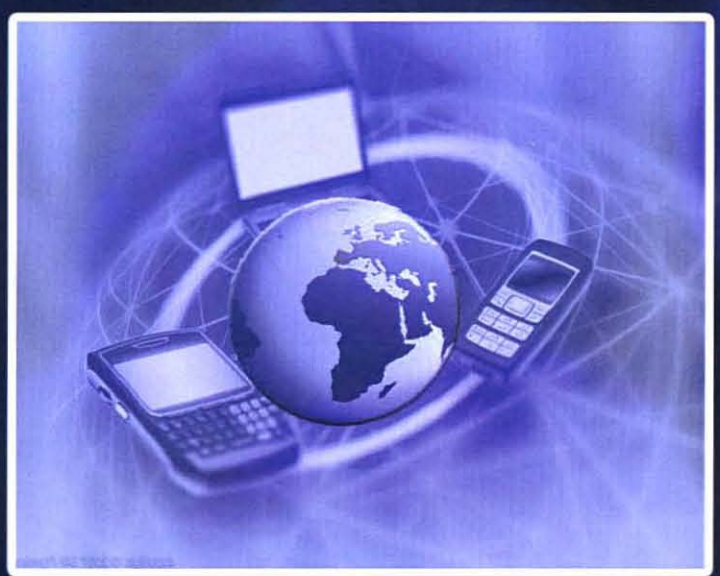
Research Issues in Wireless

Communications and Networking

Farhat Anwar
Wajdi Al-Khateeb



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CHAPTER 17

SEAMLESS CONVERGENCE OF WIFI/WIMAX

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17.1 INTRODUCTION

The next generation of the wireless networks will consist of several overlapping tiers. Provision of undisrupted communication to mobile users is a challenging task. Handover delay is one of the problematic issues that users are faced in the heterogeneous networks. However, in the case of both the WiMAX and the WiFi technologies which are located at the same base station (BS), the vertical handover (VHO) delay will be less as compared with the two conventional WiMAX/WiFi heterogeneous networks with two different wireless Internet service providers (WISP). Nevertheless, protocol conversion is still adding delay and jitter for data exchange between the needed two technologies. In this chapter, In order to reduce the delay in the protocol conversion, a new industrial design for WiWi (WiMAX and WiFi) adaptation layer is proposed. The realization of the interworking between these two standards is discussed and evaluated. The results show that the proposed scheme -with the scenario under study- has better performance than other related works.

By distributing a high-speed Internet access from cable, Digital Subscriber Line (DSL), and other fixed broadband connections within the wireless hotspots, WiFi has dramatically increased productivity and convenience. Today, there are nearly pervasive WiFi that delivers the high-speed Wireless Local Area Network (WLAN) connectivity to millions of offices, homes, and public locations, such as hotels, cafés, and airports. The integration of WiFi into notebooks, handhelds and Consumer Electronics (CE) devices has accelerated the adoption of WiFi to the point where it is nearly a default feature in these devices [1].

On the other hand, the WiMAX takes wireless Internet access to the next level, and over time, could achieve similar rates to devices as WiFi. WiMAX can deliver Internet access miles from the nearest WiFi hotspot and blanket large areas called wide area networks (WANs), be they metropolitan, suburban, or rural with multi-megabit per second mobile broadband Internet access [2]. Although the wide area Internet connectivity offered by 2.5 and 3G cellular data services are mobile, these services do not provide the broadband speeds to which users have become accustomed whereas WiMAX can deliver these services. In the last few years, WiMAX has established its relevance as an alternative to wired DSL and cable, providing a competitive broadband service that can be rapidly and cost effectively deployed.

Together, the WiMAX and the WiFi are ideal partners for service providers to deliver convenient and affordable mobile broadband Internet services in more places. Both are open IEEE wireless standards built from the ground up for Internet Protocol (IP)-based applications and services. IEEE 802.11 has accelerated the network deployment for providing high transmission rate in limited geographical coverage, while IEEE 802.16 offers more flexibility while maintaining the technology data rate and transmission range [3]. The limited coverage range of WiFi makes it difficult to meet the future ubiquitous networks need while IEEE 802.16 can provide the high speed Internet access in a wide area. A natural trend is the combination of the IEEE 802.16