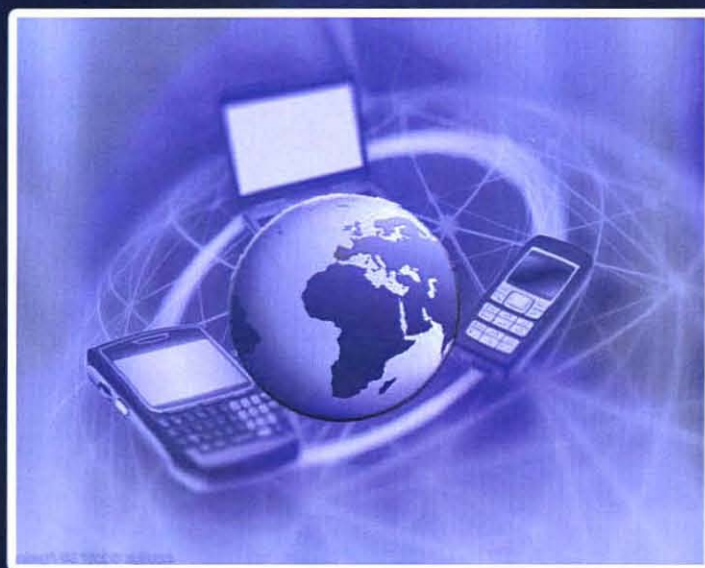


Research Issues in Wireless

Communications and Networking

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Wajdi Al-Khateeb



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CHAPTER 31

ENHANCEMENT OF VOIP AND VIDEO STREAMING PERFORMANCE OVER IEEE802.11E WLAN

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31.1 INTRODUCTION

There are various versions of IEEE802.11 WLAN in the market, and each applies different modulation technique and operates in different frequency bands. For example, the IEEE 802.11b version provides data rates up to 11 Mb/s on the wireless medium, applying complementary code keying (CCK) and direct sequence spread spectrum (DSSS) as modulation technique. It operates in the industrial, scientific, and medical (ISM) band at 2.4 GHz. On the other hand, the IEEE 802.11a version operates in the unlicensed 5 GHz band, and provides data rates up to 54 Mb/s on the wireless medium, applying the multicarrier technique orthogonal frequency-division multiplexing (OFDM) as the modulation technique [1]. The 802.11g version applies the same multicarrier modulation technique as 802.11a, but operates in the 2.4 GHz ISM band like 802.11b. However, due to channel conditions and protocol overhead, the maximum achievable throughput on the MAC layer is less than the data rate available on the wireless medium for the mentioned IEEE 802.11 versions [2].

To date, 802.11 WLAN can be considered as a wireless version of Ethernet supporting best effort service (e.g., mail, browsing ... etc). However, the need of wireless networks that support quality of service (QoS) has recently grown. In addition, the increasing needs of transmitting voice, video, and other multimedia applications with high-speed Internet access over WLANS made it necessary to have such networks. Relatively, the idea of enhancing the 802.11 MAC protocols and upcoming with the 802.11e (QoS enabled version of IEEE 802.11) was initiated. 802.11e adds QoS features and multimedia applications support to the existing 802.11b and 802.11a wireless standards, while maintaining full backward compatibility with these standards [3].

As the raw data rate at the physical (PHY) layer of IEEE 802.11 standard is now up to 54 Mbps, applications such as VoIP over WLAN and video streaming become feasible. However, the MAC protocol in the original 802.11 standard was designed with best-effort applications in mind and thus cannot meet the basic quality of service QoS requirements for these emerging applications. To address this issue, the IEEE 802.11e working group was established to strengthen QoS support at the MAC layer. Although the IEEE 802.11e has not been finally ratified, it has already received much attention from the research community.

IEEE 802.11e provides a channel access function, called Enhanced Distributed Channel Access (EDCA). It also provides a controlled medium access function, referred to as Hybrid Coordination Function Controlled Channel Access (HCCA), support applications with QoS requirements [4].