather than connectivity reasons. A decision algorithm gives a better performance when several parameters are considered, more so when a combination of static and dynamic parameters are considered. But the trade off is with the increase in decision time and complexity of the algorithm. The decision may depend on various groups of parameters such as,

- Network- Related Parameters - Bandwidth, Latency, RSS, SINR, Cost, Security ...etc.
- Terminal Related Parameters - Velocity, Battery power, Location Information ...etc.
- User-Related Parameters - user profile and preferences

In this thesis the Received signal strength (RSS) and Signal to interference and noise ratio (SINR) parameters are used to perform the decision making. Matlab software was used to simulate the vertical handover between heterogeneous networks using two classes of calls.

1.5 Thesis Outline

This thesis consists of five chapters described as follow;

Chapter two: presents the related work and the literature review of vertical handover decision making.

Chapter three: presents the different vertical handover decision parameters and the classification of vertical handover decision algorithm.

Chapter four: Provides the Results and Discussions.

Chapter five: presents the conclusion and recommendation for future work.